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THE EFFECT OF A SALT AND TRACE ELEMENT SUPPLEMENT ON THE GROWTH OF JAVANESE SHEEP OFFERED *LEUCAENA LEUCOCEPHALA*

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In two studies liveweight gains of Javanese thin-tail sheep offered *Leucaena leucocephala* (leucaena) increased from 31 to 74 g/d (Experiment 1) and 40 to 86 g/d (Experiment 2) when offered a salt and trace element supplement. Dry matter intake increased from 63 to 84 g/kg LW $^{0.75}$ /d in Experiment 2 and there was a similar but non significant trend in Experiment 1. The mineral supplement was readily consumed when offered free choice and the average intake was 1.96 ± 0.04 g/kg LW$^{0\ 75}$/d (Experiment 1). When mixed with leucaena to provide a similar mineral intake (Experiment 2) liveweight gain was similar to that for a pelleted diet containing 50% elephant grass:40% concentrate:10% fishmeal.

Key words: sheep, leucaena, trace-elements, sodium ,liveweight gain

The performance of sheep and goats offered *Leucaena leucocephala* as a sole diet at this institute has been poorer than expected based on measurements such as digestibility and feed intake (Yates 1982). Periodic analyses of leucaena have shown sodium concentration to be generally less than 0.01% (dry matter basis). The recommended dietary minimum for sheep is 0.04 to 0.10% of the dry matter (NRC 1975) or 0.5 to 1.0 g/d (ARC 1965 ; Aitken 1976). Although no studies have been reported on the response to sodium in ruminants offered leucaena, there is limited evidence that responses can sometimes be obtained with other elements e.g. copper, iron and zinc (Jones et al 1978).

The low concentration of sodium and the possibility of beneficial effects from the addition of other elements prompted the present study to measure the growth of Javanese sheep offered leucaena with and without a salt and trace element supplement.

Materials and Methods

Two experiments were conducted. The sheep used in both were non-pregnant, non-lactating Javanese thin tail ewes. They were housed in individual pens under cover and provided with water ad libitum.

Experiment 1: Three sheep were used and the experiment was conducted over a period of thirty-one weeks.For the first thirteen weeks the animals were offered 100% leucaena ad libitum. During the following ten weeks they were offered, in addition to 100% leucaena ab libitum, unrestricted access to a salt and trace element supplement. This was offered in a loose form in individual buckets. Initially 100g supplement was offered to each animal and when this had been consumed a further 100g was offered. This procedure was repeated as often as necessary during the ten week period.After ten weeks the supplement was removed and the animals were offered 100 % leucaena ad libitum for the remaining eight weeks of the experiment.

Experiment 2: Thirteen sheep were used. They were allocated to the following dietary treatments by restricted randomization based on live weight:

A. Leucaena ad libitum (4)
B. Leucaena ad libitum mixed with a salt and trace element supplement at 5g/kg fresh weight (4)
C. Pelleted diet containing 50% elephant grass (*Pennisetum purpureum*): 40% concentrate : 10% fishmeal (5)

The diets were offered for four weeks prior to the experimental measurement period of eight weeks.

In both experiments the leucaena (cv Cunningham and Hawaii) was offered fresh, once daily. The salt and trace element mixture contained 0.05% copper, 0.25% iron, 0.40% manganese, 0.40% zinc, 0.005% iodine, 0.002% cobalt, 0.001% selenium, 0.01% molybdenum, 0.36% sulphur, .7.36% calcium carbonate and 90.00% sodium chloride.

Feed intake was recorded daily and samples of feed were taken weekly and dried at 100°C for dry matter determination. Animals were weighed weekly immediately prior to feeding. Liveweight gains were determined by regression analyses of liveweights on time, and dry matter intakes were analysed by analysis of variance.

Results and Discussion

The salt and trace element supplement improved liveweight gain significantly in both experiments (Tables 1 and 2). The average increase was

Table 1:

Liveweight gains (LWG), dry matter intakes (DMI), and feed conversion ratios (FCR), for three Javanese thin-tail ewes offered initially fresh leucaena, followed by fresh leucaena with a salt and trace element supplement and finally fresh leucaena

	Weeks	Initial LW, kg	LWG g/d	DMI g/kg LW 0.75/d	FCR (kg DMI/kg LWG)
Leucaena	13	18.0	42[a]	77[a]	16.7
Leucaena + salt/trace elements	10	20.5	74[b]	86[a]	12.6
Leucaena	8	26.3	20[a]	75[a]	43.7

Values with different superscripts are significantly different ($P < 0.01$)

140% ($P < 0.01$) in Experiment 1 and 115% ($P < 0.01$) in Experiment 2. There was no significant difference in the liveweight gain of sheep offered the pelleted diet and those offered leucaena supplemented with salt and trace elements (Table 2). Although this pelleted diet has given the best live - weight gains for Javanese sheep recorded at this Institute, the performance of sheep used in this study was poorer than previously recorded (Obst et al 1978). The supplement significantly increased feed intake in Experiment 2 (with a similar but non-significant trend in Experiment 1) and lowered feed conversion ratios (kg DM feed/kg liveweight gain) in both experiments.

Table 2:

Liveweight gains (LWG), dry matter intakes (DMI) and feed conversion ratios (FCR) for Javanese thin-tail ewes offered, concurrently, either fresh leucaena with and without a salt and trace element supplement or a pelleted diet containing 50% elephant grass: 40% concentrate: 10% fishmeal over an eight week period

	Animals	Initial LW, kg	LWG g/d	DMI g/kg LW 0.75/d	FCR kg DM/kg LWG
Leucaena	4	20.5	40[b]	63[b]	15.8
Leucaena + salt/trace elements	4	21.1	86[a]	84[a]	10.5
Pelleted diet	5	21.6	79[a]	75[ab]	10.4

Values with different superscripts are significantly different ($P < 0.01$)

In Experiment 1, the average consumption of supplement was 1.96 ± 0.04 g/kg $LW^{0.75}$/d. As a percentage of the feed dry matter this provided 0.7 % sodium and approximately twice the recommended concentrations of trace elements (NRC 1975). The addition of 5g of supplement/kg fresh leucaena (Experiment 2) gave a daily intake of 1.40 ± 0.07 g/kg $LW^{0.75}$/d supplement which provided 0.5% sodium and approximately one and a half times the recommended trace element concentrations (NRC 1975), on a feed dry matter basis.

A similar response to that observed in this study has been obtained for Javanese sheep fed natural grass with a salt-trace element supplement (Panggabean - unpublished data). Further work is planned to determine whether the response is due to sodium or to a trace element.

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