PDF - EFFECTS OF FERTILIZER LEVELS AND HARVEST TIME ON YIELD OF PANICUM MAXIMUM CV. MOMBASA AND ITS NUTRIENT DIGESTIBILITY BY RED SOKOTO BUCKS - researchcub.infoABSTRACT The first study was carried out to determine the effects ofapplication of varied levels of fertilizer (NPK 15-15-15) and harvest time on yieldand chemical composition of Panicum maximum cv. Mombasa in Shika, NorthernGuinea Savannah of Nigeria.The experiment waslaid out in 4×3 factorialarrangements in Randomised Complete Block Design (RCBD) with 3 replicates(Blocks). The 2 factors were fertilizer levels (0, 200, 300 and 400 Kg/ha NPK15-15-15) and harvest time (8, 10, and 12 weeks after planting, WAP). The freshand dry matter yields of Panicum maximum cv. Mombasa were influenced positivelywith increasing levels of fertilizer and harvest time. Total dry matterincreased significantly (P<0.05) from 2.30 tonnes/ha in the control to 4.20tonnes/ha in 400kg fertilizer applied treatment and total fresh weight alsoincreased significantly (P<0.05) with age, from 8.6 tonnes/ha at 8th week to21.00 tonnes/ha at week 12 after planting. Results from the study revealed thatCrude protein content of the forage increased significantly (P<0.05) from7.83% in the control (0kg/ha NPK) to 11.66% in treatment with 400kg/ha NPK.Crude fibre decreased from36.94% in the controlto33.96% in treatment with400kg/ha NPK. CP of Panicum maximum cv. Mombasa declined with maturity (from10.29%at 8to 9.24% at 12 weeks after planting). CF and Ash's percentagesincreased (P<0.05) with age. DM, OM, CP and NFE of the forage were highestin week 8 after planting and declined thereafter. ADF values indicated adecrease as NDF values showed an increase as fertilizer levels were increased.NDF and lignin content of the forage increased with age. P (from 1.46 g/kg atin the control to 1.75 g/kg in treatment with 300kg/ha NPK) and K (from 4.73g/kg at in the control to 8.42 g/kg in treatment with 300kg/ha NPK) content ofthe forage was affected positively whereas Ca and Na did not changesignificantly (P>0.05) with fertilization. It can be concluded that theapplication of NPK (15-15-15) at the rate of 400kg/ha improved the nutritivevalue and yield of Panicum maximum cv. Mombasa. Panicum maximum cv. Mombasa wasat its best nutritive value at8th week after planting but yielded more drymatter at 12th week after planting. Thus, farmers are encouraged to apply NPK(15-15-15) at 400kg/ha and harvest Panicum maximum cv. Mombasa at 10th week forbetter forage in terms of nutritive value and yield. The second experiment wasconducted to investigate the effects of Concentrate inclusion levels onnutrients digestibility and Nitrogen balance in Red Sokoto bucks fed Panicummaximum cv. Mombasa based diets. The Concentrate inclusion levels were 15, 30,45 and 60 % (Treatments 1, 2, 3 and 4, respectively). Twelve (12) Red Sokotobucks were randomly assigned to the four treatments in a Completely RandomisedDesign (CRD).Dry matter digestibility was significantly (P<0.05) higher inbucks fed diet containing 60% Concentrate (75.21%) compared to the other threeTreatments. Bucks fed diet containing 60% Concentrate had the highest(P<0.05) Organic matter digestibility (75.32%) compared to the otherTreatments. Nitrogen free extract and Neutral detergent fibre digestibilityfollowed a similar pattern of change as in Organic matter. Bucks fed Treatmentswith 45 and 60% Concentrate inclusion showed significantly (P<0.05) higherether extract digestibility compared to those fed 15 and 30 %. Crude fibredigestibility was significantly (P<0.05) higher in bucks fed diet containing30% Concentrate (84.59). Treatments 3 and 4 were similar, whereas Treatment 1recorded the lowest (68.74%) crude fibre digestibility. Crude proteindigestibility increased with increasing Concentrate levels. Highest(P<0.05)CP digestibility values were observed in bucks fed diet containing60% Concentrate (81.77%) while bucks fed diet containing 15% Concentraterecorded the least values. Acid detergent fibre digestibility followed a trendsimilar to that of crude protein. Nitrogen intake increased significantly(P<0.05) with an increase in Concentrate levels. Bucks fed diet containing60%

Concentrate (8.36g/day) were significantly higher (P<0.05) in Nitrogenintake. Faecal nitrogen loss decreased significantly (P<0.05) as Concentrateinclusion levels increased (from 1.52 g/day in treatment with 60% Concentrateto 2.32 g/dayin treatment with 150%), while Urine nitrogen loss followed atrend opposite to that of faecal nitrogen loss. The highest (P<0.05) TotalNitrogen excreted was observed in treatment 3 (3.00g/day). Nitrogen retainedwas similar in bucks fed diet containing 30 and 60% Concentrate but wassignificantly higher (P<0.05) in bucks fed diet containing 15 and 45%Concentrate. Nitrogen absorbed as a percentage of intake and Nitrogen retainedas a percentage of intake followed the same pattern. Bucks fed diet with 60%Concentrate inclusion were significantly higher (P<0.05) while bucks feddiet containing 15 and 45% Concentrate were lower in these parameters. Inconclusion, the inclusion of Concentrate in Panicummaximum cv. Mombasa baseddiet increased the diet's intake, digestibility and Nitrogen retention in RedSokoto bucks. It is therefore recommended that farmers could incorporate 60%Concentrate in a Panicummaximum cv. Mombasa based diet for improveddigestibility and nitrogen retentionin Red Sokoto bucks.

