Replacement Value of Urea Treated Corn with Cobs for Concentrate Feed Mixture in Pregnant Ewes Rations

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Abstract: Two trials were carried out to evaluate the effect of feeding urea treated corn with cobs (UCC) as 50% (T2) or total replacement (T3) of pelleted concentrate feed mixture (CFM) compared to the conventional diets (CFM) on its production and reproduction performance. Rice straw was offered separately from the concentrate. Evaluation criteria included DM intake and utilization, ruminal fermentation characteristics, milk yield, birth, weaning and marketing weight and feed efficiency. In the first trial, 27 Ossimi, ewes beginning 45 days before expected day of lambing were assigned to the control, T2 and T3 diets. The milk was measured on day 14 post partum and once every week up to the 12th week. The growth experimental periods were 137 day in duration using 15 weaned lambs. The selected lambs were allocated to the same three. In digestibility trial, 9 adult rams were allocated to three tested diets. In vivo digestibility, nutrients digestibility were different among diets. Feeding values (TDN) was greater for T3 followed by control diet whereas the highest DCP was recorded for T2. Feeding UCC had no effect on ruminal parameter in terms of pH, NH3 and total FVA`s across the sampling time except for NH3-N. The replacement of CFM by UCC resulted in insignificant higher ($p \leq 0.05$) lambs birth weight T3 (3.44 kg) but lower milk yield T3 (436 g /day). The lower birth weight lambs control group ($p \leq 0.05$) tended to grow faster and perform higher weaning as compared to the treated group. In growth trail, feeding UCC diets reduced ADG approximately 10% compared to control. The results indicated that DM, TDN and DCP needed produce 1 kg gain almost 5 to 10% better than the corresponding items from T2 and T3. Replacement of CFM in pregnant and growing lamps rations with UCC would be cost effective as cost UCC is only at 60% less than cost of CFM. [Journal of American Science 2010;6(6):166-178]. (ISSN: 1545-1003).

Keyword: Sheep**,** feed**,** urea treated Corn-cobs**,** digestibility, nutritive value, growth, milk yield, performance.

1. Introduction

Sheep populations in Egypt are almost 5 million, (MOA 2005). During the last two decade the importance of sheep production as a source of animal protein in Egypt has been increased. Meanwhile, the mutton price has also increased. In fact, the small ruminants are mainly associated with small farmers. Therefore there is need to research and develop stall-feeding systems for small ruminants based on crop by-products.

In Egypt, maize for grain is planted on approximately 1.68 million feddan producing 5.8 million metric tons averaged 3.47 ton per feddan**)**. Importation is 4.7 million tons. Almost 70% home production whole-crop maize is utilized by ruminants (MOA 2005). Cobs (as residues) were estimated to about 1.7 million tones (represent 25% of ear corn).

A major constraint facing livestock development is the lack of adequate supplies of feedstuffs at economic prices. Feeds represent the greatest proportional cost in livestock production and its availability is affected by seasonal variation in feed quantity and quality which causes fluctuations in animal nutrition and productivity throughout the year in particular during the summer season. Moreover, soybean meal and cottonseed meal are two important sources of protein used extensively in Egypt to feed ruminants and represent the most expensive ingredients in ruminant rations. There are large quantities of maize cobs which could be fed to ruminants instead of being wasted. Collection of maize cobs is easier than that of maize stalk which is left in the field where the maize is harvested while the cobs are gathered before dehusking and shelling.

In order to improve the low quality byproducts the most pragmatic and UCCeptable is chemical treatment. This treatment disrupts the cell wall by solubilizing hemi cellulose, lignin and silica, hydrolyzing uronic acid and acetic acid esters and swelling cellulose (Jackson 1977). The use of urea or ammonia to upgrade straws and other low quality has been world wide spread in the last three decades. Urea, the most commonly used an inexpensive NPN source are an attractive protein replacement compared with nowadays tremendously expensive natural proteins (Oji` *et al* 2007) stated that fertilizer grade urea can be used to improve the nutritional value of maize residues for small ruminant feeding during off season periods.

On the other hand, the relationship of birth weight to weaning and weans weight to slaughter weight is economically very important in lamb production and is affected by genetic, physiological and feeding of ewes and fetal growth affect by feeding her mother during pregnancy stage (Wu.G 2006).

The experiments reported here studied the possibility of replacing concentrate feed mixture (CFM) in diets of pregnant ewes and growing lambs with ammonia treated corn with cobs**.**

2. Material and Methods:

The present work conducted at sedes Experimental Station and By-Product Utilization Department , Animal Production Research Institute (APRI) to study the effect of including urea treated corn with cobs in small ruminant diets on performance of Ossimi ewes (lactation and new born lambs performance) and considering a simple economical evaluation of urea treated corn with cobs supplemented rations . Nutrients in the CFM, UCC and RS were chemically measured before formulating the experimental rations.

