The Effects of Urea-mineral Lick Blocks on the Liveweight Gain of Local Yellow Cattle and Goats in Grazing Conditions

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Introduction

Natural grasses and cereal straws are the main sources of roughage for cattle and goats in the subtropical regions of China. The practice in general use is to graze the animals on unimproved hill pasture during the spring and autumn seasons, and to feed them on crop residues during winter. Supplements such as protein, cereal grain and minerals are rarely offered to cattle and goats, and the animals are usually unable to maintain their body weight. Weight losses may and often do occur during the winter season when they are solely fed on untreated straw. The primary limiting factors of cereal straw are their low contents of nitrogen (N), their low intake and poor digestibility. Hill pasture in our region are mainly grasses which have established and grown naturally. Despite the differences which exist from place to place, they are low in nutritive value. Liu *et al.* (1995) observed that hay prepared from natural pasture had a similar content of N and digestibility of dry matter comparable to that rice straw (RS). Heifers however fed on a hay-based diet had daily gain significantly lower than those on an improved ammoniated RS diet (578 vs 780 g/d) (Liu *et al.* 1990).

When wild grasses and cereal straws are given to ruminants alone or form a high proportion of their diet, the primary consideration should be to overcome the resulting nutrient limitations by dietary supplementation. One of the most critical nutrients is considered to be fermentable N used by the rumen microbes. Urea is probably the most common source of supplementing fermentable N, and can be sprayed on to cereal straws or may bemixed with available energy supplements. The use of urea/molasses blocks (UMB) is a convenient way of avoiding the excessive intake of urea (Leng and Preston 1983).

Despite the differences in formulation from place to place, UMB feeding has given positive results in many parts of the world (Kunju 1986; Hadjipanayiotou *et al.*, 1993b). In China, Chen *et al.*(1993) observed that the use of supplementary UMB increased the milk yield of dairy cows by 6.7 %, and the daily gains of heifers by 15.5 %.

However molasses is not freely available in many regions of China nor in many other countries, and attempts have therefore been made to produce blocks with low content of molasses (Hadjipanayiotou *et al.*, 1993a).

Molasses in our region is in short supply and if available is expensive. A urea-mineral lick block without molasses (ULB) has recently been manufactured for local cattle and goats to eliminate some dietary deficiencies and to improve their rates of growth. The objective of the present paper was to investigate the performance of cattle and goats in grazing conditions with or without ULB.

Materials and Methods

Description of the Lick Blocks

Urea, salt and minerals are the main ingredients of ULB. Its formulation was derived on the basis of the composition of traditional feedstuffs (Xu 1989, Zhejiang Academy of Agriculture 1983). The ingredients and composition of ULB are shown in Table 1.

Salt and urea, and cement as a binder were used as purchased, while the remainders of the minerals were purchased as a mixture already prepared in a feed additive plant. The ingredients were then mixed by a shovel on a concrete floor. Approximately 200 kg of mineral mixture were prepared every time. The mineral premix and cement were mixed first, and they were then well mixed with the rest of ingredients. The mixture was then compressed in a mould measuring 15 cm x 15 cm x 10 cm, and the resulting blocks weighing 2 kg each were wrapped immediately.

TABLE 1: Ingredients and composition of urea-mineral lick block

Ingredients	**%**	**Composition #**	g/kg
Urea	10	N*6.25	250
Salt	65	Ca	>9
Cement	15	P	>5
Mineral premix	10		mg/kg
Total	100	Fe	1300
		Cu	140
		Zn	520
		Mn	450
		I	10
		Co	5
		Se	3

Moisture content was less than 15 %.

Cattle Trial

A cattle trial was conducted in the village of Suichang County in southern Zhejiang. Thirty-two local breed yellow cattle were selected from different farms and divided into two groups of sixteen based on their sex, age and liveweight. They were then randomly allocated to control (no block) or ULB treatments (Table 2). All animals were treated with anthelminthic (methyl-thio-imidazole) prior to trial. The cattle grazed on hill pasture during the day and were offered RS ad libitum in stalls at night, at which time the animals on treatment had

free access to the ULB. The trial lasted for sixty days and all animals were weighed at the beginning and at the end of trial. The results were analysed using a Student "t" test.

