Egyptian J. of Sheep and Goat Sciences (Special Issue, 2nd Inter. Sci. Conf. on SR Production, 2008) Vol 3(1): 61 - 76

SUGARCANE BAGASSE SILAGE TREATED WITH DIFFERENT LEVELS OF UREA FOR IMPROVING SHEEP PRODUCTION. II. BODY WEIGHT CHANGES AND EWES` REPRODUCTIVE PERFORMANCE

M. A. Kobeisy[1], M. Zenhom[2], I. A. Salem[1] and M. Hayder[2]

1- Anim. Prod. Dept., Fac. of Agric., Assiut Univ., Assiut, Egypt.
2- Mallawi Animal Prod. Station, Anim. Prod. Institute, Agric. Res. Center.

ABSTRACT

This study was carried out to investigate the influence of sugarcane bagasse silage treated with different levels of urea on body weight and ewes reproductive performance. The study included 179 3/4 Chios x 1/4 Ossimi sheep, 103 ewes and 76 newborn lambs. Animals were divided into four treatment groups, a control group (26 animals) fed concentrates with wheat straw, and three silage fed groups, T_0 (25 animals), $T_{1.5}$ (26 animals) and T_3 (26 animals) receiving silage containing 0, 1.5 and 3 % urea, respectively. The animals were fed 60 % of their nutritional requirements from a concentrate mixture while the roughages, silage or wheat straw, were given ad libitum. The experiment was lasted 10 months and consisted of 4 periods, pre-mating (1 month), mating (1 month), pregnancy (5 months) and lactation (3 months). Body weight, incidence of estrus, number of service per conception and fertility rates were recorded. During the pre-mating period, silage or urea had no significant effect on body weight or body weight gain, whereas the increase in feed intake was significant ($P<0.05$). During pregnancy, T_0, $T_{1.5}$ and T_3 had higher body weight and body weight gain ($P<0.05$) and feed intake ($P<0.01$) as compared to the control group, whereas during lactation, $T_{1.5}$ and T_3 groups had higher body weight than that of T_0 fed group.

Numbers of ewes that exhibited estrus or lambed were less in urea fed groups ($T_{1.5}$ and T_3) than the control and T_0 silage fed groups. Number of services per conception (S/C) was adversely affected by urea treatment, particularly the 3% urea level. Silage fed groups had higher body weight at lambing and their lambs had higher average and total birth weight and weaning weight than the control group. Long term feeding of urea had adverse effect on fertility of treated ewes as compared to fertility before treatment. About 18% (8 out of 45 ewes) of urea fed-groups had estrus length more than 48 hours as compared to about 4% (2 out of 49 ewes) for both control and silage (T_0) fed groups. In conclusion, feeding sugarcane bagasse silage with or without urea may improve growth performance, whereas feeding urea, particularly the combined effect of long term feeding and high level (3%), have had a negative effect on reproductive performance of ewes.

Key words: *Sheep, sugarcane bagasse, urea, body weight, estrus, service per conception, fertility, and %.*

INTRODUCTION

In Egypt, about 4.71 million tons of bagasse are generated in sugarcane factories **(FAO, 2002)**. It is a valuable source of highly digestible fibres for ruminants. However, due to its low nitrogen content, urea or ammonia may be used to increase its crude protein content. On the other hand, high dietary protein content may interact with the reproductive performance of ruminants **(Ferguson and Chalupa, 1989)**. Therefore, the purpose of this study is to investigate the effects of sugarcane bagasse silage supplemented with different levels of urea (1.5 and 3 %, DM basis) on body weight and ewe fertility.

MATERIALS AND METHODS

Animals and treatments

The present study was carried out at Mallawi Animal Production Research Station on 103 mature 3/4 Chios x 1/4 Ossimi ewes and 76 newborn lambs. The aim of the study was to determine the effect of feeding sugarcane bagasse silage treated with different levels of urea on body weight changes and reproductive performance of ewe's in different stages of production. Ewes were treated for internal and external parasites with IVOMEC – Super at the start of experiment. Also, animals were subjected to the routine vaccination programs for infectious diseases (e.g. FMD, Rift valley fever, Sheep Box … etc.). Animals were in a good health conditions through the experiment and there were no apparent digestive disorders.

The experimental animals were allocated to one of four treatment groups which were balanced for age and initial live weight, a control group (C, 26 animals) fed wheat straw and three treatment groups (T_0, $T_{1.5}$ and T_3) fed sugarcane bagasse silage treated with different levels of urea, 0, 1.5 and 3 %, on dry matter basis, respectively. All animals were fed 60% of their nutritional requirements according to NRC (1985) as a concentrate mixture offered in one meal at 8:00 a.m., while roughages were given ad libitum. Fresh food was weighed and offered at 8:30 a.m. sufficient silage and wheat straw were offered daily to provide 110% of the measured ad lib intake of the previous day and refusal were weighed and discarded. Silage and wheat straw consumptions were determined daily by difference between the quantity of feed offered and refused. Dry matter intake was estimated after adjusting the material offered and refused for dry matter content. Samples were dried at 65° C° for 24 hours. Animals were weighed every other week in the morning before feeding and weight gain was calculated. Mineral mixture blocks were used to cover the animal's requirements. Animals were allowed to drink water ad libitum three times daily.