Ewes feeding trails:

Twenty seven pregnant Ossimi ewes were selected 2-3 years old averaged 50.0 kg live body weight (LBW) in the last six week of gestation. The selected animals divided based on their live weight into three similar groups 9 ewes each and randomly allocated to diets of either control, T2 and T3.

Animals were group-housed and the diets were offered in two portions at 8 am and 16 pm and had free UCCess to water. Animals were weighed at the beginning and at the end of the trial. The animals were healthy during the experimental period.

Survival rate:

Live lambs per born lambs and live lambs per ewe were determined after parturition and 30, 60 and 84 days after lambing.

Milk recording:

The 24-h milk production of each ewe was measured on d 14 (2weeks post partum) and once every week by hand milking throughout a 70-d of lactation period at 7-d intervals. On the day of parturition, ewes and lambs were weighed. Lambs were weaned at 84 d of age and both the ewe and lambs were weighed at this time. Milk production was measured using procedures described Rusev and lazarov,(1967) and Farage,(1979). UCCording to this methods the ewes have been milked twice daily by milking one teat while the lamb suckle the other one. The morning and evening milked yield multiplied by 2 to calculate the daily output. The weight of the collected milk was recorded and used to determine 24-h milk production. Total milk production for each ewe was calculated as the sum of milk produced on each day of milking.

Digestibility trials:

The metabolism trial included 9, each lamb was placed in a separate metabolism cage designed to collect with a 2 wk adjustment period and a 7 days collection period. Three rams were randomly assigned to each of the same ration as in feeding trial. Feeds offered, output of feces was recorded daily during the last 7 days of the collection period. Fecal trays were placed for total fecal collection during the 7 days collection period. Feed was offered twice daily and water was refreshed at 0700 and 01500. Fecal output was weighed, sub sampled (10% of wet weight), and composted across 7days within lamb for each period. Samples were stored frozen (– 20°C) until dried in a forced-air oven for 48 h. The collections were made concurrently with the meals. Samples of feed were taken daily at 10% of the total offered and the residues were collected. A sub-sample (20%) of feces was composed, kept each day in plastic bags in the freezer (-20 °C) until the end of the experiment. Feed ingredients and dried feces were ground to pass a 1-mm screen in a hammer mill before analysis. The following chemical analyses were determined: dry matter (DM), Crude protein (CP), Crude fiber (CF), Ether Extract (EE), Ash and Nitrogen Free Extract (NFE) UCCording to AOAC (1990). The feed offered to each ram during the preliminary and collection period was set to 90% of average feed intake during the second week of the adjustment period. There were no feed refusals during the 7-d collection period.

Weaning weight:

The born lambs were weighed every two weeks up to the 84th days of age.

Growth trial:

The growth of 15 weaned lambs 84 days old was evaluated for 137days. The lambs were divided into 3 equal groups five each group with initial body weight 19.06, 18.87 and 19.18 kg given UCCess to the tested diets for control, T2 and T3, respectively similar to those used in ewes trial. Lambs were fed at 0700 and 01500 daily and the basal diet (CFM and UCC) and RS were offered separately at each feeding and were allowed free UCCess to lick mineral blocks and water. Animal weights were recorded at the beginning and in 15dayes interval throughout the 137 days growth period. To minimize variation due to drinking, feeding, and defecation, lambs were weighed full on the morning of the first day of the experiment and every 15 days before morning replenishment of feed.

The amount of feed provided for the late-gestation and lactating ewes was based on the guidelines put forth (APRI) to be applied y the experimental stations and was determined for per group based on BW measured biweekly. The standard practice for the sheep flock at the Animal production research institute to feed adult, no lactating, no pregnant ewes in confinement a maintenance ration of 2% of BW/d. During the ewes and growth trials the basal levels were adjusted so that diets were completely consumed each day; orts consisted solely of straw.

Rumen fluid:

Approximately 15 ml of ruminal fluid was collected using ruminal tube, and pH was measured immediately using a portable pH meter. Ruminal fluid samples representing 0, 3 and 6 h after feeding.
Ruminal parameter (pH, ammonia nitrogen and VFA's)
Ruminal kinetics (pH, Ammonia nitrogen and VFA's) were determined using liquor collected by rumen tube via esophagus three times before morning feeding (zero time, 3 and 6 hrs after feeding)
This ruminal fluid sample (15 ml) was acidified with 1.0 ml of 6 N H_2SO_4 and frozen (-10°C) ; this sample was later thawed at room temperature, centrifuged at 10,000 x g for 10 min, and a portion of the supernatant was analyzed for NH_3- N UCCording to Broderick and Kang (1980). The resulting NH_3 concentrations were converted to NH_3 - N. for statistical analysis, and NH_3 - N concentrations are reported in. Total VFA's concentrations were determined using.

The data were statistically analyzed using GLM produces of SAS (1990). Duncan's test (1955) was applied in experiment whenever to test differences.

The following model was used:

$Y_{ij} = \mu + Ti + e_{ij}$
Where : Y_{ij} = observed trait,
μ = overall mean,
Ti = effect of treatment,
e_{ij} = random error.

