PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
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Pakistan Journal of Nutrition 2 (4): 258-261, 2003

Feeding of Urea Treated Wheat Straw in Saanen Goat Male Kids

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Abstract: This study was conducted to determine the wheat straws treated with urea (0.05 kg/kg straw) and low protein concentrate in Saanen male kids performance. Thirty-two Saanen male kids (16 weeks of age; 16.125 ± 0.5 kg body weight) were used in a completely randomized design and divided into two uniform treatments. 50 kg urea dissolved in 1000 kg water spreaded over 1000 kg wheat straw and stored for 30 days. Each treatment consisted 16 kids during the 16-weeks to compare performance with diets based on wheat straw (WS) supplemented with 12% crude protein (CP) levels of crushed barley-wheat concentrate (50:50) as traditional in Turkey. Treatment I (control) were fed on 500 g. untreated straw (US) and 500 g. crushed barley-wheat concentrate (50:50). Treatment II were fed on urea treated straw (UTS) and crushed barley-wheat concentrate (50:50). At the end of the trial, the findings were not statistically important ($p<0.05$). In conclusion, supplementation of treated wheat straw (TWS) with a barley-wheat based concentrate support had not positive effect on Saanen kids' performance for 4 months.

Key words: Urea treatment, goat kids, wheat straw, barley-wheat

Introduction

The province of Çanakkale is situated on both sides of the straits which separate two continents called Asia and Europe. Geographically, it is in the north-west of Turkey. Economy in the province depends on agriculture and livestock breeding, but in the recent years the industry which depends on dairy industry has developed considerably. The industry which deals with the sub-branches of dairy products especially Saanen goats has also developed in the region. Goat meat (kid) is eaten by more people than any other meat in Çanakkale. It is particularly healthy and nutritious and is exceptionally low in fat and calories compared to other meats.

In this province authorities has recognized the potential value of the estimated thousands tons of utilizable cereal straw that go to waste by using wrong in Çanakkale. There is a large excess of crop residues, mainly wheat straw and barley straw in this province. The use of straw for cattle, sheep, goats fattening has been limited by the low intake and consequent requirement for costly supplement Straw is the most abundant of all agricultural residues and has a great potential as a feedstuff for ruminants in most semi-arid and sub-tropical regions. However, voluntary intake and digestibility of straw are limited by its high lignin content, the manner by which lignin is bound to digestible materials, and its low nitrogen content (Coxworth *et al*., 1977). In the present experiment, treated with urea of straw was used to investigate whether this could be used, together with a limited amount of supplement, as a food for fattening. Nutritional surveys in various parts of the Turkey show that ruminants are mostly maintained on straw-based rations (Coskun *et al*., 1990). Animals on such rations often suffer from poor nutritional values. Therefore, the improvement of the nutritional values of straw is presently used to a small extent at farms in Turkey. Cereal straws differ in two important respects from the vast majority of other plant materials offered as feed to ruminant and non-ruminant animals. Treatment of straw with chemicals like ammonia and ammonia precursors as urea to increase the digestibility is used in many parts of the world. Such treatment generally increases both the rate and extent of fibre digestion in the rumen, which leads to higher energy value of the treated material as well as to a higher intake. The potential increase in both rate and extent of digestion can only be realized if other factors necessary obtain this increase are not limiting. The most important factor in this context is the quantity of nitrogen supplied to the rumen microorganisms. Treatment of straw will thus not only influence fibre digestibility but has also a great impact on nitrogen metabolism (Hvelplund *et al*., 1978). Urea may be a cheaper means of providing some of the required nitrogen to goats, but it must not interfere with maximum feed intake. The nitrogen content of feed grade urea is 42-45 percent in contrast to feed protein with 16 percent. Good urea use in the rumen depends on rations with at least 75 percent TDN and the availability of sufficient starch and sugars like molasses to convert the urea nitrogen into microbial protein, and when the ration protein content is below 12 percent. The protein content in straw is generally low [app. 40 g CP (Crude Protein)/kg DM]. The major part of this protein is probably associated with the cell walls and therefore slowly degradable in the rumen. Treatment of straws to increase the fibre digestion probably also increases the

Table 1: Chemical composition dry matter basis of feeds (%)

Feeds/Compositions	Untreated straw	Treated straw	Wheat	Barley
Ash	3.39	2.52	2.0	2.5
Crude protein	4.06	8.38	11.8	10.5
Ether extract	1.89	2.06	1.9	1.9
Crude Fiber	40.7	40.7	2.8	5.0
Dry Matter	92.41	59.68	88	89
Moisture	7.31	40.32	12	11

