DRY MATTER YIELD OF *Brachiaria ruziziensis* AS AFFECTED BY COW DUNG MANURE RATES AND STAGES OF HARVEST.

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ABSTRACT

The study was conducted at Professor Lawal Abdu Saulawa Livestock Teaching and Research Farm, Federal University Dutsin-Ma to evaluate the effect of cow dung manure rates and stages of harvest on the dry matter yield of *Brachiaria ruziziensis.* The experiment was laid in a Randomized Complete Block Design (RCBD) in a 3×3 factorial arrangements, with three manure rates (5, 10 and 15 t/ha) as the first factor, replicated thrice and stages of harvest (6, 8 and 10 WAP) as the second factor. A week before transplanting, cow dung manure was applied to each plot manually by broadcast and immediately incorporated into the soil using hoe. Seedlings of *B.* ruzi were uprooted from the Pasture introduction plot of the Teaching and Research Farm and transplanted to the experimental field with inter and intra-row space of 0.5m and 0.2m respectively when the rain became established. Weed was controlled during the experimental period. DMY data on *B.*ruzi was taken at each of the stages of harvest. Data collected were subjected to 3-way analysis of variance (ANOVA), using General Linear Model of SAS, 2005. Significant differences among the treatment means were compared using Duncan Multiple Range Test of the SAS package. The result showed that the DMY was significantly ($P<0.05$) affected by cow dung manure rates and stages of harvest. Forage grown with 15t/ha rate of manure application produced the highest dry matter yield (11.20t/ha) while maximum yield was obtained when harvested at 10WAP (10.49t/ha) . It was concluded that higher forage yield of *Brachiaria ruziziensis* is achievable when cow dung is applied at 15t/ha and harvested at 10 weeks after planting.

Key words: cow dung, harvest, yield, *Brachiaria*, transplant.

INTRODUCTION

Feeds scarcity is one of the major challenges of livestock production in Nigeria due to variation in the pattern of rainfall (Lamidi and Olugbose, 2014) thereby resulting in slow growth and reduction in productivity (milk and meat) output per animal. This results in seasonal migration of herdsmen from north to the southern part of Nigeria, leadingto encroachment of farmlands, culminating in farmers/herders clash, a menace which has become the order of the day in Nigeria (Aruwayo *et al.,* 2021). Ruminant animals majorly depend on forage for their nutrition which is considered the cheapest major nutritional component in their diets particularly in rural and sub-urban areas of the tropics (Akinsoyinu and Onwuka, 1988). In underdeveloped and developing countries of the tropics, ruminant animals depend majorly on forage as concentrate rations are expensive and unaffordable to most stock owners. *Brachiaria ruziziensis* is a grass forage plant with higher dry matter yield ranging between 6-21t/ha, (Akinola, 2018) palatability and high nutritional quality (7-13%CP) which if explored can increase the productivity of ruminant animals in the north western Nigeria (Umami *et al.,* 2018). Pasture production and availability in Sub-Saharan Africa has become a big challenge as a result of soil infertility being caused by soil degradation which can be physical, chemical or biological (Aregheore, 2002). Fortunately, sub-Saharan Africa is endowed with lots of livestock that produce a lot of nutritive manure, for example; average dung nutrient composition of 18.3g N/kg, 4.5g P/kg and 21.3g K/kg on dry weight base was recorded from manures collected in Ethiopian highlands Lupwayi *et al.,* (2000). north-western Nigeria has the highest livestock density in Nigeria with approximately 21.3 million cattle, 15.6 million goats, and 7 million sheep (FAO, 2011) Organic manure is an alternative source of soil nutrient used in amendment of soil condition (Neil, 2007). Meanwhile, it has been established that stages of harvest greatly influence the dry matter yield of forages, as there exist an increase in yield as the stage of harvest advances (Turk *et al.,* 2009). Work on the evaluation of dry matter yield of *Brachiaria ruziziensis* as affected by cow dung and stages of harvest in the Sahel Savanna region of Nigeria is scarce. Therefore this research sought to look into the effect of cow dung application rates and stages of harvest on DMY of *Brachiaria ruziziensis*.

MATERIALS AND METHODS

Experimental site

The experiment was conducted at the Professor Lawal Abdul Saulawa Livestock Teaching and Research Farm, Federal University Dutsin-Ma, Katsina State, located in the Sudan Savanna ecological zone. The area lies

between Latitude12°27'18'N and Longitude 7°29'29'E, and 605 meters above sea level. The area receives an annual rainfall of 700 mm,which spread from May to September. (Tukur etal., 2013). Maximum and minimum air temperature measured during the experimental period were 28.25^{0}C and 23.35^{0}C respectively in September with relative humidity of approximately 68% during the rainy season (MSGRP, 2022).

Soil sample of the experimental site

Soil sample was collected for nutrient analysis from the experimental site with the aid of Soil auger at four corners and center of the plots at 0-30cm depth to make a composite for soil analysis at the beginning of experiment so as to ascertain the level of nutrient in the soil as well as determining the nutrient requirement. The soil sample was analyzed for physical and chemical properties as described by A.E.S (1998) while the cow dung was also analyzed for its chemical composition. The analysis was carried out at the chemical laboratory of the Department of Soil Science, Faculty of Agriculture, Ahmadu Bello University, Zaria.