3. Results

Chemical Composition

The analyzed composition of dietary ingredients is reported in Table (1). The concentrate feed mixture (CFM) contained 87.11 OM, 14.04% CP, 18.95% CF, and 2.46.0% EE (DM basis). Treated Corn with cobs averaged 98.24%OM, 13.99% CP, 17.10% CF and 4.16% EE, and rice straw 81.5% OM, 3.92% CP, 35.24% CF and 0.46% EE on DM basis.

Urea treatment was effective in upgrading the nutritional value of corn with cobs. Treated corn with cobs had higher (N x 6.25) 13.99% as compared to7.59 to for untreated represent 85% increment. Meantime, ether extract and ash content decreased from 5.60 and 2.27 to 4.16 and 1.76% respectively (Table 1). The moisture content of the treated corn with cobs upon opening the stack was approximately 27% reduced to 14.85% after exposing to air for 24 hrs.

The formulated tested diets were isonitrogenous (almost 10% CP) containing 0.00, 16.86 and 32.4 gram nitrogen (NPN) originated from urea treated corn with cobs for control, T2 and T3, respectively. These values represent 19.2 and 38.5% for the total nitrogen for T2 and T3, respectively.

Digestibility trial

Data presented in (Table 2) revealed that the intake from the concentrate (CFM and / or UCC) for T2 and T3 during the digestibility trial was 3 and 7% lower as compared to the control ration. Also, there was tendency for straw intake to decrease (20 and 27%) by feeding 50% and 100% urea treated corn with cobs, respectively. These together resulted in 10 and 15% decrease in the total dry matter intake for T2 and T3, respectively. There was slight difference (3 and 6% lower for T2 and T3, respectively as compared to control) regarding the DMI of straw among the three groups. The fecal nitrogen excretion was 6.2, 6.8 and 5.3 g/d/h represent 38, 44 and 39% from the N intake for control, T2 and T3, respectively. The almost similar percentage of digested N retained (as percentage of intake) for control and 100% UCC group revealed that NPN urea source has no effect N efficiency.

The apparent digestibility coefficients are presented in (Table 2). Highest DM and OM digestibility (69.67 and 71.96%) were recorded for the control ration being 9% and 6% and 7 and 3% higher than T2 and T3, respectively. Crude protein exhibited almost similar digestibility for control and 100%UCC diet (61.42 and 60.60%, respectively) being 8% lower than 50% UCC group. The digestibility for crude fiber ranged between 69.94% (control) and 53.05 for T3. The CF in control diet was highly digestible (16 and 32%) than T2 and T3, respectively. control group. The EE digestibility for T3 was 9 and 5% higher than the values recorded for T1 and T2, respectively. The values for NFE showed similar coefficients for control and T3 diets being 7% higher than T2.

Table (1): Chemical composition of experimental concentrate feed mixture, rice straw, urea treated corn cobs with corn cobs

Item	Moisture %	DM composition					
		OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture CFM	8.45	87.11	14.04	18.95	2.46	51.66	12.89
Rice straw RS	7.85	81.50	3.92	35.24	0.46	41.88	18.50
Urea treated corn cobs UCC	14.85	98.24	13.99	7.71	4.16	72.38	1.76
Corn cobs CC	9.75	97.73	7.59	7.70	5.60	76.84	2.27

CFM : 26%, undecortecated cotton seed meal , 44% wheat bran, 19% yellow corn, 5% rice bran, 1% salt mixture, 2% lime stone and 3% molasses.

Table (2): Dry matter intake, nutrient digestibility and nutritive values of different experimental diets.

Item	Experimental Diets			
	T1	T2 50 %UCC	T3 100%UCC	±SE
Animal weight , kg	40.50	39.51	38.18	±4.90
CFM	0.916	0.458	----	…..
UCC	------	0.426	0.852	……
RS	0. 627	0. 507	0.461	±2.42
Total DMI kg /head /day	1.543	1.391	1.313	±1.26
Nutrient Digestibility %				
DM	69.76 [a]	63.72 [b]	65.92 [b]	±0.61
OM	71.96	67.23	69.88	±0.68
CP	61.41 [b]	66.09 [a]	60.60 [b]	±0.39
CF	69.94 [a]	60.28 [b]	53.05 [c]	±1.42
EE	77.46 [b]	79..90 [b]	85.10 [a]	±1.26
NFE	75.06	69.93	76.37	±1.21
Nutrient Values				
TDN	62.78	60.81	64.92	± 0.25
DCP	6.12	6.46	5.80	±0.22
TDN intake g/h/day	968	846	852	±2.44
DCP intake g/h/day	94 [a]	90 [a]	76 [b]	±0.03

[a, b, c] Means in the some row having different superscripts are significantly different at, ($p< 0.05$).

Rumen fluid parameter:

Rumen pH values at zero time ranged between 7.42 and 7.43 (Table 3)and tended to slightly increase 3h after feeding to7.5, 7.7 and rose by 6 h to 7.9, 8.0 and 8.0 for T1, T2 and T3, respectively. This result revealed that the rumen pH values are not affected by the source of nitrogen.

