

Influence of nitrogen source on the voluntary intake and digestibility of barley straw by ewe lambs.

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SUMMARY

Thirty-five one-year old ewe lambs were used. The lambs were divided into two groups. The first group contained twenty-one lambs housed in digestibility cages while the second group fourteen lambs housed in individual pens.

The ewe lambs were given a basal diet of barley straw, supplemented with three levels of cottonseed cake or urea. An orthogonal analysis was used for the data. The results showed that the range of intakes of barley straw were 56.5 and 60.6 g/kg W^{0.75} for cottonseed cake and 46.2, and 48.1 g/kg W^{0.75} for urea supplemented diets while for the control (A) it was 48.1 g/kg W^{0.75}. The mean intake of barley straw supplemented with cottonseed cake was high, but supplementation had a little effect on the digestibility, while urea supplement had no effect on the digestibility and straw intake.

INTRODUCTION

Barley straws are important sources of feed for maintenance of ruminants if their quality could be improved . Cottonseed cake is widely used as source of additional energy and protein when straw is fed *ad libitum* . Opportunities exist in some ruminant production

systems to use non-protein nitrogen sources and/or minerals to improve the feeding value of cereal straws. However, responses in intake and digestibility to supplementation of those roughages with urea or other essential minerals have been quite negligible (Doyle and Panday, 1990).

In this experiment the effect of cotton seed cake or urea supplementation on the intake and digestibility of barley straw by sheep was studied.

MATERIALS AND METHODS

Animals:

Thirty-five one-year old ewe lambs were used. The lambs were divided into two groups. The first group contained twenty-one lambs housed in digestibility cages while the second group contained fourteen lambs housed in individual pens .

The live-weight of the ewe lambs ranged from 32 to 40 kilograms, with average live-weight of 36 kg.

Diets:

Barley straw was harvested from the experimental plots of ICARDA. The straw was totally weed free and was chopped mechanically .

Feeding and Management:

The experiment ran for four weeks. The lambs were weighed three times, at the start of adaptation period, before and after collection period. The ewe lambs were fed each day at 08:00 am, except on weighing days when the feeding was delayed to about 10:00 a. m. Before the start of the experiment mineral and vitamin supplements were mixed with the diets (2 gm for each ewe lambs daily). Water was offered twice daily in the morning and afternoon.

Three different levels of cottonseed cake (C1, C2 and C3) and three different levels of urea solution (U1,U2,and U3) (Table 2) were prepared before the start of the experiment .

The ewe lambs were weighed and allocated at random to treatments and fed the basal diet of barley straw *ad libitum* with the supplements according to the experimental designs for four weeks, with digestibility measurements in the last 10-days.

In the first group, the ewe lambs were kept in digestibility cages and each diet was offered to three ewe lambs. In the second group, the ewe lambs were kept in individual pens and each diet was offered to two ewe lambs.

Feed, feed refusal and faeces were collected during last 10-day of the experimental period and 10% of faeces from each sheep was stored at

10°C and frozen. Also, 10% of feed and refusal from each sheep was taken daily .At the end of collection period, a sample for each feed refusal and faeces was retained for dry matter determination and subsequent chemical analysis . Individual intake and residues of chopped barley straw were recorded and calculated daily.

Chemical Analysis:

Each sample of feed, refusals and faeces was dried in a forced-drought oven at 105°C to constant weight over night (24 hour) and ground through a 2 mm screen before analysis. Details of the chemical methods used have been described previously by Williams *et al.* (1988).

Statistical Analysis:

A Randomized Complete Block Design was used , in which each diet was allocated at random to one sheep per cage or pen and the data was analyzed by orthogonal analysis (Steel and Torrie,1980)..

RESULTS

Chemical Composition of the diets:

The proximate analysis of the barley straw and cottonseed cake are given in Table (1). *In vitro* dry matter digestibility (DMD) and the organic matter digestibility (DOMD) of barley straw as also shown in Table (1)

Feed intake of barley straw:

Mean dry matter intake of barley straw and average daily gain for each treatment are given in Table (2). Voluntary feed intake of straw was increased at the three different levels of cottonseed cake or urea supplementations. The highest level of cottonseed cake (C3) and medium level of urea (U2) gave the highest dry matter intake (gm/day). The response of straw intake to cottonseed cake supplementation was larger. However, the supplements had little effect on the digestibility of the rations. The medium level of cottonseed cake DOM intake, but differences between responses to level of cottonseed cake supplementation were not significant. Supplementation significantly ($P < 0.05$) the voluntary intake of straw, but there was no response to increasing the level of cottonseed cake. Supplementation with urea had no effect on straw intake. The average daily gain on all treatments was poor.

The highest gain (217 gm) was achieved on supplementation with the highest level of cottonseed cake (C3). There was a loss of weight when feeding straw alone or using third level of urea (U3).

Table (2) Feed intake, OMD and average daily gain of ewe lambs given a basal diet of barley straw or supplemented with three different levels of cottonseed cake (C1, C2, and C3 or urea (U1, U2 and U3).