Preparation of silage

Sugarcane bagasse (SCB) was collected through different periods of experiments from sugarcane mills that produced molasses, which are spread in Mallawi town. SCB was spread, in a clean place, in a thin layer and allowed to sundry for 2–3 days with continuous toppling. After drying, SCB was chaffed mechanically to 0.5 to

2.0 cm particle size . During the ensiling process, water was added to the chopped SCB to decrease the dry matter content to 40 %.

Groups of under ground trenches were used for ensiling of SCB. They were padded with plastic sheets and filled with chopped SCB in layers. Molasses and/or urea were added after diluting in amount of water equivalent to the chopped SCB. Molasses was added as 5 % of dry mater and urea was added as 0, 1.5 and 3 % for making T_0, $T_{1.5}$ and T_3 SCBS. After filling the trench with SCBS, it was covered with plastic sheets and a thick layer (20–40 cm) of soil. After a period of 45 days, trenches were opened from one side and silage was offered daily to the experimental animals.

Experimental procedures

Ewes in the treatment groups were of similar average body weight (39.1 to 39.4 kg) and reproductive history. The experimental period lasted 10 months and consisted of 4 periods, pre-mating or flushing (1 month), mating (1 month), pregnancy (5 months) and lactation (3 months). The live weight of sheep was recorded at beginning of the experiment and every other week, and body weight changes were calculated. At mating season, applied in autumn, ewes were monitored for signs of estrus using well trained ram two times per day at 8:0 and 15:0 h during the mating season which lasted 30 days. The ewes in estrus were mated using 3/4 Chios x 1/4 Ossimi rams. Four mature rams of nearly the same age and weight were used to breed the ewes. All rams were assigned for breeding ewes of the four groups to avoid confounding effects of rams on the results. Date, weight and ID number of ewes exhibited estrus were recorded. Day of mating was considered to be day 0 of pregnancy. All ewes lambed in February. Animals were subjected to fertility test 2 years after treatment. After lambing, ewes were housed in individual pens measuring 2x1 m for 3 days to ensure that no disorders in udder or milk secretion and that placenta was let down. After that they returned to their respective groups.

Management of suckling lambs

Suckling milk was the main source for feeding lambs during the first 6 weeks of life. Thereafter, lambs were gradually adapted to a starter ration (83% yellow corn, 15% soybean, 1% calcium carbonate and 1% Nacl). They were isolated far from their mothers and were fed as a group once daily. The isolation period increased gradually from 1 hour during the fifth week of age up to the whole daytime (i.e. from morning till afternoon) at the week eighth of age. Body weight of lambs was recorded and daily gain was calculated. Milk intake was measured using weighing suckling technique described by **Economides (1987).**

Statistical analysis

Results were subjected to analysis of variance procedure using general linear model procedure (PROC GLM) of the Statistical Analysis System Institute **(SAS, 1989).**

RESULTS AND DISCUSSION

Ewes' body weights and body weight changes

1. Pre- and post- mating periods

Silage fed groups either with or without urea had higher body weights, body weight gain and feed intake than those of control group. The effect was more pronounced in post mating period (Table 2). This effect of silage feeding could be attributed to the higher ($P<0.01$) intake of silage as compared to the control group diet containing straw as roughage (Tables 1 and 2).

Table 1. Live body weight (kg), weight gain (g/day) and silage intake (g/day) of ewes during pre-mating period as influenced by feeding sugarcane bagasse silage (SCBS) and the effect of urea treatmants[1]

Parameters	Control	SCBS[2]		
	C	T_0	$T_{1.5}$	T_3
Body bweight[3], kg				
Initial	39.40±1.32	39.41±1.36	39.13±1.39	39.11±1.39
Final	40.87±1.32	40.92±1.36	41.30±1.39	41.6±1.39
Gain, g/d	1.47±0.56	1.52±0.57	2.17±0.59	2.53±0.59
Daily weight change, g/day	35.03±13.36	36.07±13.69	51.63±14.04	60.15±14.04
Silage intake, g/day	512.9^{a}±10.1	543.4^{c}±10.1	554.7^{bc}±10.1	633.3^{d}±10.1

1. values are least square means ± SEM,
2. SCBS = sugarcane bagasse silage with added urea, 0, 1.5 and 3.0 percent,
3. initial weight = 6 weeks before mating and final weight was recorded after lambing.

Values with different letters in the same raw are different ($P< 0.01$) except a,c ($P< 0.05$)..

