

The Effect of Urea Treated Straws and Urea-Molasses Feed Blocks (UMB) on Reproductive Performance of Libyan Barbary Sheep

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ABSTRACT: This experiment was conducted to evaluate the effect of urea treated straws and urea-molasses feed blocks (UMB) on reproductive performance of Libyan Barbary sheep. Total of 78 head of weaned females Barbary sheep were assigned randomly to four groups. Control group received untreated straws, group 1 received straws treated with urea, group 2 received untreated straws in addition to urea- molasses feed blocks (UMB), and group 3 received straws treated with urea plus UMB. The straws were treated with urea (4%). Blood samples were collected for the analysis of progesterone hormone to detect the ovarian activity. The average concentration of progesterone for the three months of age (the seventh, eighth and ninth) was significantly different ($P \leq 0.05$) between the control (1.47 ng/ml) and the first group (1.76 ng/ml), and between the second (1.24 ng/ml) and each of the control and first groups and also between the first and the third group (1.56 ng/ml), were it was not significant between the control and the third group. The results showed the percentage of animals reached puberty during the period of taking blood samples, where the female lambs in the first group recorded highest percentage of puberty during the seventh and eighth month of age (33.3%) and (28.57%) respectively, followed by the third group (31.57%) and (26.33%). The study showed highest conception rate, lambing % and twinning % in the first group 33.3%, 38%, 4.7% followed by the third group 21, 21%, 0% respectively. The results also showed no significant differences ($P \leq 0.05$) in the birth weight of new born lambs between groups. The averages weights were 3.76, 3.63, 3.11 and 3.82 kg in the control, first, second and third groups, respectively. It is clear that urea has no negative effect on the reproductive performance, and can be used safely to increase the nutritional value of the straws.

Keywords: Sheep, straw, Urea, Progesterone.

INTRODUCTION

Straws are the main source of roughages for feeding ruminants in the tropics and subtropics, but do not provide sufficient nutrients even for maintenance. Many of these countries start looking for improving the nutritional value of these roughages by using chemical treatment, and urea was suggested as the best, cheaper and the available source.

Sepulveda *et al.*, (1996) reported that lambs received urea reached puberty earlier than control group, and pregnancy percentage were 55.6 and 30.0 respectively. High levels of urea might retard puberty age and fertility in young growing lambs (Abi Saab, 2003). Miller (2005) had found the treatment of range straw with urea and molasses improved the nutritional value and production of new born lambs. Cereal straws can be treated with urea without negative effects on growth parameters of their lambs and reproductive performance (Akraim *et al.*, 2009).

Using feed blocks in feeding ruminants is one of the strategies used to improve the diets high in fibers during dry season (Aganga *et al.*, 2005). They reported that feed blocks consist of 47% molasses, 15% urea and 16% bran increased the body weight of the lambs by 94% compared to control group.

MATERIALS AND METHOD

This experiment was conducted at the sheep research station, faculty of agriculture, university of Tripoli, Libya. Total of 78 head of weaned female lambs of Libyan Barbary sheep (3-4 months of age) and with average weight of 19.42 kg were assigned randomly to four groups: control Group (18 head) received untreated straws, group 1 (21 head) received urea treated straws (4% urea), group 2 (20 head) received untreated straws plus urea-molasses feed blocks (UMB), and group 3 (19 head) received treated straws (4% urea) plus urea-molasses feed blocks (UMB). All groups supplied with concentrate diet started with 250 gm/head/day at age of 3-6 months and increased to 500 gm/head/day after 6 months until the end of experiment. Straws were given *ad libitum* and water was available at all times. Approximate chemical analysis (AOAC, 1990) of feeds used in the experiment is presented in table (1).

Table 1. Approximate analysis of feeds used in the experiment.