TABLE 2: Animals used in cattle trial

	Control	ULB group
No. of animals (head)	16	16
Male/Female	8/8	8/8
Age (year)	2.7± 1.4	2.7± 1.3
Live weight (kg)	169.1±54.4	166.4±55.0

Goat Trial

The goat trial was conducted on two private farms (Farms A and B) in Fuyang County. Sixteen and twelve growing goats were selected from Farms A and B respectively. All animals were treated with anthelminthic (methyl-thio- imidazole) prior to trial. On each farm, the goats were divided into two equal groups and were randomly allocated to treatment either with or without blocks. All goats grazed together on hill pasture during the day and were offered RS ad libitum in stalls at night. The animals with block treatment had free access to the ULB along with their RS at night. The trial lasted for three months and all animals were weighed at the beginning and at the end of the trial.

The results were analysed as a two-way factorial design in which farm was considered as one of factors. Because initial liveweight and liveweight gain were not significantly different between farms, the results were compared using a Student "t" test.

Results and Discussion

The ULB used was of a good hardness and the breaking strength was 40 kg/cm². Furthermore, the ULB was easily transported and offered to the animals. Even in situations of high humidity there were no losses from mould growth or from the slake of blocks when they were offered to the animals over a long period of time.

The ULB was palatable to both cattle and goats and in the initial

period of both trials we had to limit time of access to avoid an excessive intake of ULB. The consumption of ULB became stable after about ten days from the commencement of the trial. On average, the intake of ULB was 50 g/head/d for cattle and 10 g/head/d for goats. Thus a ULB block weighing 2 kg is sufficient per head for cattle for forty days or for 10 goats for twenty days.

The results of the two feeding trials are presented in Tables 3 and 4. Both cattle and goats with access to ULB performed better than those on the control diet. Liveweight gains were significantly higher in animals with access to block than in those with no block; 370 vs 203 g/d for cattle and 95 vs 73 g/d for goats.

TABLE 3: Economics of using a urea-mineral lick block as a dietary supplement for local yellow cattle

	ULB group	Control	Prob
Number of animals	16	16	
Initial liveweight (kg)	169.1±54.4	166.4±55.0	
NS weight gain (g/d)	370	203	<0.05
Comparison	182	100	
Daily cost of supplements (RMB yuan #)	0.10	0	
Net Daily income (RMB yuan #)	1.75	1.02	

1 US$ = 8.3 Yuan

The animals offered blocks had better body condition and looked healthier than did control groups. Although intakes were not determined because of the difficulty of "on farm" conditions, the improvement in productive performance of the animals on treatment was encouraging. Hadjipanayiotou *et al.* (1993b) observed that effects of urea-containing blocks on liveweight gains in cattle and sheep were more pronounced than the effects on feed intake. In other words, there appears to be a marked improvement in diet digestibility.

In both trials the grazing available to the animals was natural

pasture only with no concentrate supplements. It is considered that the available energy ingested does not provide the nutrients required by animals for a high level of productivity and therefore a large response in animal performance to the mineral contents of the blocks cannot be expected. With growing lambs on ensiled sisal pulp Rodriguez *et al.* (1985) observed that there was no response in animal performance to providing an appropriate mineral mixture. However limited amounts of either a good quality green forage or rumen undegradable protein apparently improved the liveweight gain in lambs. Further study is therefore needed to investigate the effects of ULB feeding on the productive performance of animals when supplemented with a combination of locally available carbohydrate and protein sources.

TABLE 4: Effect of urea-mineral block feeding on the live weight gain of local goats

	ULB group	Control	Prob
Number of animals	14	14	
Initial liveweight (kg)	10.4±1.6	11.7±2.0	NS
weight gain (g/d)	95	73	<0.05
Comparison	130	100	
Daily cost of supplements (RMB yuan #)	0.03	0	
Net daily income (Yuan #)	0.55	0.44	

1 US$ = 8.3 Yuan

Conclusion

Urea mineral blocks without molasses are palatable to local yellow cattle and goats grazing on natural hill pasture. Mineral available can result in growth rates in cattle and goats significantly higher than in those without access to blocks. It is concluded that lick-blocks containing urea and minerals can be widely used to improve the productive performance of animals with access to only low quality roughages.

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