Land preparation, experimental design and treatments

A gross land area measuring 9m×9m was used for the trial. The land was cleared and beds were prepared to meet a better condition for early establishment of seedlings. The experiment was laid out in a Randomized Complete Block Design (RCBD) with 3x3 factorial arrangements, replicated three times. 3 levels of cow dung (5, 10 and15 t/ha) was the first factor and 3 stages of harvest (6, 8 and 10 weeks after planting) was the second factor. Forage samples cut at each stage of harvest was bulked, and sub-samples oven dried for estimation of dry matter yield.

Data collection

Yield determination (t/ha) of fresh forage within each treatment was determined by the use of a $(0.5m)^2$ quadrant and the forage was cut at 5cm above the ground level using a hand sickle for total fresh forage and sub-sample of 100-120g was taken, weighed and oven dried at 65^{0}C to a constant weight to estimate dry matter yield.

Dry matter production was calculated as (TFW (DWss/FWss)) ×10=dry matter kg/ha. (Tarawali*et al*., 1995) where:

TFW= Total fresh weight from $0.5m^2$ in (g),

DWss= Dry weight of the sub sample in (g)

FWss= Fresh weight of the sub-sample in (g)

Statistical analysis

All data collected were subjected to a three-way analysis of variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2005). Significant ($P<0.05$) differences between the treatment means were compared using the Duncan Multiple Range Test (Duncan, 1995) of the SAS package.

RESULTS AND DISCUSSION

The DMY of *Brachiaria ruziziensis* significantly increased ($P<0.05$) with increase in Cow dung application from 5t/ha (6.28), 10t/ha (9.91) through 15t/ha (11.20) rate (Fig 1.), this implies that increase in Nitrogen application results in increased growth rate and overall biomass accumulation resulting in increased dry matter yield of the forage. This correspond with the report of Naveh *et al.,* (1967) who observed significant effect of cow dung manure on the DMY of *Brachiaria ruziziensis* and concluded that application of cow dung manure is economical in growing forages due to comparatively low cost when compared with poultry manure and inorganic fertilizers. This is in agreement with the report of Maleko *et al.,* (2015) who reported significant difference in DMY of *Brachiaria ruziziensis* as affected by cow dung between 10 and 15t/ha rate. Stages of harvest also had a significant effect on the DMY (Fig 2). At 10WAP, the dry matter yield was higher when compared to other stages of harvest. Meanwhile, the yields obtained at each of the stages of harvest in this study fell within the range (6-21t/ha) reported by Akinola (2018) for *Brachiaria ruziziensis*.

CONCLUSION.

It was concluded that application of cow dung at 15t/ha and harvesting at 10WAP give the highest DMY of *Brachiaria ruziziensis*. It is therefore recommended that farmers and stock owners grow *Brachiaria ruziziensis* with 15t/ha of cow dung and harvest at 10WAP for a better yield in the Sahel savanna zone of Nigeria.

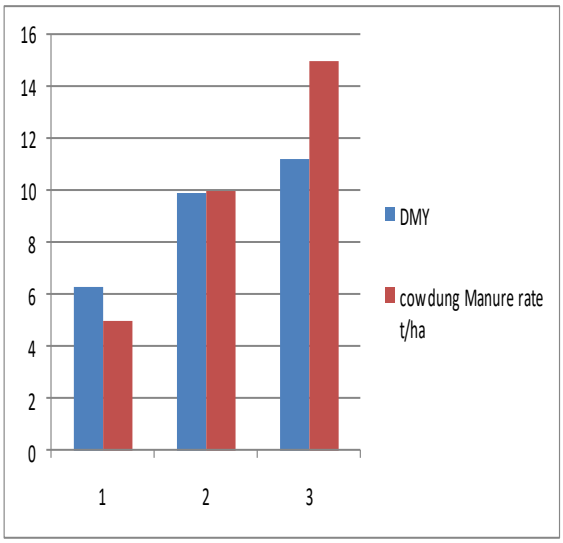

Fig 1 DMY of Brachiariaruziziensis as affected by Cow dung application rates

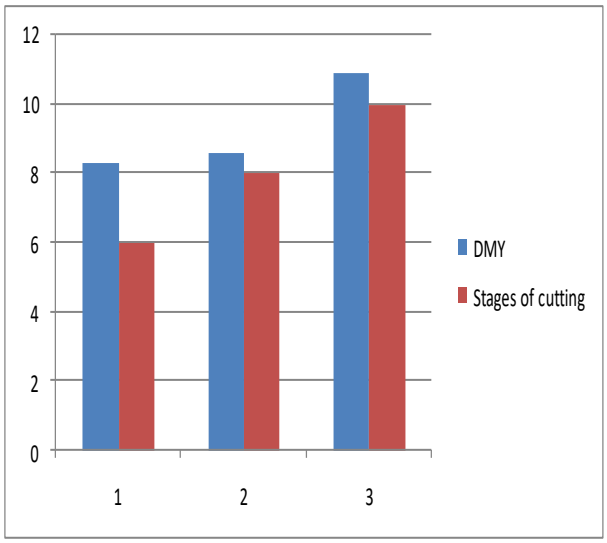

Fig 2 DMY of Brachiariaruziziensis as affected by stages of cutting.

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