Parameter	Straw Alone 0	Straw + Cottonseed Cake C1 C2 C3			Straw + Urea U1 U2 U3			S.E.	
Total DM intake (g/d)	766	934			1007			1030	746 842 788 39.8
Total DM intake (g/kg w 0.75)	48.1	56.5			60.0			60.6	46.2 50.4 48.1 2025
N intake (g/d) Total	4.82	7.96			10.60			12.42	6.26 9.04 10.18 0.44

CP in the diet live weight (kg)	39.3	53.3	65.8	75.4	52.3	67.6	80.7	–
Average daily gain (gm)	-17	133	133	217	100	0.0	-67	88
OMD (g/kg)	598	563	621	584	589	573	616	20
CP:ME	4.8	7.0	7.8	9.7	6.5	8.4	9.6	

S.E : Standard error of the means

ME: Metabolizable energy assuming that 1kg DOM contains 15 MJ/ ME.

DISCUSSION

The supplementation with cottonseed cake significantly increased the voluntary feed intake of straw, but there was no response to increasing the level of cottonseed cake. The nitrogen source, especially cottonseed cake, may have an effect on this result. Sudana and Leng (1986) showed that supplementation with cottonseed cake or cottonseed cake plus urea increased straw dry matter intake and also had a loss in live-weight.

The ewe lambs offered straw with a supplement of cottonseed cake had a higher live-weight gain, than the other two groups of the different levels, but the control group had a reduction in live-weight. This finding agrees with that reported by Sudana and Leng (1986) and Capper *et al.* (1989) who found that live-weight gain was significantly increased by supplementation of cottonseed cake. Supplement of cottonseed cake or urea to barely straw had a little effect on the digestibility of the diets.

The digestibility of diets with medium level of cottonseed cake supplement was greater than others, but for urea, the highest level had greater digestibility of diets than others. This agrees with the findings of Capper *et al.* (1989), who showed that organic matter digestibility of Badia straw was improved significantly by cottonseed cake supplementation, but this did not occur with straw of ER/Apam and C63. Also, Umunna (1982) observed that faecal nitrogen, dry matter and nitrogen digestibility were not significantly affected by the treatments of urea. Oldham *et al.* (1977) reported that nitrogen digestibility for straw with urea (0.64) was rather low in compary.on with the other diets (0.70-0:80).

There was an improvement in the voluntary intake of feed with the addition of urea. This improvement in response was due to the change in the physical and chemical structure of straw by urea supplementation. This agrees with the findings of Umunna (1982) who reported that the feed intake was significantly improved by the addition of extra nitrogen in the form of either urea or ground nut cake. Also, Alawa *et al.* (1986) showed that all protein supplements improved overall straw dry matter intakes, the improvement being significant for urea only. The medium supplement of urea had a higher intake than the two other levels.

The difference may to some extent be explained by the fact that the **crude protein content** in this diet was adequate to maximize intake

(Elliott and Topps, 1965; Blaxter and Wilson, 1963). This finding agrees with Hassan and Mukhtar (1971) who observed that the animal on the diet with 2.7% urea consumed slightly less feed than the other three groups (0.0, 1.3 and 1.7%) urea.

Ewe lambs offered barely straw with a low supplement of urea had an increase in live-weight as compared to the control, which had a reduction in live-weight. This difference in response may be attributed to the different stages of development of the ewe lambs. Taparia and Jat (1989) reported that heifers lost weight when given the grass alone and gained weight on nitrogen-supplemented diets.

From the results of this experiment it is concluded that feed intake was improved by supplementing urea. The medium level of urea had a higher intake than the two other levels. The supplementation with cotton seed cake significantly increased feed intake of straw, but supplement of cotton seed cake or urea to barely straw had a little effect on the digestibility of the diets.

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تأثير المصدر النيتروجيني على التناول الطوعي ومعامل هضم بين الشعير في الحملان الإناث

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ملخص البحث

خمسة وثلاثون رأسا من الحملان الإناث عمرها عام واحد استخدمت في الدراسة ، حيث جري تقسيمها إلى مجموعتين ، مجموعة أولي أحتوت علي واحد وعشرين من الحملان وضعت في أقفاص لتعيين معامل الهضم بينما وضعت المجموعة الثانية المكونة من اربعة عشر حملا في حظائر مفردة اطعمت الحلال بين الشعير كغذاء أساسي منعا بمستويات من كسب بذرة القطن أو اليوريا أوضحت نتائج التجربة بان متوسط تناول التين المدعم بكسب الفطن كان 56,5 و 60,6 جرام كيلو جرام من الوزن الأبيض الحيوان الوزن 0,75 ، بينما كان 46.2 و 48 للتبن المدعم باليوريا وتناولت مجموعة الشاهد 48,1 جرام /

كيلو جرام من كان متوسط تناول الشعير المدعم بكسب بذرة القطن عالية – لكن هذا الدعم كان ضعيف التأثير على معامل الهضم ، بينما لم يكن التدعيم باليوريا ذو تأثير على كل من وزنها الأيضي معامل الهضم وتناول تبس الشعير