This high intake may be due to the following: 1) good preservation quality of the silage as **O'Doherty *et al.*. (1997)** pointed that the fermentation pattern of silage had a positive effect on intake, 2) higher palatability of **silage (Mohamed, 1998)** and mainly 3) the higher digestibility of silages compared to the control diet (Table 6). Similarly, **Elliott (1967)** found positive relationship between digestibility and intake. The rate of increase in body weight and intake were higher ($P< 0.01$) with urea-supplemented animals; particularly those fed silages with the high level of added urea. Urea addition to silage increased its N content, which subsequently would favorably encourage intake **(Castro and Machado, 1990).**

Also, **Aston *et al.* (1979)** found adverse effect of low pH and acetic acid content of silage on voluntary intake. They showed an improvement in intake when using urea supplement and attributed these results to the partial neutralization of silage acidity. Body weight of ewes increased gradually from start of experiment (6 weeks pre- mating, Table 2) and reached its maximum at 20 weeks post mating (Tables 1 & 2). The changes in live weight gain were almost constant till the last 4 weeks of pregnancy where it showed a sharp increase reflecting the rapid growth of the fetus, placenta and the conceptus fluids during the last 4 weeks of pregnancy.

(2). Body weight (kg), daily body weight gain (g/day) and silage intake (g/day) during pregnancy in ewes fed sugar cane bagasse silage treated with different levels of urea

Parameters	Control	SCBS[1]		
	C	T_0	$T_{1.5}$	T_3
Body bweight[2], kg				
Initial	$40.9^{A}\pm1.5$	$40.9^{A}\pm1.6$	$41.3^{A}\pm1.6$	$41.6^{A}\pm1.6$
Final	$48.5^{B}\pm1.5$	$51.6^{B}\pm1.6$	$53.2^{B}\pm1.6$	$55..9^{B}\pm1.6$
Change	$7.7^{d}\pm0.8$	$10.73^{ab}\pm0.9$	$11.9^{a}\pm0.9$	$14.3^{c}\pm0.9$
Daily weight change, g/day	$54.9^{d}\pm6.0$	$76.6^{ab}\pm6.1$	$85.0^{a}\pm6.3$	$102.3^{c}\pm6.3$
Silage intake, g/day	$494.5^{a}\pm4.5$	$538.1^{b}\pm4.5$	$547.7^{b}\pm4.5$	$564.4^{d}\pm4.5$

2. The lactation period

Feeding silage with added urea had a significant (P< 0.01) effect on silage intake during lactation period (Table 3), although the effects on body weight and body weight gain was not significant. This is a normal physiological response due to the increase of milk production in silage fed groups as compared with control one. During the physiological stress of milk production, particularly during the peak of lactation, ewes tended to have no increase or may lost body weight. **(Dapoza *et al.*, 1999 and Olsson *et al.*, 1999).** Silage fed groups (T_0 and to some extent $T_{1.5}$) showed negative body weight gain although their intake exceeded (P< 0.01) that of the controls. This may be attributed to their higher milk production.. This also could reflect a greater mobilization of body reserves especially during the early stages of lactation, and consequently the loss of more weight in silage fed groups **(Banchero *et al.*, 2003)**. Also, **Sanh *et al.*. (2002)** reported no increase in body weight of lactating cows although they had higher silage intake.

Table 3. Body weight (kg), daily body weight changes (g/day) and roughage intake (g/day) during lactation in ewes fed sugar cane bagasse silage treated with different levels of urea[1].

Parameters	Control	SCBS[1]		
	C	T_0	$T_{1.5}$	T_3
Body bweight[2], kg				
Initial	43.69 ± 1.74	46.44 ± 1.74	47.1 ± 1.68	47.2 ± 1.59
Final	41.91 ± 1.74	42.13 ± 1.74	45.0 ± 1.68	46.4 ± 1.59
Change	-1.78 ^{c} ± 0.90	-4.31 ^{a} ± 0.90	-2.4 ± 0.87	-0.9 ^{bc} ± 0.83
Daily weight change, g/day	-25.5 ^{c}± 12.68	-61.6 ^{a} ± 2.68	-34.9 ± 12.47	-12.4^{bc}±11.80
Silage intake, g/day	524.6^{a} ± 0.01	639.1^{b} ± 0.01	631.77^{b}± 0.01	636.5^{b} ± 0.01

1. SCBS = sugarcane bagasse silage with added urea, 0, 1.5 and 3.0 percent,
2. Initial weight = weight at mating day. Final weight = weight at 20weeks after mating.
values with different liters in the same raw (small litter) or the same column (capital litter) are different (P< 0.01) except a,c (P< 0.05).

Reproductive performance

1. Conception rate (CR)

The effect of feeding sugarcane bagasse silage and increasing levels of urea on CR is presented in Tables (4 & 5). Results showed insignificant effect of feeding silage (T_0) on CR. Average CR was about 84, 83, 78 and 82 (as a percent of ewes mated) and about 81, 80, 69 and 69 (as a percent of ewes subjected to mating) in control and silage fed groups (T_0, $T_{1.5}$ and T_3), respectively (Table 4). These results may suggest that urea supplementation had a negative effect on fertility of ewes. Such adverse effect of urea supplementation on CR were still prominent even after treatments were stopped (Table 5), as we followed the fertility of ewes for two years after the end of urea supplementation.