Feeds/ Nutrients	Concentrates %	Untreated straws %	Treated straws %	Urea-molasses feed blocks (UMB) %
Dry Matter	88.48	91.8	92.8	81.32
Carbohydrates	76.24	47.23	43.11	30.4
Proteins	12.84	4.51	10.24	40.42
Fats	1.92	0.7	1.18	0.85
Crude fibers	4.46	39.65	38.24	2.55
Ash	4.54	7.91	7.23	25.78

Treatment of straws with urea

Straws treated with urea (4%) according to Bonomi *et al.*, (1993) by dissolving 4 kg of urea in 40 liters of water and spraying it on 100 kg of barley straw (on DM basis) which spread on polyethylene sheet. The sprayed straw was covered with the same polyethylene sheet and well tight and subjected to urealalysis by anaerobic storage for 3-4 weeks. The animals in treated groups were subjected to adaptation period for 15 days. The treated and untreated straws were given to the animals of treated groups by a ratio of 25%: 75% during the first 5 days, 50%: 50% during the 5 days after and 75%: 25% for the last 5 days.

Preparation of urea-molasses feed blocks (UMB)

The molasses feed blocks were prepared by mixing molasses (42 kg) with urea (10 kg) 12 hours before mixing with another ingredients, then added 9 kg cement, 5 kg sodium chloride, 2 kg minerals, and 30 kg wheat bran. The ingredients were thoroughly and molded to rectangular blocks of an average of 8 kg, and left at least one week to solidify before feeding. Animals in treated groups subjected to adaptation period for 12 days. UMB were allowed to be licked by the animals for only one hour during the first 3 days, 3 hours for the next 3 days, then 5 hours for the next 3 days and 8 hours for the last 3 days before feeding them *ad libitum*.

Blood samples

Ten ml. of blood samples were collected from jugular vein of lambs in anti- coagulant vacutainer tubes 2 times per week for 3 months starting from the beginning of seventh until the end of ninth month of age. The collected samples were centrifuged for 10 minutes at 3000 rpm, and the obtained plasma samples were stored in deep-freezer for subsequent analysis of progesterone hormone to detect the ovarian activity of lambs. The analysis of progesterone hormone was carried out by ELISA technique in Biotechnology Research Center in Tripoli according to the procedure approved by BioCheck, Inc the producer of the standard kits.

Collection of data

The lambs were weighed at weaning age (3-4 months) and at one month intervals until they were 12 months of age. Consumption of treated and untreated straw also was recorded for one month. Age at puberty was determined through progesterone concentration in plasma. Conception rate, date of birth, weight of new born lambs and lambing % were determined.

Statistical analysis

The design used in the experiment based on complete randomized design (CRD) and the obtained data were analyzed according to Statistical Analysis system user's Guide (SAS. 2013) for one way analysis of variance, and by using Duncan test (DUNCAN, 1955) to compare between means. According to the following model:

$$Y_{IJK} = \mu + A_i + B_j + e_{IJK}$$

Where: Y_{IJK} = response,

μ = general mean,

A_i = effect of urea,

B_j = effect of UMB,

e_{IJK} = random error.

RESULTS AND DISCUSSION

The concentration of progesterone hormone:

The concentration of progesterone hormone was measured during the period between the beginning of the seventh and the end of ninth months of age to detect the age of puberty. The average concentration of progesterone during the seventh, eighth and ninth month and the general mean are shown in table 2.

Table 2. The mean concentration of progesterone hormone (ng/ml) \pm SE during the seventh, eighth and ninth months and the general mean during this period.

Treat groups/ Age (month)	Mean of Progesterone concentration (ng/ml) \pm SE			
	Control	Group 1	Group 2	Group 3
Seventh	0.96 \pm 0.04 ^{ab}	1.24 \pm 0.09 ^{ab}	0.96 \pm 0.048 ^{ab}	0.96 \pm 0.025 ^{ab}
Eighth	1.18 \pm 0.111 ^{bcd}	1.51 \pm 0.157 ^{ac}	1.141 \pm 0.05 ^{bd}	1.36 \pm 0.121 ^{cd}
Ninth	2.26 \pm 1.84 ^e	2.54 \pm 0.214 ^e	1.59 \pm 0.089 ^f	2.36 \pm 0.137 ^e
General mean	1.47 \pm 0.1264 ^b	1.76 \pm 0.138 ^a	1.24 \pm 0.06 ^c	1.56 \pm 0.124 ^{cb}

^{abcde} Means with the different superscripts within row are significantly different at, (P \leq 0.05).