Ruminal ammonia concentration was 16.4, 13.6 and 15 (mg/100 ml) for control, T2 and T3 at zero time tended to increase up to 22.9, 23.5 and 23.6 at 3 hrs after feeding (Table 3). At 6 hrs after feeding the concentration showed remarkable decrease up to 13.3, 9.5 and 11.5 for control, T2 and T3, respectively. The control group presented higher ammonia concentration compare to the treated group. Statistically, the differences were significant ($P < 0.05$) at 6 h.

Total VFA concentration in ruminal fluid (Table 3) was lower in the control ration at zero time being 6.07 as compared to T2 and T3 (7.26 and 7.34 respectively). Meanwhile, it tended to be greater up to 11.3 at 6h after feeding as compared to 10.7 and 10.80 for T2 and T3, respectively.

Statistically, neither pH nor total VFA concentration significantly differed among diets while ammonia concentration only displayed a weak tendency towards reduction with the 50% UCC (T2) diet.

Table (3): Rumen fluid parameter of lambs fed the experimental diets

Item		Experimental Diets			±SE
		T1 CFM	T2 50 %UCC	T3 100 %UCC	
pH	hrs				
	0	7.42	7.43	7.42	±0.06
	3	7.54	7.68	7.70	±0.07
	6	7.92	8.04	7.99	±0.05
Overall mean		7.63	7.72	7.70	±0.11
NH3-N(mg/dl)	hrs				
	0	16.36 [a]	13.58 [b]	14.95 [a]	±1.10
	3	22.87	23.53	23.64	±0.20
	6	13.27 [a]	9.53 [b]	11.50 [a]	±0.49
Overall mean		17.50	15.55	16.70	±1.11
VFA`s (meq / dl)	hrs				
	0	6.07	7.26	7.34	±0.75
	3	10.25	8.91	9.70	±0.65
	6	11.30	10.70	10.80	±0.12
Overall mean		9.21	8.96	9.34	±0.42

[a , b, c] Means in the some row having different superscripts are significantly different at (P< 0.05).

Ewes feeding trial and milk yield:

Data presented in (Table 4) showed that intake from control ration and T2 were almost similar being 720 and 702 concentrate and 480 and 470g rice straw, respectively. The T3 ration presented much lower intake 677 and 451g concentrate and rice straw, respectively.

The calculated feeding values in terms of TDN and DCP resulted for the digestibility trial (Table 2) showed that feeding 100% UCC plus RS increased TDN content (64.90) by 3 and 7% compared with the control (62.78) and T2 (60.81), respectively. On the other hand, DCP for the same diet (5.80) was 5 and 10% lower than T1 and T2, respectively. However, feed intakes for the selected late pregnant ewes were in the range 3 and 3.2% of body weight indicating that the diets were palatable.

UCCording to the feeding values (in terms of TDN and DCP) of the tested diets extracted from the digestibility trial (Table2), the TDN intake for control group (968 g/h/d) was approximately 15% higher than the T2 and T3 groups, respectively. Corresponding values for DCP intake (94.4 g/h/d) was 5 and 24% higher for control group than T2 (89.9 g/h/d) and T3 76.2 g/h/d).

Milk yield:

Over the 70 - d lactation (begin from the third week post partum) , average estimated (7 days interval) milk production for the nine selected ewes rearing single lambs (Table 4) was 527, 497 and 436 g/h/d, for the control, T2 and T3, respectively.

The differences between control group and 50% UCC group were reduced by mid and late lactation. In fact, average estimated milk production in the first month of lactation for control group was slightly (almost 5%) higher than the other two tested groups. The level of milk production was declining and continued to decline after d 49.

Table (4): Ewes feeding and milk yield

Item	Experimental groups			
	T1 CFM	T2 50 %UCC	T3 100 %UCC	±SE
Ewes feeding g / h / d :				
Concentrate	720	702	677	14.69
Rice straw (RS)	480	470	451	16.36
Total dry matter intake (DMI)	1200	1172	1128	14.17
Average milk yield g/h /d	527	497	436	3.20

[a, b,c] Means in the some row having different superscripts are significantly different at (p< 0.05).

Survival rates

Lambs survival rates normally derived from the number of lambs/ewe present at 4 stages: born alive, 30 days after birth, from 30 up to 60 and end weaning (84 day). UCCording to the results obtained in this study (Table 5) lambs mortality rates for T1, T2 and T3 were 18.2, 0.0 and 11.1 % for the first stage, respectively, being nil for the other stages for the three groups.

Table (5): Effect of feeding the experimental diets on lambs survival rate %.