Table 2: Feeding urea treated (UTS) or untreated (US) straw and cereal to local Saanen kids' performance

Groups Characters	Control	Urea Treatment Straw
Initial Body weight (kg)	16.125	16.120
Weekly weight gain in group (g)	3.46	5.9
Straw intake in group (kg/d)	4.46	4.46
Cereal intake in group (kg/d)	6.81	6.81
Days on trial (d)	112	112
Total live weight gain in group (kg)	310	346.5
Cost of Straw (kg/Cent)	5.7¢	7¢

Table 3: Response of urea treated (UTS) - untreated (US) straw and cereal to local Saanen kids' body weights during the feeding periods

Weeks	Control	Treatment
1	16,12 ± 0,98	16,12 ± 0,98
2	15,18 ± 0,98	16,18 ± 0,98
3	18,59 ± 1,10	18,37 ± 1,10
4	18,21 ± 1,10	18,65 ± 1,10
5	17,78 ± 1,21	18,46 ± 1,21
6	18,56 ± 1,23	18,50 ± 1,23
7	18,56 ± 1,27	18,71 ± 1,27
8	19,93 ± 1,39	19,99 ± 1,39
9	20,88 ± 1,46	20,43 ± 1,46
10	21,52 ± 1,50	21,28 ± 1,50
11	20,81 ± 1,46	21,71 ± 1,46
12	21,38 ± 1,46	21,58 ± 1,47
13	22,24 ± 1,54	23,24 ± 1,54
14	21,41 ± 1,54	23,04 ± ,54
15	21,45 ± 1,47	23,39 ± 1,47
16	22,16 ± 1,53	24,16 ± 1,53

protein degradation as the major part of the protein is associated with the cell walls. Rumen microbial synthesis requires an adequate supply of nitrogen to achieve maximal efficiency. This paper discusses the effects of wheat straws treated with urea (0.05kg/kg straw) on Saanen kid's fattening performance.

Materials and methods

Two groups of kids were chosen for this experiment. One group of 16 kids were fed a 500 g/d crushed barley-wheat based concentrate (50:50)/, at 1.5% of body weight with wheat straw 3.56% dry matter (DM), plus crushed barley-wheat the other group consisted 16 kids and were fed treated wheat straw (TWS) 3.56% DM with 5% urea.

Animals and treatments: Thirty-two Saanen male kids (n = 32) were used. They were 16 weeks of age and between 16.125 ± 0.5 kg body weight. They were allocated at random to receive 16 for control and 16 for treatments. The groups were as follows:500 g/d untreated straw + 500 g/d crushed barley-wheat based concentrate (50:50), and 500 g/d treated straw + 500 g/d crushed barley and wheat based concentrate (50:50)/d. The feeds were given for 4 months. Prior to that the kids were adapted to indoor feeding and to the straw diet for a period of 15 days. The experiment was carried out at Hacioglu farm in Ezine-Çanakkale.

Urea treatment of straws: 50 kg urea (46% N) was dissolved into a 1000 liter capacity of tank and 1000 kg wheat straws were spreaded and pulverized by pulverizator on a large surface at 28 °C in May. The stacks were moistured and pressed with a farm tractor and covered with a plastic and left for 30 days before being opened. Before the feeds were used, the stack was allowed to ventilate for 3 days to allow for the escape of volatile ammonia and for drying.

Composition of diets: The supplement consisted of 50% by weight of crushed barley and 50% of wheat .The chemical composition of the supplement ingredients and of the treated and untreated straw is given in Table 1 according to Feedstuffs ingredient analyses table, 1998 edition by Dale, 1998; Ergül, 1997.

Statistical Analyses: Results were subjected to a model with the fixed effects of age, treatment and repeated effect on kids was using by SAS (1987) packet programme.