The data shows that there were no significant differences (P \leq 0.05) in the concentration of progesterone hormones between the groups during the seventh month (0.96, 1.24, 0.99 and 0.96 ng/ml respectively). During the eighth month there was only significant difference between the first group (1.51 ng/ml) and the second group (1.14 ng/ml). Progesterone concentrations during the ninth month were 2.26, 2.54, 1.59 and 2.36 ng/ml for the control, first, second and third groups respectively, and there were no significant differences (P \leq 0.05) between the control group and the first and third groups, while there was difference between the second group and other groups. According to the general mean during the period between seventh and ninth months of age, we found that there was significant difference (P \leq 0.05) between the control (1.47ng/ml) and first group (1.76 ng/ml) and second group (1.24 ng/ml), and also between the first and third group (1.56 ng/ml), while there were no differences between the control and the third group and also between the second and the third group.

Overall, the concentrations of progesterone were higher in groups subjected to urea treatment compared with untreated groups, and the concentration increased

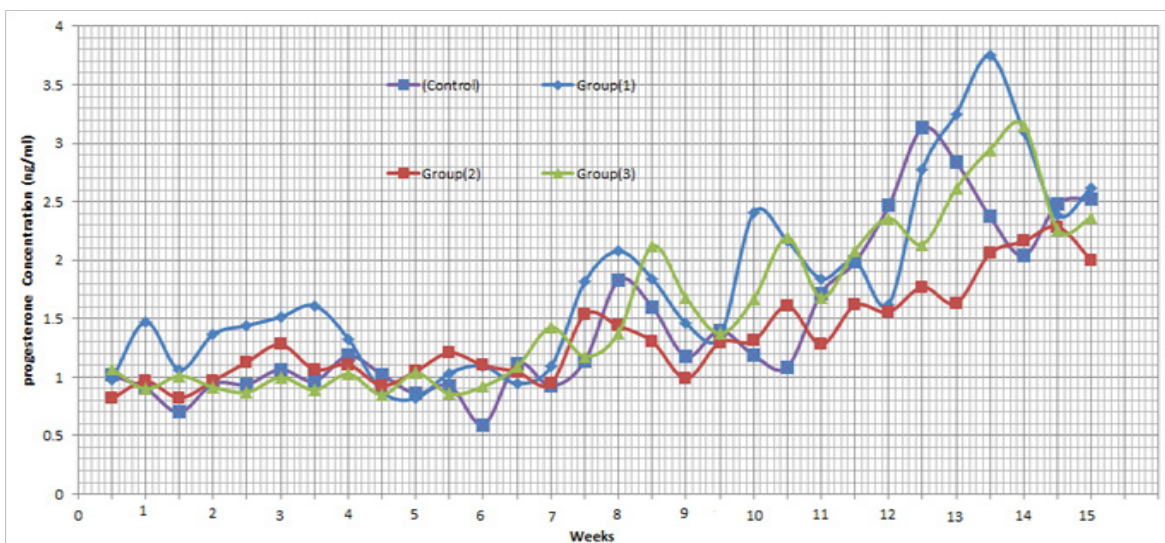


Figure 1. The concentration of progesterone (ng/ml) during the seventh, eighth and ninth month of age

As the lambs advanced in age and start cycling (figure 1), this result is not consistent with Santos (2001) who reported that the products of nitrogen metabolism (urea – nitrogen) may decrease progesterone concentration in plasma, and Akraim *et al.*,(2012), who reported that progesterone concentration did not differ between treated and untreated groups in sheep. Mohammed *et al.* (2012) reported that feeding urea 1-1.5 % had negative effects on number and diameter of ovarian follicles and the concentration of progesterone.

Age of puberty :

Table (3) shows the percentage of animals reached puberty during the period between the seventh and the ninth months of age and after ninth month. The lambs reached puberty during the seventh month were 33.33, 20.00 and 31.57 % for group 1, 2 and 3 respectively, and no lambs reached puberty in the control group.

