The effect of urea-treated barley straw in ewe’s diet on pre-weaning growth parameters of lambs

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SUMMARY

The objective of this study was to evaluate the effects of urea-treated straw in ewe’s diet on pre-weaning growth parameters of her lambs. Forty Barbary ewes (3-6 years of age, average weight 41 kg) were randomly chosen from the flock of Al-Fateh University Sheep Experimental Station. Ewes were divided into two groups, control group (C) receive untreated barley straw and treatment group (T) receive barley straw treated with 10 % urea solution applied as 40% (V/W). All barley straw was sprayed with molasses when introduced to animals. Both groups receive commercial concentrate according to physiological state. Experiment started with introducing the rams in July. Fifteen lambs in each group were studied. Mean birth weight of lambs was 4.21kg and 3.733kg for T and C groups respectively, there was no significant difference between groups. Over all groups, males were heavier at birth 4.279kg than female 3.7kg (p < 0.05). Birth weight was 4.5kg and 3.99kg in males, 3.88kg and 3.56kg in females for T and C groups respectively. Interaction between urea treatment and sex of lamb was not significant. Pre-weaning average daily gain (DG) in lambs of T group (222.19g), in C group (203.82g), but this difference was not significant. DG was 232.553g and 213.439g in males, 210.346g and 197.407g in females for T and C respectively. DG was not affected by treatment-sex interaction. Lambs of T group were heavier (27.733kg) than lambs of C group (24.30kg) at weaning (weaning age adjusted to 120 days) (p < 0.05). Weaning weight was 31.678 kg and 29.34kg in males, 30kg and 27.037kg in females for T and C respectively. Effect of sex-treatment interaction was not significant. Cereal straws can be treated with urea and incorporated in ewe’s diet without negative effects on growth parameters of her lambs.

Keywords: urea, straw, Barbary lambs, birth weight, daily gain, weaning weight.

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INTRODUCTION

Feed shortage is a major constraint for sheep and goat production in Libya. Cereal straws represent the only roughage of sheep and goats for long period of year.

Urea treatment is a method in which straw is treated by ammonia released from urea, and it is technically feasible method to improve the nutritive value of straws (Schiere and Nell, 1993). Lambs received wheat straw treated with urea showing the best performance in comparison with those received non treated wheat straw (Antongiovanni et al. 1991).

Daily weight gain was higher in ram lambs received urea treated straw in comparison with straw alone or the addition of urea grain at feeding (Abi Saab et al. 2003). When two thirds of the total nitrogen in a poor quality 50% forage diet was supplied in urea to the heifers, birth weight of calves and average daily gain of calves was not statistically different because of the dietary treatment of their dams (Bond and Oltjen 1973).

To our knowledge the information is rare about the effect of ewe consumption of urea treated straw during pregnancy and lactation on the subsequent growth parameters of their lambs. The results presented in this paper are part of study conducted to investigate the effect of urea treated barley straw on the reproductive performance and post-partum ovarian activity of Libyan Barbary ewes (Akraim et al. 2008).

MATERIAL AND METHODS

This study was conducted in sheep experiment station, Faculty of agriculture, Al-Fateh University, Tripoli. Experiment station located in 32-52 n, and 31-13 s. Forty Barbary ewes (3-6 years, mean weight 41,2 kg) were randomly chosen from the flock, and subdivided in two groups each with 20 ewes. The study begin with the introduction of rams in June.

The two groups received commercial concentrate according to their physiological stage, based on corn and soybean meal, and offered barley straw (control group) or urea-treated barley straw (treatment group). Water offered ad-libitum.

Barley straw treated with 10 % urea solution applied as 40% (V/W). Barley straw treated or untreated with urea was sprayed by molasses when introduced to animals and offered ad-libitum. Chemical composition of straw appeared in Table 1. Adaptation period of 15 days to urea was carried. Fifteen ewes of each group were lambed. Sixteen lambs were born to treatment group and seventeen to control group. Fifteen lambs where randomly studied in each group. Weight of lambs has been registered within 15 hours of birth and each week until weaning. All lambs have been weaned in the same time and the comparison between the two groups made on the basis of 120 days adjusted weaning weight according to the following equation:
120 days adjusted weaning weight = ((weaning weight – birth weight)/age at weaning)*120 + birth weight

Birth weights, daily gain and weaning weights are presented as means using the following model: $Y_{ijk} = M + A_i + B_j + AB_{ij} + E_{ijk}$

With $M$: general mean, $A$: urea treatment, $B$: lamb sex, $AB$: urea treatment-sex interaction and $E_{ijk}$: standard error. The effect of the feeding urea treated straw was considered significant when the level of probability was 0.05 or less. Trends for the feeding to affect pre-weaning growth were admitted for levels of probability comprised between 0.05 and 0.1.

