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**COMPARATIVE GROWTH PERFORMANCE OF WEST AFRICAN DWARF GOAT
SUPPLEMENTED WITH *Calliandra calothyrsus*, *Leucaena leucocephala*, OR
COTTON SEED CAKE IN WEST CAMEROON.**

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Abstract

A comparative growth performance study of African Dwarf Goats supplemented with *Calliandra calothyrsus*, *Leucaena leucocephala* or cotton seed cake was carried out on farm around Dschang and in the University Experimental Farm. Goats between 12 and 16 months of age were divided into 4 groups of 11 goats each with one group kept as a control. The supplemented animals received respectively 390 g of *L. leucocephala*, 380 g of *C. calothyrsus* (fresh matter) and 88.8 g of cotton seed cake each, corresponding to 6 g of nitrogen per animal per day. The animals were weighed every 21 days during 84 days. The adjusted average daily weight gains of animal supplemented with cotton seed cake (22.73g/j) was significantly higher ($P < 0.05$) from that of the animals supplemented with *L. leucocephala* (13,00g/j) or *C. Calothyrsus* (12,26 g/j). The animals of the control group had an adjusted average daily weight gain (11,54 g/j) not significantly lower than that of the animals supplemented with *C. Calothyrsus*.

Keywords: Cameroon, daily gain

Introduction

In many areas of Africa, ruminant livestock has long been of great importance to the rural population because it serves many purposes such as direct production of food, traction for transportation and land preparation, cash reserves for emergency investments and long term savings, and the fulfillment of social obligations. However, ruminant production across most of these areas is constrained by the poor quality of the consumed feed.

Under the traditional system of small ruminant husbandry, animals are left to graze and scavenge household wastes in or around the village during the dry season. During the rainy season when most of the space is under crop production, they depend on household wastes or on what grows along the road or on fallow when available, and where they are usually tethered. While this system entails little or no cost to the producer, it has adverse implication on the nutritional status, growth rate, and reproduction performance and disease resistance of these animals. As a result feeding has frequently been cited as the most limiting factor to ruminant production in tropical Africa. This is particularly true in highly populated rural areas such as the western region of Cameroon (density 400 - 1000 inhab/km²) where most of what was left as rangeland is actually being used either for crop production or for building.

Owing to the fact that in many areas, low cost land conversion possibilities are exhausted, there is a need to look for means to increase animal production through higher out-put per unit area of land. In light of this requisite, a shift from a resource-based to a more science-based system of livestock production has to play an increasingly important role in achieving these objectives.

This study was carried out to evaluate the comparative growth performance of West African Dwarf Goat (W.A.D.G) supplemented with *Calliandra calothyrsus*, *Leucaena leucocephala* or Cotton seed cake during the rainy season.

Material and Methods

The study was carried out in Foto a village around Dschang in the Western Highland zone of Cameroon and at the University Experimental Farm. Animals used for this study were African Dwarf Goat (*Capra reversa*). Four groups of 11 goats of 8 to 12 months of age were used on-farm. A control group of 11 animals with the same characteristic was raised at the University Experimental Farm in the same environment. At the beginning of the trial all animals were vaccinated against goat plague. They received antibiotic injection and underwent internal and external parasite control.

Animals were tethered every morning on fallow where they stayed at daytime. They spent the nighttime on the border of the farmer house. The major species of the pastures where the animals were maintained were *Pennisetum purpureum*, *Pennisetum clandestinum*, *Bracharia ruziziensis*, *Panicum maximum*, *Bidens spinosa*, *Sida sp.*, *Setaria sp.*, *Ageratum spp.* etc. Every morning 390 g and 380 g of fresh leaves of *L. leucocephala* and *C. calothyrsus*, respectively, corresponding to 6 g of nitrogen were harvested from the University Experimental Farm and distributed to each animal of the corresponding group. Leaves of *C. calothyrsus* were served just after harvesting to avoid tannin effect. Each animal supplemented with cottonseed cake received 88.8 g/day corresponding also to 6 g of nitrogen.

After an adaptation period of 30 days, animals were weighed every 3 weeks early in the morning during the 84 days study period. Due to variation in initial weight, covariance analysis was carried out on the data and significant differences among adjusted treatments means were tested.

Results and Discussion

Mean weight change of animals.

