DIETARY EFFECTS OF *Momordica charantia* LEAF POWDER ON *IN VITRO* GAS PRODUCTION AND GROWTH PERFORMANCE OF WEST AFRICAN DWARF GOATS

BY

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A dissertation submitted to the Department of Animal Nutrition, College of Animal Science and Livestock Production, Federal University of Agriculture, Abeokuta in partial fulfillment of the requirements for the award of the Degree of Masters of Agriculture, Ruminant Animal Nutrition.

JULY, 2025.

ABSTRACT

The adverse effects of using antibiotics have rejuvenated the interest of animal nutritionists towards the use of plants and its compounds as a potential panacea to mitigate methane emission and enhance nutritional efficiency. This study investigated the dietary effects of *Momordica charantia* leaf powder (MCLP) on *in vitro* gas production and growth performance of West African dwarf goats. Two experiments were conducted; experiment 1 investigated the *in vitro* total gas and methane production, *in vitro* dry matter digestibility and post-incubation parameters of diets containing *Momordica charantia* leaf powder. The experimental substrate for the *in vitro* experiment was incubated for 48 hrs and it consists of *Megathyrsus maximus* and a formulated concentrate diet with varying levels (0, 10, 20, 30, 40 and 50 mg/g DM) of MCLP to form six different treatments. In experiment 2 (*in vivo* study), twenty West African dwarf (WAD) goats (average body weight 8.5 ± 1.17 kg) were allotted on weight equalization into four dietary treatment groups of five animals each in a Completely Randomized Design (CRD). Concentrate diets containing 0, 10, 20 and 30 g/kg MCLP and *Megathyrsus maximus* were offered to each group for 84 days. Growth performance characteristics, nutrient digestibility, nitrogen utilization, rumen fermentation parameters and blood profile of the animals were determined. Data were subjected to One-Way Analysis of Variance and treatment means were separated using the Duncan's multiple range test (DMRT). Results showed that inclusion of MCLP in the diets significantly ($p < 0.05$) reduced *in vitro* total gas and methane production. Inclusion of 20-30 mg/g MCLP in the diets reduced percentage of methane produced with minimal effect on digestibility. The weight gain was not significantly ($p > 0.05$) influenced by the inclusion of MCLP in the diets. Goats offered diets containing 0 and 10 g/kg MCLP had the highest ($p< 0.05$) total dry matter intake, while improved feed conversion ratio (FCR) was at 20 g/kg MCLP. Goats offered diet containing 20 g/kg and 30 g/kg MCLP had higher ($p< 0.05$) dry matter, crude protein and crude fibre digestibility than the control diet. Nitrogen absorbed and nitrogen balance were significantly ($p< 0.05$) higher in goats fed diets containing MCLP than the control diet while the percentage nitrogen retention was highest in goats fed 30 g/kg MCLP diet. Rumen ammonia nitrogen concentration at 4 hr post feeding reduced significantly in goats fed diets with inclusion of MCLP while goats fed diets 30 g/kg MCLP recorded the lowest protozoa population. Inclusion of MCLP in the diets of WAD goats had significant effect ($p< 0.05$) on serum total protein and globulin. Malondialdehyde

decreased with increased level of MCLP while superoxide dismutase and glutathione peroxidase increased with addition of MCLP in the diets. The study concluded that 20 mg/g MCLP could be included in the diet of West African dwarf goats as phytogenic additive to reduce methane production, improve dry matter intake, crude protein digestibility and reduce oxidative stress without detrimental effect on its health status.