The mechanism whereby feeding high protein diets to ruminants compromises reproductive performance is not known yet **(Fahey *et al.*., 2001)**. In the present study, the negative effect of urea supplements on fertility or CR may be attributed to: 1) Feeding excess urea resulted in an increase of urea concentration in the circulating blood and tissues especially uterine and reproductive tract which might change the suitable environment for sperm or fertilized ova, and resulting in early losses of embryos and the animal recycles to be mated again **(Fahey *et al.*., 2001, Kenny *et al.*., 2001 and Jordan and Swanson, 1979a),** 2) Urea addition decreased serum progesterone concentrations (which is responsible of the maintenance of pregnancy). Dietary protein supplementation at levels exceeding requirements decreased concentration, excretion and/or catabolism of progesterone **(McEvoy *et al.*., 1997; O`Doherty and Crosby 1996).** In this respect, **Stock and Fortune (1993)** demonstrated that low progesterone level was associated with low fertility due to oocyte deterioration. Feeding urea for a long time (about 9 months) may be a cause of decreased fertility during and after the end of urea supplementation as exhibited by the present results (Tables 4 & 5). Also, this adverse effect on fertility may be due to the increase in urea concentrations at tissue level, especially the reproductive organs, resulting in cellular damage through the body resulting in a sub-optimal uterine and/or ovarian

2. The lactation period

Feeding silage with added urea had a significant ($P< 0.01$) effect on silage intake during lactation period (Table 3), although the effects on body weight and body weight gain was not significant. This is a normal physiological response due to the increase of milk production in silage fed groups as compared with control one. During the physiological stress of milk production, particularly during the peak of lactation, ewes tended to have no increase or may lost body weight. **(Dapoza *et al.*. , 1999 and Olsson *et al.*, 1999).** Silage fed groups (T_0 and to some extent $T_{1.5}$) showed negative body weight gain although their intake exceeded ($P< 0.01$) that of the controls. This may be attributed to their higher milk production.. This also could reflect a greater mobilization of body reserves especially during the early stages of lactation, and consequently the loss of more weight in silage fed groups **(Banchero *et al.*., 2003)**. Also, **Sanh *et al.*. (2002)** reported no increase in body weight of lactating cows although they had higher silage intake.

environment, and thereby decreasing fertility **(Jordan and Swanson, 1979a)**. In this regard, **Putnam *et al.*. (1999)** reported that dairy cows had chronically elevated N concentrations postpartum as a result of feeding high protein level during the prepartum period. Also, **Daghash *et al.*. (1994)** found that infertile Chios and Ossimi ewes had higher ($P< 0.01$) urea levels in the blood, by 31.43 %, than fertile ewes.

Table 4. Some reproductive parameters of ewes fed sugarcane bagasse silage treated with different levels of urea.

Item ± SE	Control	SCBS		
		T_0	$T_{1.5}$	T_3
No of ewes	26	25	26	26
Body weight at mating	40.9±1.3	40.9±1.4	41.3±1.4	41.6±1.4
No of ewes exhibited estrus	25/26	24/25	23/26	22/26
ewes exhibited estrus, %	96.15	96	88.46	84.62±
No of service/conception	1.1^{c}±	1.0^{bc}±0.1	1.17^{c}±0.1	1.32^{a}±0.1
No of ewes lambed	21/25	20/24	18/23	18/22
Fertility as % from mated ewes	84	83.33	78.26	81.82
Fertility as % from total ewes	80.77	80	69.23	69.23
Gestation period, days	150.9±0.4	151.2±0.4	150.6±0.4	151.6±0.4
Body weight at lambing	43.7±1.7	46.4±1.7	47.4±1.7	47.2±1.6
No of lambs (total)	23	22	20	21
No of lambs (alive)	20	19	17	20
No of total lambs produced/ewe lambed	1.1±0.1	1.1±0.1	1.1±0.1	1.2±0.1
No of lambs produced (alive)/ewe lambed	0.9±0.1	0.9±0.1	0.9±0.1	1.1±0.1
Total birth weight/ewe*	3.8^{a}±0.3	4.4^{c}±0.3	4.4^{c}±0.3	4.6^{c}±0.3
Average birth weight	3.5^{a}±0.1	3.9^{c}±0.1	3.9^{c}±0.1	4.0^{bc}±.1
No of lambs weaned/ewe lambed (alive)	1±0.11	1.1±0.11	1±0.12	0.9±0.11
No of lambs weaned/ewe lambed	0.9±0.1	0.95±0.1	0.83±0.1	0.89±0.1
Weaning weight/ewe*	13.9±1.1	14.9±1.0	14.8±1.1	15.3±1.1
Average weaning weight	12.5±0.6	13.6±0.6	13.3±0.7	13.6±0.7

Most values are least square means ± standard error

Values with different liters in the same raw are different (P< 0.01), except a,c (P< 0.05).