Management of the fattening trial: The sixteen kids for each treatment and control were fed in groups but care was taken to see that the supplement was well distributed along the trough to ensure that all animals had an equal share. New straw was introduced twice daily. An allowance was offered to ensure that 10 to 15% of uneaten straw remained before each feeding time

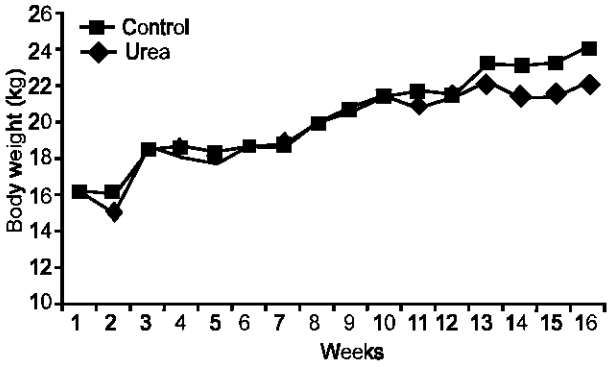

Fig. 1: Effect of UTS, US and crushed barley-wheat to local Saanen kids body weight

and the daily intake of each group was measured. The kids were cleaned daily and weighed once every weeks.

Results and Discussion

The responses in body weight gain to UTS and to levels of supplement were not significant ($p<0.05$). But the kids on US, after completion of the trial, looked emaciated and some had lost weight while the kids which received the UTS had a very healthy appearance. The data indicating the activity of UTS stimulation during the fattening period is shown in Fig. 1. The kids on treatment 32 were kept in a condition fit for animal breeding.

UTS can be fed to ruminants as an economical replacement for a part of the protein in a ration. Many years ago, researchers recognized that nonprotein nitrogen (NPN) compounds are used by bacteria in the rumen of cattle and sheep. Since that time, studies show that these compounds are broken down to ammonia during the normal fermentation process in the rumen. Microorganisms in the rumen combine the ammonia with products of carbohydrate metabolism to form amino acids and hence, proteins. Poor quality roughages comprise the most part of the diet for ruminant animals in most provinces for a considerable part of the year in Turkey. Animals on such diets are on negative energy balance and supplementary feeding with energy and nitrogen has been used for improving the nutritional status of animals (Capper *et al.*, 1989; Hadjipanayiotou *et al.*, 1993). Most of the experimental research reported in the literature on the use of UTS as a ruminant feed has been performed with ruminants. Chemical analyses of the straws indicated a wide range of straw quality between US and UTS (Table 1). Crude protein varied from 4.06 to 8.38%. The results of the feeding trials are presented in Table 2. The improvement in weight gain and feed efficiency due to an increase in nutrient density is accord with previous studies (Sudana and Leng, 1986; Schmidt and Weissbach, 1990; Djibrillou *et al.*, 1998; Hvelplund, 1978). It is concluded that the UTS may be an appropriate feed for different ruminants. The changes are in agreement with expectations, although the difference in intake of UTS and US might have been expected to be greater. Joy *et al.* (1992) has reported that different treatments caused an increase in total nitrogen content and a decrease in neutral detergent fibre content as well as a significant effect on the digestibility of the organic matter (DOM) in the straw. On the other hand in confirmation of earlier research by Singh and Klopenstein (1994); Animut *et al.* (2002); Coskun *et al.* (1990) reported that supplementation of urea to wheat straw and plus casein to ammoniated WS did not result in any significant effect in different ruminants. In a similar study, Madrid *et al.* (1998) reported that digestibility or intake of DM and OM in a diet based on urea+NaOH-treated barley straw could only be improved by supplementation at modest levels with citrus by-product in goats. The present study confirms previous observations Singh and Klopenstein (1994); Animut *et al.* (2002); Coskun *et al.* (1990) that a benefit from urea UTS did not improved feed efficiency and BWG statistically important in Saanen kids ($p<0.05$). The kids which received the urea treated straw with 50:50 crushed barley and wheat of supplement were judged to be a little fattened for slaughter than control group's kids but results were not statistically important than control group (Table 3). Thus urea treatment can in future, enable straw to be used for fattening of kids with only small amounts of locally produced feed supplements. The technology is now being used by educated farmers in the area but not general in Turkey. The use of urea on small farms is not difficult when stalks of 1 tone or less have to be treated and the urea has to be provided in commercially available tanks usually with capacities in excess of 1000 kg. Small domestic-type chemical bottles are presently produced containing 15, 30 or 60 kg of different chemicals. These would be eminently suitable for stacks containing 0.5, 1.0 or 2.0 tones of straw.

Conclusions: The results of the present study suggest that the urea treatment of straws is simple, but can not be attractive economically to farmers engaging in commercial fattening production to the Saanen kids.

Acknowledgement

The authors are grateful to the hacipasa farm for their support of the feeding trials reported here.

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