CHAPTER ONE

1.0 Introduction

Nigeria is an agricultural country with diverse vegetation,varying from rainforest to the Sahel. About 32.42 million hectares of grazingland and 39.41 million hectares of cropland in Nigeria provide a substantialamount of feed for the country's livestock(Shiawoya and Tsado, 2011). Thesavannah zone is home to about 80% of ruminant livestock population.Availability and quality of feed stuff are major constraints in the developmentof the livestock industry in this region. Extensive areas of the grazing landsare composed of indigenous species, which are of low quality (Shiawoya andTsado, 2011). There is a wide variation in the quality and quantity of pastureavailable from one time of the year to another (Adamu, 2015). Hence, there isneed to develop or adopt strategies, or technologies to providehighqualityforage for livestock in this region.

Several forage species, especially grasses have beenintroduced into Shika, Northern Nigeria and screened for productivity andadaptively over the past years. This has been in search of outstandingmaterials that could be used to partially or completely replace the lowproductive native grassland species (Whiteman, 1980). In some of the screeningtrials, Agishi (1978) on upland and Akinola and Olorunju (1990) on lowlandreported some forage species that are well adapted to the Northern GuineaSavannah and produced a substantial amount of forage biomass.

There are many grass species that are used for pasture inthe tropics and subtropics due to their high dry matter yields and good animalfeed quality. Panicum maximum is one of these extensively used forage grasses(Correa and Santos, 2003). Panicum maximum (Guinea grass) is a native oftropical Africa, extending to the sub-tropics of South 1

Africa. It occurs at forest edges in the bush, as a pioneergrass covering the land cleared from the forest and in grassland with scatteredtrees where it tends to grow in high shades under trees (Whiteman, 1980).Proper soil fertility management and understanding the nutritional requirementof this grass species are extremely important for pasture management, which isreflected by higher feed yield and their availability for animals. The use ofinorganic fertilizers can significantly increase forages production, providinggreater capacity and thus resulting in higher milk and meat production per unitof area used (Pereira et al., 2011; Iwanmoto et al., 2015). The increased yielddue to fertilizer application could be attributed to increased in both leafproduction,

increased number of tillers and photosynthesis directly (Aderinolaet al., 2011).Dry matter yield also generally increases with increasingfertilizer rates (Carvalho et al., 2000; Adewumi, 2013). Fertilization enhancesnutrient digestibility, which canimprove livestock Production (Peyraud andAstigarraga, 1998). Fertilizer contributes to the greater productivity ofMombasa Guinea Grass by increasing production per cycle and the number ofharvest cycles (Pereira et al., 2012; Hare etal., 2015). Increasing rates ofnitrogen significantly increased CP and NDF concentrations in stems and leavesand; ADF concentrations in stems (Peyraud and Astigarraga, 1998; Adewumi, 2013;Hare et al., 2015) andreduction in the crude fibre content of stem (Onyeonaguet al., 2012).In addition, it can also provide other supplementary effects thatwill increase the efficiency of the system as a whole, such as the productionof soilage or hay to be used during the dry season (Cecato et al., 2001). Stageof maturity also affects the quality and quantity of Panicum maximum. DryMatter yield increases with advancing maturity, but quality declines (Taute etal,2002). Onyeonagu (2012) noted that cutting interval and fertilizerapplication havesignificant influence on the chemical composition of Panicummaximum forage.

Ruminant production is one of the major livestock activitiesin most of the developing countries in the tropics (Okoruwa and Agbonlahor,2016). Ruminant livestock play an important role in the economic development ofNigeria in terms of feeding the steadily growing population and providing theinvestible resources for national development (Bolaji et al., 2016).Over theyears, there has been a great increase in the production of goats in Nigeriawhich has resulted in poverty alleviation and the supply of high-quality animalprotein in order to meet the demand of the teeming population (Ibrahim et al.,2014). Goats are classified as an important small ruminant on account of theirunique ability to adapt and maintain themselves in a harsh environment. (Bolajiet al., 2016). Goats are one of the most prolific of all domesticated ruminantsunder tropical and subtropical conditions (Webb and Mamabolo, 2004) and theirsmall size relative to cattle contributes to their wide distribution and easymanagement among Farmers. (Bolaji et al., 2016). The Red Sokoto, is the mostimportant goat breed in Nigeria, accounting for about 70% of the estimated 34.5million goats in Nigeria (Osuhor et al., 1998). Animal protein is one of themost important components of human diet and its consumption varies from countryto country (Okai et al., 2005). Goats as a multipurpose animal are a majorsource of milk, skin and manure apart from meat. Goats also provide income formeeting household needs (Peacock et al ., 2005). Nigerian small ruminantindustry is faced with the problem of meeting the nutritional requirements ofthe animals (Jones and Wilson, 1987; Fasae et al., 2005). Goats in Nigeriasuffer several nutritional stresses in the dry season as a result of seasonalvariability that affects the availability and nutritive quality of pastureswhich in turn causes marked decrease in nutrient intake and performance of theanimal (Bolaji et al., 2016).Therefore, study on the effects of fertilizer andharvest time on Panicum maximumcv. Mombasa and Concentrate inclusion levels inPanicum maximumMombasa based diets isvery important.

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