The rams were introduced at early age (7 months) and the exposure was only for two months which resulted in low conception rate in all groups compared with other literatures (Edrees,1997), and this is also reflected on lambing % and twinning % . The lambing % was 16.6, 38.0, 15.0 and 21.0 % for control, group 1, group 2 and group 3 respectively. Twinning occurred only in animals received urea treated straw (group 1) and were no twinning in other groups (control, group 2 and group 3). The results show that conception rate and lambing % were better in animals received urea treated straw compared with other groups, which agreed with the findings of Edrees (1997) and Hoon *et al.*,(2000).

However, these percentages of lambs in puberty increased by advancing age in all groups, and less than 20 % of these lambs reached puberty after the ninth month of age. The results indicated that lambs received urea treated straw and urea-molasses feed blocks (UMB) reached puberty earlier than control group. This may be due to providing the rumen with energy source and nitrogen that causes the increase in activity of bacteria which increase the amount consumed and rate of digestion.

Table 3. Percentage of lambs reached puberty during the seventh, eighth, ninth and after ninth month of age.

Traits \ Treat. group /	Control Group (18 lambs) %	Group 1 (21 lambs) %	Group 2 (20 lambs) %	Group 3 (19 lambs) %
Seventh	00.00	33.33	20.00	31.57
Eighth	33.34	28.57	35.00	26.33
Ninth	50.00	23.82	30.00	26.32
After ninth month	16.66	14.28	15.00	15.78

This results agreed with the findings of Kobeisy *et al.*, (2008); Ben Salem and Nefzaoui, (2003); and Sepulveda *et al.*, (1996) when they reported that lambs reached puberty earlier in groups given straw treated with urea and feeding blocks (UMB) compared with the control groups, and they related that to the increase in digestibility of roughages and the improvement of live weights of the lambs. On the other hand Abi Saab *et al.*, (2003) reported that using relatively high levels of urea may delay puberty age and fertility in growing lambs.

c) conception rate , lambing % and twinning %:

The effect of feeding treated and untreated straw and urea-molasses feed blocks (UMB) on conception % and lambing % are presented in table (4).The conception % were 16.6, 33.3, 15.0 and 21.0% for the control, first, second and third group respectively.

Table 4. Conception %, lambing % and Twinning % in control and treatment groups.

Traits \ Treat. group /	Control Group (18 lambs)	Group 1 (21 lambs)	Group 2 (20 lambs)	Group 3 (19 lambs)
Conception %	16.6	33.3	15.0	21.0
Lambing %	16.6	38.0	15.0	21.0
Twinning %	00.0	04.7	00.0	00.0

d) weights of new born lambs :

Studying the weights of new born lambs to investigate the effect of urea and UMB on the growth of new born lambs during pregnancy period of mothers receiving urea and UMB.

Table 5. Mean \pm SE of weight of new born lambs in control and treatment groups.

Trait \ Treat Groups/	Control	Group 1	Group 2	Group 3
Weights of new born lambs(kg)	3.76 \pm 0.16 ^a	3.63 \pm 0.26 ^a	3.11 \pm 0.90 ^a	3.82 \pm 0.18 ^a

There were no significant differences ($p \leq 0.05$) in the weights of new born lambs between groups, and the means were 3.76, 3.63, 3.11 and 3.82 for the control, group 1, group 2 and group 3 respectively. This results are consistent with Edrees (1997), Akraim *et al.*, (2009) and Sepulveda *et al.*,(1996) when they reported that urea treatment had no effects on weights of new born lambs, and did not agree with Hendranto (1991) who reported that there were an increase in the body weights of new born of mothers fed straw treated with urea.

CONCLUSION

It is clear that urea has no negative effect on the reproductive parameters and weights of new born lambs , and most of the parameters studied were better in lambs received urea and UMB. So that urea can be used safely to increase the nutritional value of the straw without causing any undesirable effects on reproductive characteristics of the female lambs of Libyan Barbary sheep.

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