EFFECT OF AFRICAN BLACK PLUM (*Vitex doniana*) NUTRIENT BLOCK SUPPLEMENTATION ON LIVE WEIGHT CHANGES OF SAHEL DOES AND KIDS

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ABSTRACT
An experiment was conducted to investigate the effect of African black plum (ABP) multi- nutrient block supplementation on the live-weight changes of Sahel does and kids. A total of twelve (12) lactating Sahel does (2 years old) were randomly assigned to three treatments: 0% ABP (F1), ABP leaf meal (F2), and ABP fruit meal (F3) multi-nutrient blocks with four does per treatment in a completely randomized design. Live-weight changes were recorded bi-weekly. Data generated were analyzed using SAS (2005) Statistical Package and differences between means were separated using Least Significant Difference (LSD). The trial evaluated the effect of nutrient block supplementation on live-weight changes of the does and their kids. Experimental does were offered basal diet ad libitum and supplemented with multi-nutrient blocks. The trend of live-weight changes observed in the does showed a decline ($p<0.05$) soon after kidding up to the 4th week and stabilized thereafter, although does on ABP leaf meal (F2) treatment group had slightly higher ($p<0.05$) weight gain (22.00 kg) compared to does on F3 (20.50 kg) and the control (20.00 kg). The trend of live-weight changes of the kids suckled by does on the treatment groups showed a steady increase ($p<0.05$) in the live-weight gains of the kids up to the 12th week; with kids suckled by does on F2 (ABP leaf meal) having higher ($p<0.05$) weight gain (4.45 kg). It was concluded that supplementing lactating Sahel does with ABP leaf meal (F2) multi-nutrient blocks improved the weight gain of the does and kids. The study recommended ABP leaf meal (F2) multi-nutrient block supplementation for lactating Sahel does for increased weight gain of the does and kids.
KEYWORDS: African black plum, *Vitex doniana*, Nutrient block, Lactating Sahel does, Kids

INTRODUCTION

The optimization of the efficiency of utilization of available feed resources could be achieved through the use of supplements which provide the deficient nutrients. Traditionally, livestock rearers use conventional concentrate supplements to enhance the nutritive value of poor-quality roughages, but the exorbitant prices and low accessibility of the concentrates is a major hindrance (Singh, Pathak, Khan and Sharma, 2015). However, Mohammed *et al.* (2007) reported that poor quality roughages could be efficiently utilized by animals by supplementation with multi-nutrient blocks which will provide fermentable nitrogen and minerals that could by-pass the rumen. Multi-mineral blocks are hard stone-like blocks placed around the animal pen for licking. They contain a range of nutrients to supplement the need of the animals (Dzidiya *et al*., 2015). The purpose of supplementation is to provide nutrients that are deficient in the basal diet that are necessary for production by creating an efficient ecosystem for fermentative digestion of fibre in the rumen (Singh *et al.,* 2015).

MATERIALS AND METHODS

Experimental Location

The experiment was laid at the Livestock Teaching and Research Farm, Federal University Dutse, Jigawa State. Dutse lies on latitude 11.10^{0}N and 12.30^{0}N and longitude 8.40^{0}E and 12.12^{0}E of the Greenwich Meridian and has an elevation of 435 meters above sea level (Ahungwa *et al.,* 2022). The inhabitants engage mostly in crop farming and rearing of livestock. The area has an annual rainfall of 574 - 644 mm with average annual temperature of 18^{0}C - 37^{0}C (JSAP, 2016).

Collection and Preparation of Experimental Materials and other Ingredients

Fresh leaves and fruits of African black plum (ABP) were collected from Raju village in Dutse and were spread on tarpaulin under shade until completely dried. They were crushed, milled and stored in jute sacks prior to usage. Other feed ingredients were purchased from the livestock section of Shuwarin market in Dutse.

Treatments and Experimental Design

Completely Randomized Design (CRD) was used for the experiment comprising three treatments with four replicates each. The basal diet was offered to the does *ad libitum* twice daily and supplemented with multi-nutrient blocks.

Management of Experimental Animals and Feeding

One buck was used to naturally mate the does aged, upon successful fertilization, pregnant does were managed until parturition. The does were kept in cross-ventilated pens and intensively managed on basal diet and

supplemented with multi-nutrient blocks. The kids were suckled for a period of 90 days. Fresh drinking water was provided to the does *ad libitum*.

Kids' Management

At birth, the umbilical cord was cut and a tincture of iodine was applied to prevent entry of pathogens and aid healing (Ahamefule *et al.,* 2012). The weights of the kids were recorded immediately after parturition using a 10 kg capacity sensitive weighing scale. The newborn kids were left to suckle their dams freely for the first 7 days to ensure they suckle adequate colostrum prior to commencement of the experiment.

Multi-Nutrient Block Formulation

Multi-nutrient blocks (F1, F2 and F3) were produced following the procedure of Yami (2007) using locally available materials with the different parts of African black plum included in the formulations. F1 (control) had no ABP, F2 had ABP leaf meal while F3 had ABP fruit meal incorporated into the blocks (Table 1). Manual mixing of the ingredients was applied in which approximately 10 kg of ingredients was mixed per batch.

Determination of Live-weight Changes of Does and Kids

The does and kids were weighed prior to the commencement of the study and subsequently, bi-weekly between 8:00 am and 9:00 am before feeding in the morning.