Adjusted mean weights obtained from different weighing are shown on table 1. Weight gains for the control were 0.97 kg while that of the supplemented groups were 1.03 kg, 1.09 kg and 1.91 kg for animals supplemented with *C. calothyrsus*, *L. leucocephala*, and cottonseed cake respectively. Even though consistent and higher gains were observed for animal supplemented with *L. leucocephala* than those of the other treatment groups during the first half of the study, there weren't significant difference during this period. During the second half of the study, the adjusted mean weights of the animal supplemented with cottonseed cake were relatively higher than that of the other treatment group. These result seem to be in agreement with those of Ndamukong (1984) who reported that supplementation under such conditions substituted some forage intake and enable the animal to consume only the quantity of forage needed to cover their requirements. This could have been the case if the basal diet supplied the same nutrients as those obtained from the supplements. In this study the basal diet was constituted of grasses and others forage species and was mainly a source of energy while the supplements supplied proteins. The absence of significant difference between the treatments seem to suggest that at the beginning of the rainy season forage was rich in nutrients and able to cover the need of the animals. The logarithmic adjustments of the weight as a function of time in weeks gave the following equations:

$$\text{Control} \quad Y_O = 0.22\text{Ln}(t) + 11.01 \quad (R^2 = 0.33)$$

$$C. \text{ calothyrsus} \quad Y_c = 0.61\text{Ln}(t) + 11.20 \quad (R^2 = 0.87)$$

$$L. \text{ leucocephala} \quad Y_L = 0.32\text{Ln}(t) + 12.08 \quad (R^2 = 0.69)$$

$$\text{Cotton seed cake} \quad Y_T = 1.14\text{Ln}(t) + 10.54 \quad (R^2 = 0.77)$$

These adjustment gave interesting results as indicated by the relatively high coefficient of determination (R^2) associated with each equation which varies from 0.69 for the group

supplemented with *L. leucocephala* to 0.87 for the *C. calothyrsus* group. These supplements had relatively high influence on the growth of the West African Dwarf Goats.

Mean daily weight gain.

Table 2 shows mean daily weight gains observed during the different three weeks period. During the first half of the study the animals fed cottonseed cake and those supplemented with *L. leucocephala* had higher ($P < 0.05$) mean daily weight gains as compared to others. At the beginning of the second half of the study, higher weight gains were recorded for animals supplemented with cottonseed cake and *C. calothyrsus*. Animals supplemented with cottonseed cake had weight gains that were practically twice that of animals supplemented with *C. calothyrsus*. Animals supplemented with *L. leucocephala* and the control group continued to lose weight during this period. The animals fed *L. leucocephala* as supplement continued to lose weight as a result of their relatively poor health status. At the end of the study a drastic decline in the weight of the animals supplemented with cottonseed cake or *C. calothyrsus* was equally observed. This decline in performance due to the absence of good roughage is in line with the observations of Riviere (1977) who noted that the nitrogen supplementation may improve growth performance only when sufficient dry matter is supplied to the animals. In general goats appreciate diversified diets and would grow poorly if permanently subjected to a limited type of forage species (Devendra and Burns, 1983). The mean daily weight gains of 13.0 and 12.26 g observed during this study for animals supplemented with *L. leucocephala* and *C. calothyrsus* are lower than the 45 g/day observed by Leng (1997) in a study carried out in Australia on goats grazing freely in pastures and supplemented with *L. leucocephala* or the 24 g/day observed by Dzowela et al (1994) who used 0.14 kg/day dry matter of *C. calothyrsus* for goats during the dry season in Zimbabwe. Jones (1994) found mean increase in weight gain of 14% with inclusion of *L. leucocephala* in ruminant's diet. Daily weight gains of animal supplemented with cottonseed cake are lower than those recorded by the studies of Zimmelink et al (1985) and Okello et al (1996) which was 30.1

g/day/animal. Kerboeuf and Godu (1984) further reported that in humid zones animals are continuously exposed to parasite, which weakens them and causes a drop in production. This could have been responsible for some of the variation in performance observed during this study. In overall it seems certain that nitrogen supplementation even at a relatively low rate reduce the negative effects of the stress caused by poor feeding and help animals resisting better to parasite burden and all other factor which might leads to a reduction in productivity

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Table 1 - Adjusted mean weight (kg) after 0, 21, 42, 63 and 84 days of trials.

Diets	Studies periods in days				
	0	21	42	63	84
Control	10,91	11,40	11,24	11,20	11,88
<i>C. calothyrsus</i>	10,67	11,92	12,12	12,72	12,70
<i>L. leucocephala</i>	11,88	12,41	12,78	12,61	12,97
Cottonseed cake	11,20	11,83	12,27	13,58	13,11

Table 2 - Adjusted mean daily weight gain (g) during the different studies periods.

Diet	Studies periods in days				
	0 – 21	22 – 42	43 – 63	64 – 84	0 - 84
Control	23,33b	-7,62c	-1,90c	32,40a	11,54c
<i>C. Calothyrsus.</i>	11,90c	9,52b	31,42b	-4,00d	12,26bc
<i>L.leucocephala.</i>	25,23b	17,62a	-5,71c	14,76b	13,00b
Cottonseed cake	30,00a	20,95a	62,40a	-12,40c	22,73a

a, b, c, and d: Means followed in the same column with the same letters are not significantly different at 5% level.