Item	Experimental groups			
	T1 CFM	T2 50 %UCC	T3 100 %UCC	±SE
At first day	81-------82	100.00	88--------89	--------
Form day 1 up to 30	81------82	100.00	88-------89	-------
Form day 30 up to 60	81------82	100.00	88--------89	--------
Form day 60 up to 90	81-----82	100.00	88-------89	--------
Lambs survived at weaning per 100.00 ewes	100.00	111.1	88-------89	--------

Growth trial - Lambs performance

Weaning period

Although lambs born from ewes fed on the control ration were significantly light in weight (2.48 kg/h) than those on tested rations (3.17 and 3.44 kg /h for T2 and T3, respectively) , it tended to grow faster than those suckled from ewes fed on T2 and T3 rations and had higher daily gain and weaning body weight of 18.13kg compared to 18.08 and 17.63kg for T2 and T3 (Table 6). Mean daily live weight gain (from birth up to weaning, 84 days) for the control and treatment groups T2 and T3 were found to be 172, 164 and 156 g, respectively. However, the differences were not significant.

Respective to the effect of sex on birth weight and daily gain up to weaning, regardless from the different treatments, born male lambs showed higher average birth weight for the three groups (3.80 kg) and lower average daily gain 156.04g/h as compared to female born lambs 3.08 kg and 155.8g/h, respectively).

Table (6): Average total weight gain for male and female lambs and some reproductive performance of ewes.

Item	Experimental groups					
	(T1) CFM		(T2) 50 %UCC		(T3) 100 %UCC	
	♂	♀	♂	♀	♂	♀
Birth weight BW kg	2.48	2.48	3.77	2.58	3.80	3.08
Average (M and F)	2.44		3.18		3.44	
Weaning weight WW kg	18.25	18.00	20.25	15.92	18.00	17.25
Average (M and F)	18.3		18.1		17.6	
Total gain TG kg	15.78	15.52	16.48	13.33	14.20	14.18
Average (M and F)	15.65		14.91		14.19	
Average daily gain ADG gm	173.41	170.55	181.10	146.48	156.04	155.82
Average (M and F)	171.98		163.79		155.93	
No .of ewes / treat .	9		9		9	
No. of lambs born / teat.	11.00		10.00		9.00	
Average litter size / ewe	1.22		1.11		1.00	
Average of lambs birth weight, kg	2.24		3.12		3.16	
Average litter weight, kg	2.73		3.46		3.16	

weaning period = 84 days BW = birth weight WW = weaning weight TG = total gain

Growth period

All weaned lambs used in the growth trial were fed almost at 3.0% of BW throughout the trial and the quantity of feed refusals (data not shown) was very minimal and did not differ among treatments.

Feeding cost based on*	per ton
CFM	900 LE
CC	500 LE
RS	100 LE
Urea treatment	50LE

For the period from weaning up to the end of growth period (137 d), the lambs fed the control ration consumed more concentrates and rice straw than those fed on treated groups. The data presented in (Table 7) showed that the rice straw and the basal diet (CFM and/or UCC) was for control group almost 3 and 8% higher than T2 (50%UCC) and T3 (100% UCC). Organic matter intake did not differ among the groups ranged between 772.5 and 776 g/h/d, whereas CPI varied between 84.0 and 87.8 g/h/d across treatments (Table 6).

The CP intake ranged between 90g/h/d (control) and 84g/h/d for T3. Because of their numerically higher DMI of CFM as well RS for control group, lambs consumed a greater quantity of crude fiber (231.8 compare to 194.5 and 158.0g/h/d for T2 and T3, respectively. These figures represent 15 and 33% higher for control than T2 and T3, respectively. Ether extract intake for the all urea treated ear corn group (T3) was 60 and 24% higher than control and T2, respectively. It could be observed from the recorded DMI figures that there was a tendency for straw DM intake to decrease as UCC in the diet increased. However, the concentrates in three tested diets represent almost 60% of the total dry matter intake.

Feeding the tested weaned lambs on the experimental rations for 137days resulted in slight differences in ADG between the control (9 and 12%) higher than T2 and T3, respectively. Based on initial and final BW of the tested animals (Table 7) during the 137 days growth period, the average daily gain was 156., 142 and 139 g/d/h. for control and 50% and 100% UCC groups, respectively.

The weaned lambs light in weight in particular those fed on control and 100% UCC diet exhibited higher growth rate than the heavier lambs. The lambs over 20kg weaning weight in the three tested groups were the lowest ADG across the growth period as compared to those less than 20 kg fed the same diets. It seems that the low weaning weight lambs have the capacity to grow at rates at least approaching, if not equivalent to, the high weaned weight during the growth period.

Feed efficiency ratio in terms of (Kg of DM intake need to produce 1 kg gain was comparable for T2 and T3 consuming 5% DM higher than the control (5.82, 6.20 and 6.1 Kg DMI/ 1Kg gain, respectively). The TDN conversion rate comparable for control and T2 groups being slightly better than T3 representing 3.7, 3.8 and 4.0 Kg TDN per kg gain weight. The conversion rate for DCP was similar for control and T3 being 11% lower than T2 in terms of kg gain /kg DCP intake. The DCP amount needed for 1kg gain for T2 was 356, 401 and 353 g/ kg gain for control, T2 and T3, respectively. However, the different were in significant among rations (Table 7).