Chemical Analysis

The proximate composition (DM, CP, CF, EE, NFE and ash) of the multi-nutrient blocks were determined according to AOAC (2005).

Statistical Analysis

Data generated were analyzed using SAS (2005) Statistical Package and differences between means were separated using Least Significant Difference (LSD).

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Table 1: Gross Composition of Ingredients for Multi-Nutrient Block Formulation

	Multi-Nutrient Blocks		
Ingredients (%)	F_1	F_2	F_3
Molasses	50.00	10.00	10.00
Urea	10.00	8.00	8.00
Wheat bran	20.00	27.00	27.00
Cotton seed cake	-	15.00	15.00
Cement	5.00	10.00	10.00
Common salt	5.00	5.00	5.00
Bone meal	5.00	5.00	5.00
Limestone powder	5.00	5.00	5.00
ABP leaf meal	-	15.00	0.00
ABP fruit meal	-	0.00	15.00
Total	100.00	100.00	100.00
Water (L)	4.00	12.00	10.00

ABP = African black plum, F_1 = 0% African black plum, F_2 = African black plum leaf meal, F_3 = African black plum fruit meal

Table 2: Proximate Composition of Basal Diet and African Black Plum Multi-Nutrient Blocks

		Multi-Nutrient Blocks		
Parameters (%)	Basal Diet	F_1	F_2	F_3
Dry matter	93.50	87.72	87.84	87.03
Crude protein	14.04	20.33	23.56	20.73

Crude fibre	18.50	14.41	15.04	13.87
Ether extract	5.75	2.65	2.95	3.05
Nitrogen free extract	55.30	57.05	52.44	56.70
Ash	6.41	5.56	6.01	5.65

F_1 = 0% African black plum (ABP) multi-nutrient block, F_2 = ABP leaf meal multi-nutrient block, F_3 = ABP fruit meal multi-nutrient block.

RESULTS AND DISCUSSION

Table 3 shows the live-weight changes of lactating Sahel does supplemented with African black plum multi-nutrient blocks. The trend of live-weight changes in the does showed a decline ($p<0.05$) immediately after kidding up to four weeks and stabilized thereafter, however does on ABP leaf meal (F2) treatment group had higher live-weight gain. The trend of live-weight changes signified the dietary treatment supplied the goats with the nutrients required for maintenance and production (Al-Suwaiegh, 2016). Garba (2014) reported a decline in live-weight changes of lactating does after kidding up to four weeks which conforms with the findings of this study. FAO (2007) reported block lick supplement could maintain milk production without loss of body weight.

Table 3: Live-weight changes of lactating Sahel does supplemented with African black plum multi-nutrient blocks

Treatments	Initial weight (kg)	Week 2 (kg)	Week 4 (kg)	Week 6 (kg)	Week 8 (kg)	Week 10 (kg)	Week 12 (kg)
F_1	22.50	21.00^b	20.00^b	20.00^b	20.00^b	20.00^b	20.00^b
F_2	23.00	23.00^a	22.00^a	22.00^a	22.00^a	22.00^a	22.00^a
F_3	22.50	21.50^b	20.50^b	20.50^b	20.50^b	20.50^b	20.50^b
LSD	1.20	1.05	0.36	1.14	1.23	1.38	0.91

F_1 = 0% African black plum (ABP) multi-nutrient block, F_2 = ABP leaf meal multi-nutrient block, F_3 = ABP fruit meal multi-nutrient block, LSD = Least Significant Difference.

Table 4 presents the live-weight changes of Sahel kids suckled by does supplemented with African Black Plum multi-nutrient blocks. The trend of live-weight changes showed significant ($p<0.05$) increase in the live-weight gains of the kids up to the 12th week; with kids suckled by does on F_2 (ABP leaf meal) having higher weight gain (4.45 kg). Rohila *et al.* (2011) reported higher live-weight gain in block supplemented lambs. FAO (2011) stated dietary supplementation of urea molasses multi-nutrient block improved the daily live-weight gain of calves. The higher live weight gain in kids of does on F2 (ABP leaf meal) could be due to the supply of degradable nitrogen derived from the nutrient blocks which might have contributed to improved growth of rumen micro-organisms and increased the supply of microbial protein (Mengistu & Hassen, 2018).

Table 4: Live-weight changes of Sahel kids suckled by does supplemented with African black plum multi-nutrient blocks

Treatments	Initial weight (kg)	Week 2 (kg)	Week 4 (kg)	Week 6 (kg)	Week 8 (kg)	Week 10 (kg)	Week 12 (kg)
F_1	1.18	1.82^b	2.45^b	3.09^c	3.59^b	4.12^c	4.29^b
F_2	1.20	1.86^b	2.84^a	3.55^a	4.11^a	4.53^a	4.45^a
F_3	1.15	2.21^a	2.79^a	3.26^b	3.85^a	4.31^b	4.30^b
LSD	0.33	0.12	0.15	0.21	0.04	0.17	0.11

F_1 = 0% African black plum (ABP) multi-nutrient block, F_2 = ABP leaf meal multi-nutrient block, F_3 = ABP fruit meal multi-nutrient block, LSD = Least Significant Difference.

CONCLUSION

The study concluded that supplementing lactating Sahel does with ABP leaf meal nutrient blocks improved the live-weight gains of the does and kids. It was recommended that ABP leaf meal nutrient block could be used as supplements for improved weight gain of the does and kids.

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