* Total live weight (kg) produced from ewe either at birth or weaning.

Table 5. Long-term effect of feeding sugarcane bagasse silage and urea on fertility of experimental ewes.

Item	LSM ± SE	No of mating	No of lambing	Fertility, %	No of live lambs	No of dead lambs	Total no of lambs
Con	Pre treatment	53	36	67.92	37	1	38
	During treatment	26	21	80.77	20	3	23
	After treatment	50	33	66	35	2	37
T_0	Pre treatment	59	37	62.71	40	1	41
	During treatment	25	20	80.77	19	3	22
	After treatment	45	30	66.67	35	0	35
$T_{1.5}$	Pre treatment	63	37	58.73	41	2	43
	During treatment	26	18	69.23	17	3	20
	After treatment	63	27	42.86	30	2	32
T_3	Pre treatment	56	38	67.86	42	1	43
	During treatment	26	18	69.23	20	1	21
	After treatment	75	32	42.67	36	3	38

-No of mating = number of ewes subjected to be mated by rams for 30 days period/ mating season. -Fertility % was calculated from number of ewes subjected to be mated by rams for 30 days period/ mating season. -Pre treatment= period before beginning of experiment -After treatment= period after finishing experiment and all ewes subjected to normal feeding system in station.

2. Estrus period

About 63 % of total ewes had estrus period less than 36 hours (Table 6). This result is similar to the normal estrus period pointed out by **Jainudeen et al.. (2000)** and **Bearden and Fuquay (1984).** About 11 % of ewes exhibited lengthy estrus periods of 48 hours or more. Ewes fed SCBS with added urea (T1.5 & T3) exhibited the longest estrus period where about 80% of the group (8 out of 10 ewes) had estrus period length of 48 hours or more (Table 6). On the other hand, no particular effect for SCBS without urea (group, T0) was found on estrus period. The long estrus period in animals fed 1.5% (T1.5) and 3% (T3) urea may be related to the effect of high levels of urea feeding and dietary intake which might negatively affected circulating progesterone **(Yaakub *et*** *al.*, **1999 and Jordan and Swanson, 1979b)** as described above. Low progesterone level leads to the activation of GnRH **(Jordan and Swanson, 1979b)** and the commencement of recycling estrus behavior **(Bearden and Fuquay,1984).**

Table (6). Effect of feeding ewes with sugar cane bagasse silage treated with different levels of urea[1] on estrus duration length (hours).

Item	*Number of ewes*	Estrus duration length (hours)							
		12 hrs to less than 24 hrs		24 hrs to less than 36 hrs		36 hrs to less than 48 hrs		48 hrs and more	
		No	%	No	%	No	%	No	%
Control	**25**	7	*28*	9	*36*	8	*32*	1	*4*
T0	**24**	8	*33.33*	7	*29.17*	8	*33.33*	1	*4.17*
T1.5	**23**	8	*34.78*	7	*30.43*	5	*21.74*	3	*13.04*
T3	**22**	7	*31.82*	6	*27.27*	4	*18.18*	5	*22.73*
Average	***94***	30	*31.91*	29	*30.85*	25	*26.60*	10	*10.64*

1. sugarcane bagasse silage with added urea, 0, 1.5 and 3.0 percent,

3. Gestation length

Means of gestation length in different treatment groups are presented in Table (4). Mean gestation length was similar (151 days) for control (T_0) and $T_{1.5}$ groups, while it was 152 days for T_3 group. All values are within the normal range reported by (**Jainudeen *et al.*, 2000** and **Bearden and Fuquay, 1984**). Statistical analysis for the effect of feeding silage with or without urea on gestation period showed no significant effect, although it tended to be longer in animals fed silage with added 3% urea (Table 4). This was consistent with the results of **Sibbald and Davidson (1998) and Mohamed (1986).**

4. Twining rate

Twining rate calculated as number of lambs produced per ewes lambed are shown in Table (4). Values were approximately the same and ranged from 1.10 to 1.17 for percentage of total lambs born per ewe lambed and from 0.95 to 1.11 for percentage of alive lamb at birth. These results indicated no significant effect of either silage or urea feeding on twining rate, although urea supplemented group (T_3) tended to have the highest number of lambs alive at birth (1.11 lamb/ewe) as compared with other groups (0.94 - 0.95 lamb/ewe, Table 4). This was consistent with those reported by **Fahey *et al.*. (2001) and Kenny *et al.*. (2001)** on ewes supplemented with higher level of dietary protein or urea. Also, **Yaakub *et al.*. (1999)** reported no significant effect of silage feeding on mean number of follicles or the proportion of embryos that developed to the blastocyst.