Providing that the production cost are similar except the feed cost changed UCCording to variation in the price of its components, therefore the economical efficiency well calculated from the input (feeding cost) and output (gain per unit feed). The calculated feeding cost based on the price of CFM, UCC and Rice straw (year 2003) were in average of 0.473, 0.391 and 0.313 per head daily for control, T2 and T3, respectively. UCCordingly, the cost (of feed) for producing 1 Kg gain was in average of 3.02, 2.76 and 2.26 LE/h/d for control, T2 and T3, respectively. The calculated decrease in feed cost / kg gain relative to the control was 9 (50% AAC) and 33% (100% UCC).

4. Discussions

Using urea as an agent to improve the nutritional value of low quality by products still considered as the most favorable up till now. Oji *et al*, (2007) stated that feed grade urea or the equivalent weight of fertilizer grade urea can be used to improve the nutritional value of chopped cobs (approximately 1 cm length) in terms of N, DM, NDF, ADF and OM for small ruminant feeding during off season periods. Moreover, Koster *et al*, (2002) concluded that, urea could replace between 20 and 40% of the degradable intake protein (drawn from values presented by NRC 1996).Also, Sahoo *et al,* (2002) reported that treatment with urea (storage time 21 days) improve the nutritive values as compared to urea supplementation just prior to feeding. Concerning the treatment period and moisture level, it was found that at least two weeks and 25-45% moisture level is sufficient for maximum response during summer months (Hadjipanayiotou and Economides1997 and Lines *et al*,(1996). The authors added that covered urea treated straw (UTS) is superior to non-covered, and UTS is also superior to urea-spraying prior to feeding. Lines *et al*, (1996) added that most of the changes caused by ammoniation were completed by 21 d after ammoniation. In this study, the stack opened was open after 28 days after treatment.

Increase the nitrogen content in urea treated corn and cobs by almost 185%. Wanapat *et al.*,

(1985) reported significantly increased up to 7-fold by urine and urea treatments. It could be due to the lower nitrogen content in the treated material.

The tendency, in this study, for rice straw and concentrate) to decrease by feeding 100% UCC and hence total DM, OM, and N intake decreased was similar to the results observed by Matejovsky and Sanson (1995) using ear corn as basic diets. The decrease of DMI and CP digestibility for T3 could be due increasing energy (T3) without adequate protein availability which was associated with depressed intake and digestibility (Del Curto *et al*, 1990).

Ration formulation

Forage to concentrate ratio

The diets used in this study generally have about 60% concentrates during 137 d growth period. It should be mentioned that the forage concentrate ratio does not take into consideration the quality of the forage, particle size of the forage, the type and processing of the cereal grains, and the concentration of non forage fiber sources in the diet to affect dietary starch concentration as the case in using corn and cobs in the study.

Ludden and Cecava (1995) formulate diets contained 12.5% CP using cracked corn (70%), ground corn cobs (15%), and different source of protein supplement (included urea). The results suggest that corn-based diets may be limiting in ruminally degradable N, especially when high ruminal escape protein sources are fed as supplemental CP.
The digestibility data concerning the fibrous portion tended to decrease as the proportions of CF content decreased as described by Woodford *et al* (1986).

The lower DM and CF digestibility observed in this study for 50% and 100% UCC was reported by Sanson *et al*. (1990). The authors stated that reported a decrease in DM and hemicelluloses digestibility as dietary level of corn increased from 0.26 to 0.52% of BW in steers consuming low-quality meadow hay.

Feeding urea as protein supplement to starch-based energy diet (corn) has been shown to cause depressions in forage intake as well as negative associative effects on dry matter and fiber digestibility (Chase and Hibberd, 1987; Pordomingo *et al*, 1991 and Matejovsky and Sanson (1995).Similar DMD for T2 and T3 (Table 2) was found by Nelson *et al* (1984) . The authors used maize cobs containing 40% moisture reported 61.30, 61.69 and 65.94% DMD for 2, 3 and 4% ammonia treatment, respectively.

Contrary to the negative effect of ammoniation on nutritive digestibility mentioned previously, Cottyn and De Boever (1988) and Genin *et* al, (2007) reported upgrading of straw by ammoniation. Treatment of straw with 3% NH3 improved digestibility and energy value, the contents of crude protein (CP) and digestible crude proteins (DCP) by withers. Also, Zinn *et al*, (2000) found that total tract OM digestion was slightly greater for diets containing 20% of N as NPN (partial replacement of fish meal). Moreover, the tendency for CP digestibility for urea treated corn and cobs (as source of NPN) to be greater for T2 has been reported by Bohnert *et al*, (2002a)

The lower DMD of the T2 and T3 could be due, as explained by Tuah [1] and Ørskov (1989), to that with the cobs, most of the material was cell wall while the cell content was about 6.04 and the hemicellulose very high (46.4%). They stated that the cellulose and the hemicellulose of the maize cobs may therefore not be made readily available for microbial degradation, thus decreasing its DMD and DCF values.