Table 1. Chemical composition of barley straw (% of Dry matter)

<table>
<thead>
<tr>
<th>Straw</th>
<th>Moisture</th>
<th>Crude protein</th>
<th>Ether extract</th>
<th>Crude fiber</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated straw</td>
<td>6.5</td>
<td>12.88</td>
<td>1.96</td>
<td>29.98</td>
<td>8.7</td>
</tr>
<tr>
<td>Untreated straw</td>
<td>2</td>
<td>2.6</td>
<td>1</td>
<td>37.81</td>
<td>7.5</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Birth weights, daily gain and adjusted weaning weights of lambs of two groups were presented in table 2 and significance of the main effects and their interaction are presented in table 3. Male lambs were heavier at birth than female lambs (4.28kg vs. 3.70 kg).

Table 2. Birth weight, daily gain and adjusted weaning weight of lambs

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>BW (kg)</th>
<th>DG (g)</th>
<th>WW (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>15</td>
<td>4.21 ± 0.171</td>
<td>222.19 ± 6.86</td>
<td>30.96 ± 0.87</td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>3.73 ± 0.148</td>
<td>203.82 ± 9.17</td>
<td>27.97 ± 1.14</td>
</tr>
<tr>
<td>M</td>
<td>14</td>
<td>4.28 ± 0.15</td>
<td>224.36 ± 11.01</td>
<td>30.73 ± 1.29</td>
</tr>
<tr>
<td>F</td>
<td>16</td>
<td>3.70 ± 0.15</td>
<td>203.07 ± 5.68</td>
<td>27.71 ± 1.47</td>
</tr>
<tr>
<td>MT</td>
<td>8</td>
<td>4.50 ± 0.22</td>
<td>232.55 ± 13.53</td>
<td>31.68 ± 1.47</td>
</tr>
<tr>
<td>MC</td>
<td>6</td>
<td>3.99 ± 0.15</td>
<td>213.44 ± 18.72</td>
<td>29.34 ± 2.45</td>
</tr>
<tr>
<td>FT</td>
<td>7</td>
<td>3.88 ± 0.22</td>
<td>210.35 ± 4.67</td>
<td>30.00 ± 3.86</td>
</tr>
<tr>
<td>FC</td>
<td>9</td>
<td>3.56 ± 0.21</td>
<td>197.41 ± 9.25</td>
<td>27.04 ± 1.18</td>
</tr>
</tbody>
</table>

BW: birth weight, DG: daily gain, WW: 120 days adjusted weaning weight, T: treatment, C: control, M: males, F: females, MT: treatment males, MC: control males, FT: treatment females, FC: control females. Means in the same column with different superscripts differ (p < 0.05).

Table 3. Significance of the main effects and interaction

<table>
<thead>
<tr>
<th></th>
<th>Urea</th>
<th>Sex</th>
<th>Urea x sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight</td>
<td>0.065</td>
<td>0.021*</td>
<td>0.670</td>
</tr>
<tr>
<td>Daily gain</td>
<td>0.197</td>
<td>0.126</td>
<td>0.800</td>
</tr>
<tr>
<td>Weaning weight</td>
<td>0.039*</td>
<td>0.096</td>
<td>0.589</td>
</tr>
</tbody>
</table>

In comparison with birth weights of Barbary lambs recorded in east region of Libya: 3.401 and 3.144 kg for male and female respectively (Akraim 2008).
Birth weights in this study were heavier. The fact that the management and nutrition of sheep in experiment stations are better than those of farmers flocks are thought to be important factor in this difference.

Inclusion of urea treated barley straw in ewe's diet during gestation and lactation period didn't significantly affect birth weight in this study (p < 0.05). However, there is a trend in this experiment for urea to increase birth weight.

Dietary excesses of urea associated with an increase in embryo mortality were reported, but growth enhancement of embryos among those that survive has been also mentioned (McEvoy et al. 1997). Although urea had not included in their experiment, Kleemann et al. (1993) found that birth weight was not significantly improved by either increased nutrition during mid pregnancy or an increased proportion of dietary protein fed in late pregnancy. Similar results has been reported by Bond et al. (1967) and Bond and Oltjen (1973) on cattle when urea replaced one third of protein in diets.

Average daily gain didn't significantly differ between the lambs of two groups (p < 0.05). Interaction between sex and urea was not significant (p < 0.05).

The results of our study revealed that daily gain of lambs received milk from ewes consumed urea treated straw didn't significantly different from lambs of control group.

Weaning weight (adjusted to 120 days) for lambs of urea-treated straw group was significantly higher than lambs of control group when considered together (males and females) (p < 0.05). In our experiment, lambs of two groups begin to consume small quantities of straw with the progress of age and apparently direct consuming of treated straw is a participatory factor. Treatment of straw has elevated it’s crude protein content from 2.6% in untreated to 12.88% in treated straw (Table 1.). Kraiem et al. (1991) found that lambs fed urea treated wheat straw had greater daily gains than those fed untreated straw. Response of parameters tested in this study to urea didn’t affected by sex of lamb (p < 0.05).

**CONCLUSIONS**

Urea in the ratio employed in this experiment can be safely utilized in the treatment of cereal straws and incorporated in the ewes diet during the gestation and lactation period without detrimental effect on birth weight and growth parameters of pre-weaning lambs. There is a tendency of birth weight to be enhanced due to urea inclusion in the mother's diet.

**REFERENCES**