5. Number of services per conception (S/C)

As shown in Table (4), the percent of ewes mated was higher in control (96.15%) and non-supplemented silage (96.00%) fed groups than urea treated groups, being 88.46% and 84.62% for $T_{1.5}$ and T_3-groups, respectively. This effect may be mediated through changes in the pH of the uterine and oviduct environments due to urea supplementation during early embryonic development. The reduction of uterine pH may increase the incidence of embryonic mortality **(Jainudeen *et al*., 2000).** Urea supplementation had a similar negative effect on early embryonic developments in ewes **(Fahey *et al*., 2001)** and heifers **(Kenny *et al*., 2001).** Ewes fed silage with 3% urea level had higher (P< 0.05) S/C (1.32) than the controls and those fed silage without added urea (1.08 and 1.04, respectively, Table 4). The group fed silage with the 1.5% level of urea showed an intermediate S/C value (1.17), indicating the increase of S/C with increasing urea level. This adverse effect of urea supplementation may be due to: 1) Urea addition resulted in increasing the concentrations of ammonia and urea in the follicular and uterine environment, decreasing uterine pH and decreasing systemic concentration of progesterone which could adversely affect either gametes formation and/or early embryonic development **(Sibbald and Davidson, 1998 and Jordan and Swanson, 1979a)**, 2) Urea supplementation increased serum albumin which is inversely related to S/C required per conception **(Rowlands *et al*., 1977),** 3) Urea may had a debilitating effect on the oocyte which would compromise early embryo viability **(Fahey *et al*. 2001),** and 4). Ewes fed urea treated silage produced embryos with lower cell numbers than untreated ewes and their subsequent rate of development in *in vitro* culture was poor. The above mentioned points may collectively result in early embryonic mortality and subsequently increased S/C. Similar positive correlation between urea supplementation and S/C was reported by **Jordan and Swanson (1979a).**

6. Performance of produced lambs.

<u>1 - Birth weight</u>: Average birth weights are presented in Table (4). Treatments had a significant (P<0.05) effect on birth weight. Silage fed ewes had greater (P<0.05) average and total birth weight of their lambs. Ewes supplemented with higher level of urea (3%) showed greater values of average and total birth weight as compared with other groups supplemented with lower urea levels (Table 4). This was consistent with the results of **Sibbald and Davidson (1998)** who pointed that lambs born to ewes offered silage supplemented with protein source had greater (P<0.05) birth weight than lambs born to ewes fed silage only. This positive effect on birth weight in urea treated groups may be due to: 1) higher twining rate (1.11-lamb born/ewe, Table 4). Similarly, **Al-Haboby *et al*. (1999)** reported that twining rate calculated relative to lambed or joined ewes tended to be greater in the urea supplemented group (27%) than non-supplemented ones (12%), and 2) heavier body weight and more intake of treated ewes during pregnancy than control group (Table 2). **Yaakub *et al*. (1999)** reported that

variability in embryo development rates in vitro might be influenced by dietary intake of donor cattle prior to oocyte recovery.

II- Growth performance of suckling lambs: Average body weight gain and milk intake of suckling lambs from birth till weaning at the 10th week of age are presented in Tables (4 & 7). The effects of treatments on average body weight and milk consumed were significant (P<0.05, Table 7). Groups fed Sugarcane bagasse had greater (P< 0.05) average birth weight and milk consumption than the control group (Tables 4 and 7). Urea treated- silage fed group (T_3) exhibited higher response on average (P<0.01) and total (P<0.05) birth weight than the control group. However, no significant effect for urea treatment or levels on initial or final body weight, weight gain or milk consumed were observed as compared with silage only (T0, Table 2 & 4). Similarly, weaning weight was heavier (P<0.05) in treated groups being 13.34, 13.25 and 13.53 kg for T0, T1.5 and T3, respectively than that of the control group (12.36 kg) (Table 7). The greater total weaning weight in kg/ewes was recorded in T3 (15.33 kg/ewe) followed by T0 (14.91 kg/ewe) and T1.5 (14.78 kg/ewe), while the lowest value was in control

Table (7). Body weight (kg), daily gain (g/day) and milk intake (g/day) of suckling lambs during suckling periods[1].

Parameters	Control		SCBS[2]	
	C	T_0	$T_{1.5}$	T_3
Body bweight[3], kg				
Initial	3.42 ± 0.21	3.94 ± 0.21	3.89 ± 0.22	3.94 ± 0.21
Final	12.36 ^{a} ± 0.22	13.34 ^{c}± 0.21	13.25 ^{bc}± 0.24	13.53^{bc} ± 0.21
Gain	8.98 ± 0.54	9.40 ± 0.53	9.28 ± 0.60	9.49 ± 0.58
Daily weight gain, g/day	128.28 ± 7.77	134.29± 7.56	132.61 ± 8.51	135.56 ± 8.24
Silage intake, g/day	634.95 ^{a} ± 15.5	699.95^{bc}± 15.7	684.90^{c}± 17.3	690.31^{bc}± 16.1

1. values are least square means ± SEM,
2. SCBS = sugarcane bagasse silage with added urea, 0, 1.5 and 3.0 percent,
3. initial weight = weight a birth and final weight was weight at weaning.