The lower DMI for T2 and T3 (in particular during digestibility trial) should be taken in UCCount when comparing the tested diets since intake has great effect on digestibility (Tyrrel and Moe 1975).
UCCording to Kauffmann *et al* (1980) and Hoover WH, (1986) and Galina *et al.*, (2007) who stated that major factor appears to be responsible for the decrease in fiber digestion are the rumen pH. Moderate depression in pH, to approximately 6.0, results in a small decrease in fiber digestion and considered as the lowest limit to adequate activity of the celullolitic bacteria.

The lack of an effect of NPN source on fecal N excretion agrees with other research using urea as CP supplements to low-quality forage (Coleman and Wyatt, 1982; Bohnert *et al.*, 2002b). Joy *et al*., (1992) and Hammadi (2007) observed that increasing urea dosages up to 8 % DM basis and different levels of moisture content (up to 40%) increased total N content as well as a significant effect on the DOM in low quality roughages and improvements in ADG and gain/feed (Brown *et al.*, (1995)

The higher CP digestibility for T2 (50% UCC) compared with other two groups could be due to the associated effect the two sources of nitrogen (soybean in the CFM and urea in the treated corn and cobs. Ammerman et al. (1972), observed an increase in N balance and digested N retained (expressed as a percentage of N intake) in wethers consuming low-quality forage (2.6% CP) and supplemented with urea and soybean meal (50:50 N basis), or biuret and soybean meal (50:50 N basis) compared with withers receiving just forage.
The relative lower CP digestibility for T3 (100% UCC) have been explained by Oltjen *et al*, 1969; Ammerman *et al*, 1972; Bohnert *et al*, 2002b. The

authors stated that NPN source did not affect N balance or digested N retained suggest that urea or biuret can be effectively used as a source of supplemental N by ruminants consuming low-quality forage 7% CP.

Weaning and growth period

The effect urea treatment on lamb birth weight and on ADG during weaning and growth periods observed in this study are matched with the results of Koster *et al*, (2002). The authors concluded that Prepartum urea treatment did not affect pregnancy rate, calf birth weight, or ADG.Rapid Concerning the rapid growth of the lower birth weight born lambs for control group in this work (Table 6), Greenwood et al., (2002) concluded that low-birth-weight lambs are less mature than their high-birth-weight counterparts in some aspects of endocrine and metabolic development at birth which may enhance their capacity to utilize amino acids for energy production and to support gluconeogenesis during the immediate postpartum period. The authors added that under appropriate environmental and nutritional conditions, vital life support systems can mature sufficiently to allow extremely low birth weight lambs to survive and achieve growth.

Meanwhile, Sidwell *et al*, (1964) reported positive correlation between birth and weaning weights which contradict the results of this study. Also, Greenwood et al., (1998) stated that average daily gain tended to be greater in the high- than in the low birth-weight lambs given ad libitum UCCess to feed.

However, differences in weaning weight due to breed, sex, month of birth and litter size were reported by Bodisco et al (1973) and Gonzalez (1972). On other hand, Bodisco et al (1973) reported differences due to year and litter size but not to sex. Refer to the results presented in Table (6); sex of born lambs gave insignificant differences for both birth and weaning weight.

The higher ADG of male born lambs compared the female was in UCCordance with the finding of Yilmaz (2007) who reported that at birth, 90 and 180 days of age, ram lambs were heavier than ewe lambs. Zinn et al., (2000) reported that overall, ADG was 17% greater for cattle consuming diets containing 20 vs 40% NPN. Overall, gain efficiency was 6% greater for diets containing 20% NPN.

Rumen parameter

pH value

Ruminal fluid pH was not affected by dietary treatment and averaged 7.6 across treatments. It has been reported (Ørskov 1992) that feeding grain (corn) and forage decreased ruminal pH below 6.0 and reduce the activity of cellulolytic bacteria which could reduce forage fiber digestibility. In this study, although the T3 (100% UCC) diet has been formulated from corn and cobs and rice straw, the ruminal pH was comparable to the other tested diets averaged 7.7compared to 7.6and 7.7 for the control and T2. Therefore, the lack of effect of feeding corn on ruminal pH could be due urea treatment.

Ammonia- N

The concentration of ruminal NH3-N seems to be adequate and maintained fermentation of diets in this experiment, as long VFA concentrations was within the optimal range of 2.0 to 5.0 mg/dL ruminal NH3- N as suggested by Satter and Slyter (1974) to maintain microbial growth.

The statement of Ludden and Cecava (1995) could explain the CF digestibility by the treated groups. The author consider a 3.6 mg/dL for urea as supplemental protein sources for steers fed corn-based diets as evidence for possible shortage of ruminally degradable N, in the present work the rminal ammonia was far below this concentration.

The lack of effect feeding urea treated corn and cobs on ruminal ammonia nitrogen as compared to the control has been documented by Lines and Weiss (1996) who stated that cows fed the urea diet had higher concentrations of ruminal NH3 than did cows fed urea treated hay.

TFVA´S

The higher total VFA concentration for control ration at 3 and 6 hrs after feeding could be a result of a greater supply of fermentable material that have been made available than the other tested rations.

Breeding and lambing season:

UCCording to the breeding plan in Sids experimental station, the ewes averaged three lambings over two years. It was originally decided to synchronize breeding to takes place in January, Mai and September so lambing would occur in June, October and February , respectively and hence births group between October and February when there is green forage (berseem) provide sufficient nourishment for the ewes to have enough milk and for their lambs to develop normally. Births group between June and July when feed availability is low, reducing the chances of lamb survival (mortality rates are as high as 25%). Weaning percentages are low (under 70%). On the other hand, it should be taken in UCCount that the conception rate for ewes bred in January are higher than in Mai and September. Lambing in October could be early that the lambs may be born before the Berseem could provide sufficient nourishment for the ewes to have enough milk and for their lambs to develop normally. However, considering lambing percentages and lamb survival and growth, breeding in March-April and August-September is preferable. Breeding takes place throughout the year, most breeding is linked with the highly seasonal availability of Berseem.

Survival rate

UCCording to Dwyer and Morgan (2006), the worldwide rate of mortality in newborn lambs is in excess of 15% of lambs born and represents a challenge to sheep production and welfare. Dwyer and Morgan (2006) added that especially in prolific ewes the mortality rates are high in lambs with low birth weights and that after birth the absolute growth rates are lower in the surviving light lambs than in the heavier lambs. However, in this study low birth weight lambs exhibit faster growth than the heavier born lambs.

Milk production

Respective the effect of ammoniation on the milk production, it was found that feeding lactating cows tended to gain more weight and produce more milk when fed dehydrated alfalfa meal than did than did cows supplemented ammonia treated corn cobs or soybean (Rock. *et al.*,1991). However, Hadjipanayiotou *et al*, (1993) found that feeding Awassi ewes on urea treated straw (AS) diet produced significantly less milk than those on the control diet (AS, 432 *vs* 462 g milk/ewe/day).
Meanwhile, Lines and Weiss (1996) stated that use diverse sources of dietary N (ammoniation, urea, soybean meal, or a commercial blend of animal protein meals) did not greatly influence N utilization by dairy cows.

Conclusion

Urea treatment improved the nutritive value of corn with cobs and made it at least equivalent to CFM respective CP content (14%) and when offered alone proved better efficiency compared to the control and the 50% UCC. The increased milk production of the ewes given CFM, before and during, lactation was limited in but type of feeding had an effect on the birth weight and weaning weight of lambs born and raised by these ewes.

In addition, treatment at the time of ensiling high-moisture grains may decrease mold growth and DM losses, especially in grains with less than 80% DM. Reducing particle size of these grains prior to ammoniation is important in UCCelerating anaerobic fermentation and improving feed stability during storage and may increase aerobic stability of these high-moisture grains at the time of feeding, especially during months of elevated environmental temperatures (Eastridge 2006).

The effectiveness of ammonia in inactivating aflatoxins in contaminated livestock feed stuffs has been investigated by several authors brekke (1977), Grove (1984), Fremy (1988), Bailey et. al., (1994), Hoogenboom et. al., (2001) The authors stated that ammoniation of contaminated ingredients of livestock feed resulted in efficient reduction of aflatoxin levels and abolished the detectable transfer of AFM1 or AFB1 into milk, and greatly reduced the carcinogenic risk posed by any carry-over of aflatoxins or their derivatives into milk. which most likely caused by a decreased bioavailability of the degradation products.

Further work is required to investigate other sources that could enhance the nutritive value of the residues in order to stimulate intake and production. Feeding Ossimi ewes on UCC around parturition during the summer season did not seem to enhance ewe or lamb production traits but the feed costs for lactating ewes and growing lambs can be minimized. Strategic timing of feeding urea treated by products for Ossimi sheep ewes may provide a method for increasing the weight of lambs weaned during periods of limited green forage availability.

Whether ammoniation of the by products is economical depends on relative costs of anhydrous NH_3 , Urea and alternative feedstuffs, such as cereal grains. However, this system is only UCCeptable if the value of the response is higher than associated costs of processing and treatment. However, the use of urea is up till today is feasible.

There was little difference in average daily gain or feed efficiency between lambs fed the rations based on CFM and those included UCC but reduced feed cost per kg of weight gain by 15% (50% UCC) or 35% (100% UCC), suggesting that a crude protein level near 14% based on UCC would be optimal for 25 - 40kg growing Ossimi lambs. Replacement of CFM in pregnant and growing lams rations with UCC would be cost effective as cost UCC is only at 60% less than cost of CFM.

Moreover from feeding management such ruminant exposed once to urea treated any feed stuff performed better when exposed later on to treated feed stuffs. As stated by Wiedmeier *et al*, (2002). Thus, managers should consider previous exposure to treated material (in particular the low quality) when considering applying this technology to reduce food costs.

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