Values with different liters in the same raw are different (P< 0.01) except a,c (P< 0.05).

group (13.89 kg/ewe). **Kenny *et al.*. (2001)** and **Sibbald and Davidson (1998)** reported similar results. **Brande *et al.*. (1992)** found that forage treated with urea resulted in improved utilization and in satisfactory ewe performance and lamb growth rate.

This variation in growth performance may be partially due to: 1) greater intake of silage fed to ewes (T_0, $T_{1.5}$ and T_3) during the lactation period (Table 3). **Sibbald and Davidson (1998)** reported that ewes with lower intake during lactation would reduce the live weight gains of their lambs, 2) High average and total birth weight of suckling lambs from treated groups as compared to the controls (Table 4). In this respect, **Hayder (1996)** reported that heavier lambs at birth were capable of suckling more milk. Also, **Sibbald and Davidson (1998)** and **Abd El-Rehim (1997)** found that level of intake during gestation and lactation was shown to have a significant effect on lamb birth weight and subsequent growth rate, 3) Higher milk production of dams and subsequently milk intake by their nursed lambs in the silage fed groups as compared to the controls (Table 7). **Abd El-Rehim (1997)** reported that milk production was of major consideration in determining the body weight of lambs, and 4) higher digestive system capacity and development for silage fed groups as compared with the control ones. **Sibbald and Davidson (1998)** reported that ewes with higher intake during pregnancy and lactation produce lambs with heavier rumen, abomasum and liver when adjusted for empty body weight as compared with that produced from ewes fed on lower level of intake. Also they stated that the lambs from higher intake ewes had significantly longer and wider rumen villi at weaning than did lambs from lower intake ewes. In addition, pregnant ewes with lower intake may have high levels of serum cortisol and low levels of serum triiodothyronine, consequently, lambs would born with reduced metabolic rates, lower vigor and possibly lower chances of survival **(Quigley and Drewry, 1998).**

REFERENCES

Abd El-Rehim S. A. 1997. The reproductive performance of ewes fed rations containing different sources. M. Sc. Thesis, Fac. of Agric., Ain Shams Univ., Cairo, Egypt.

Al-Haboby A. H.; A. D. Salman; T. A. Abdul Kareem. 1999. Influence of protein supplementation on reproductive traits of Awassi sheep grazing cereal stubble. Small Rumin. Res., 34: 33-40.

Aston K.; S. R. Daley and J. C. Tayler. 1979. Maize silage for milk production: The influence of concentrate supplementation and the effect of adding urea or ammonia before feeding. Anim. Prod. 29: 163-173.

Banchero G. E., G. Quintans, G. B. Martin, D. R. Lindsay and J. T. B. Milton. 2003. Production of colostrum by Polwarth ewes grazing Lucerne pastures: effect of birth type and body condition. From CD of IX World Conference on Animal Production, October, 26-31, 2003, Porto Alegre, Rio Grande Do Sul, Brazil.

Bearden H. J. and J. W. Fuquay. 1984. Applied Animal Reproduction. In: Shelley Gelbert (Ed.), The estrous cycle, pp: 63-76. Reston Publishing Company, Inc., Virginia, USA.

Brand T. S., A. A. Brand, S. W. P. Cloete and A. Duramd. 1992. Untreated urea-enriched and thermal – ammoniated oat grains as supplementary feed for pregnant and lactating South Africa Mountain Merino ewes grazing wheat stubble. J South Afrikaanse Tydskrif Vir Veekunde, 22: 58-63.

Castro F. B. and P. F. Machado. 1990. Feeding value of steam treated sugarcane bagasse in ruminant rations. Livestock Res. For Rural Development. Vol. 2, No. 1, February.

Daghash H. A., M. Zenhom and M. Gabr. 1994. Relationship between the fertility and some blood parameters in Chios and Ossimi ewes. Egyptian Soc. Anim. Reprod. Fert., 6 th Anuual Songress, Cairo, February, 7-8.

Dapoza C., C. Castrillo, J. Balcells, S. Martin-Orue and J. A. Guada. 1999. On the variation of urinary excretion of creatinine and purine derivatives in pregnant and lactating ewes given diets with different protein contents. Anim. Sci., 68: 555-566.

Economides, S. (1987) Sheep and goat production research and development in Cyprus. Page 59-74 in Small Ruminant in the Near East, FAO Anim. Prod. An Health

Elliott R. C. 1967. Voluntary intake of low-protein diets by ruminants. 1- Intake of food by cattle. J. Agric. Sci (Camb.), 69: 375-382.

El-Senousy M. and S. H. Ismail. 1995. Silage and its nutritive value for ruminants (in Arabic). Omar El-Mokhtar Univ. (Ed.).

Fahey J.; M. P. boland and D, O`Callaghan. 2001. The effect of dietary urea on embryo development in superovulated donor ewes and on early embryo survival and development in recipient ewes. Anim. Sci., 72: 395-400.

FAO. 2002. FAOSTAT Database. www.FAO.org/faostat Database Results.htm.

Ferguson J. D. and W. Chalupa. 1989. symposium: Interactions of nutrition and reproduction. Impact of protein nutrition and reproduction in dairy cows. J. D. Sci., 72 : 3080-3086.

Hayder M. 1996. Growth performance and some physiological parameters of suckling lambs fed ascorbic acid. M. Sc. Thesis, Fac. of Agric., Assiut Univ., Assiut, Egypt.

Jainudeen M. R., H. Wahid and E. S. E. Hafez. 2000. Sheep and goats. In, Hafez E.S. E. and B. Hafez (Eds.), Reproduction in farm animals, pp: 172-181, Lee and Febiger publisher, Philadelphia

Jordan E. R. and L. V. Swanson. 1979a. Effect of crude protein on reproductive efficiency, serum total protein and albumin in the high producing dairy cow. J. Dairy Sci., 62: 58-63.

Jordan E. R. and L. V. Swanson. 1979b. Serum progesterone and Luteinizing hormone in dairy cattle fed varying levels of crude protein. J. Anim. Sci., 48: 1154-1158.

Kenny D. A.; M. P. Boland; M. G. Diskin and J. M. Sreenan. 2001. Effect of pasture crude protein and fermentable energy supplementation on blood metabolite and progesterone concentrations on embryo survival in heifers. Anim. Sci., 73: 501-511.

Knox M. and J. Steel. 1996. Nutritional enhancement of parasite control in small ruminant production systems in developing countries of South East Asia and the Pacific. International J. Parasitology, 26: 963-970.

McEvoy T., J. Robinson, R. Aitken, P. Findlay and I. Robertson. 1997. Dietary excess of urea influence the viability and metabolism of preimplantation sheep embryos and may affect fetal growth among survivors. Anim. Rep. Sci., 47: 71-90.

Mohamed K. I. 1998. Effect of feeding corn stover treated with ammonia and urea on sheep performance. Ph D. Thesis, Fac. of Agric., Assiut Univ., Assiut, Egypt.

Mohamed R. S. 1986. Effect of different levels of nutrition on the productive and reproductive performance of sheep. Ph D. Thesis, Fac. of Agric., Al-Azhar Univ., Cairo, Egypt.

NRC. 1985. Nutrient requirements of sheep, (6th Ed.), National Academy of Science, National Research Council, Washington, DC.

O`Doherty J. V. and T. F. Crosby. 1996. The effect of diet in late pregnancy on progesterone concentration and colostrum yield in ewes. Theriogenol., 46: 233-241.

O`Doherty J. V. and T. F. Crosby. 1998. Blood metabolite concentrations in late pregnant ewes as indicators of nutritional status. Anim. Sci., 66: 675-683.

O`Doherty J. V.; P. F. Maher and T. F. Crosby. 1997. The performance of pregnant ewes and their progeny when offered grass silage, maize silage or maize silage/ ensiled super pressed pulp mixture during late pregnancy. Livestock Prod. Sci., 52: 11-19.

Olsson G., C. Bergsten and H. Wiktorsson. 1999. The influence of diet before and after calving on the food intake, production and health of primiparous cows, with special reference to sole hemorrhages. Anim. Sci., 66: 75-86.

Putnam D. E., G. A. Varga and H. M. Dann. 1999. Metabolic and production responses to dietary protein and exogenous somatotropin in late gestation dairy cows. J. Dairy Sci., 82: 982-995.

Quigley J. D. and J. J. Drewry. 1998. Symposium: practical considerations of transition cow and calf management. Nutrient and immunity transfer from cow to calf pre- and postcalving. J. Dairy Sci., 81: 2779-2790.

Rowlands G. J. 1980. A review of the variation in the concentrations of metabolites in the blood of beef and dairy cattle associated with physiology, nutrition and disease with particular references to the interpretation of metabolic profiles. Wld. Rev. Nutr. Diet, 35: 172-235.

Rowlands G. J.; W. Little and B. A. Kitchenham. 1977. Relationship between blood composition and fertility in dairy cows - a field study. J. Dairy Res., 44:1-7.

Sanh M. V.; H. Wiktorsson and L. V. Ly. 2002. Effect of feeding level on milk production, body weight change, feed conversion and postpartum oestrus of crossbred lactating cows in tropical conditions. Livestock Prod. Sci., 77: 331-338.

SAS, Statistical Analysis System Institute. 1989. SAS/STAT user's guide, version 6.12, SAS institute Inc., Cary, NC.

Sibbald A. M. and G. C. Davidson. 1998. The effect of nutrition during early life on voluntary food intake by lambs between weaning and 2 years of age. Anim. Sci., 66: 697-703.

Stock A. E. and J. E. Fortune. 1993. Ovarian follicular dominance in cattle: relationship between prolonged growth of the ovulatory follicle and endocrine parameters. Endocrinology. 132: 1108-1114.

Yaakub H.; D. O'Callaghan and M. P. Boland. 1999. Effect of roughage type and concentrate supplementation on follicle numbers and in vitro fertilization and development of oocyte recovered from beef heifers. Anim. Reprod. Sci., 55: 1-12.