PERFORMANCE EVALUATION AND HAEMATOLOGICAL PROFILE OF WEANED PIGS FED AERIAL PART OF MEXICAN MINT (*PLECTRANTHUS AMBOINICUS)* (LOUR.) SPRENG

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ABSTRACT

A 3-week trial was conducted to assess the effect of short-term feeding of Mexican mint (Plectranthus amboinicus) (MM) on growth performance and selected haematological parameters of weaned pigs. Thirty weaner pigs aged six weeks, average weight of 5.8 ± 0.3kg were randomly allotted to five treatments in a completely randomized design. Each treatment was further subdivided into three replicates of two pigs each. Treatment one (T1) was the control and had no P. amboinicus, treatments two (T2), three(T3), four (T4) and five(T5) consisted of 2, 4, 6, and 8% of freshly cut aerial part of P. amboinicus respectively. Feed intake and weight gain of the pigs were recorded and feed conversion ratio (FCR) was calculated. Blood samples for haematological evaluations were collected at the anterior vena cava of the pigs at the termination of the 3-week trial. There were no significant differences ($p>0.05$) in the feed intake and weight gain however, the FCR was significantly($p<0.05$) improved in pigs fed T2(2.53) when compared with pigs on diets T1 (2.76), T3(3.06), T4(3.29) and T5(2.77). The haemoglobin concentration of pigs on diet T3 had the highest Hb value of 12.47g/dL, followed by T5(12g/dL), T1(11.47g/dL), T4 (10.50g/dL), All other haematological parameters were similar. In conclusion, the inclusion of P. amboinicus up to 4% improved the feed conversion ratio and haemoglobin concentration in weaner pigs. However, a further addition of raw P. amboinicus beyond 4% is of no added advantage.

Keywords: Growth performance, Haematological indices, Pigs, *Plectranthus amboinicus*, Phytochemicals

INTRODUCTION

Monogastric animals, including pigs and poultry, play a vital role in animal protein production globally. However, the weaned pig stage presents significant challenges. Weaned pigs often experience growth plateaus and increased susceptibility to diseases due to stress and dietary changes (Adebiyi *et al*., 2023). Implementing nutritional interventions that promote growth, health, and well-being during this critical period is crucial for optimal pig production.

In recent years, there has been a growing emphasis on exploring alternative feed resources to enhance the nutritional and haematological profile, as well as the overall health of livestock. Among these resources, the aerial parts of Mexican mint (*Plectranthus amboinicus*) (MM)have emerged as a potential dietary supplement for weaned pigs. This perennial herb is also known as "Indian Borage" or "Country Borage." It possesses renowned medicinal properties (Arumugam, *et al*., 2016); and exhibits antimicrobial and antioxidant properties that can actively improve livestock growth and immune response (Huang, *et al.,* 2022, Sawant, *et al.,* 2023). These properties are attributed to the presence of a plethora of bioactive compounds and phytochemical composition in this plant (Arumugam, *et al*., 2016, Adebiyi and Lateef, 2022).

Although MM possesses medicinal properties, its application in pigs and its impact on growth and health remain unclear. Hence this study was conducted to investigate the supplementation of MM on growth performance and selected blood parameters of weaned pigs,

Materials And Method

Source and preparation of Mexican mint meal

The Mexican mint was planted at the teaching and research farm, University of Ibadan, Ibadan. The aerial parts of the plant were harvested and rinsed under running water to remove dirt, thereafter, sliced into tiny bits and incorporated into the diets.

Management of Experimental Animals

The experiment was carried out at the Piggery Unit of the Teaching and Research Farm, University of Ibadan, Ibadan, Oyo-state Nigeria**.** Six-week-old piglets (5.8±0.3kg average body weight) were used for the experiment. The piglets were fed for one week after which they were divided into different treatments. Thirty piglets were randomly assigned to five treatments. Each treatment consisted of three replicates with two pigs per replicate. The piglets in each group were given water and feed *ad libitum* during the three-week trial.

Experimental Diet

The composition of the basal diet is shown in table 1. There were five treatment groups. These were T_1, T_2, T_3, T_4, and T_5. T_1 served as the control while T_2, T_3, T_4 and T_5 consisted of 2%, 4%, 6% and 8% aerial parts of Mexican mint(MM) respectively.

TABLE 1; Gross composition of the experimental basal diet

INGREDIENTS	**COMPOSITION (kg)**
Maize	50
Soya bean meal	16.95
Wheat offal	16
Groundnut cake	14
Common salt	0.25
Bonemeal	1
Dicalcium phosphate	0.5
Lysine	0.5
Methionine	0.3
Premix	0.5
TOTAL	**100**
Calculated Nutrients	
*ME kcal/kg	2906.8
Crude protein(%)	19.86
Crude fiber (%)	3.88
Crude Fat (%)	3.84
Lysine (%)	1.27
Methionine (%)	0.54

*ME=Metabolizable energy;

Composition of vitamin premix per kg of diet; vitamin A,12,500,I.U; vitamin D 2,500I.U; vitamin E, 40mg, vitamin K_3,2MG; vitamin B_{13},mg; vitamin B_2 5.5mg; calcium panthothenate11.5mg; vitamin B_6, 5mg; vitamin B_{12} 0.025mg; choline chloride, 500mg; folic acid, 1mg; Biotin 0.08mg; manganese120mg; iron 100mg; zinc 80mg;copper, 0.8mg; iodine,1.5mg; cobalt, 0.3mg; selenium, 0.12mg; Anti-oxidant,120mg.

Data Collection

The total feed intake and weight gain for each group were recorded. The feed conversion ratio was calculated.

Haematological Evaluation

At the end of the 3-week trial, blood samples for haematological evaluations were collected through the anterior vena cava of one pig per replicate using a sterile disposable needle and syringe into

EDTA(ethylenediamine tetraacetic acid) bottles. The following haematological indices were analysed using standard procedures already documented (Adebiyi, *et al*., 2022): White Blood Cell (WBC), Red Blood Cell (RBC), haemoglobin concentration (Hb), and packed cell volume (PCV),.

Statistical Analysis

Data obtained were subjected to analysis of variance of SAS 2010 and significance means were separated using the Duncan multiple range test of the same software.

RESULTS AND DISCUSSION

Growth performance

Table 2 summarizes the impact of varying Mexican Mint (MM) levels on pig performance. While feed intake and weight gain remained unaffected across all dietary groups, the feed conversion ratio (FCR) was significant ($p < 0.05$) among the treatment groups. Notably, pigs fed a high MM level (6%, T4) exhibited the worst FCR, significantly higher than control and 2% MM (T2) groups. Conversely, the 2% MM group (T2) displayed the most efficient FCR, suggesting superior feed utilization for weight gain.

TABLE 2: Performance Characteristics of Weaned Pigs Fed Different Levels Mexican Mint

	T1	T2 (2%MM)	T3 (4%MM)	T4 (6%MM)	T5 (8%MM)	SEM
*Feed Intake(kg)	5.14	5.29	6.27	5.91	5.86	0.27
*Weight change(kg)	1.88	2.08	2.07	1.80	2.12	0.08
Feed conversion ratio(kg)	2.76^{b}	2.53^{b}	3.06^{ab}	3.29^{a}	2.77^{ab}	0.12

ab Means in the same row with different superscripts differ significantly($p<0.05$)

* Not significantly different($p<0.05$)

These findings imply that MM supplementation, at the levels used in this study, does not negatively impact overall feed intake or growth in this pig breed. However, the significantly lower FCR in T2 is an indication of enhanced feed conversion efficiency which implies that feeds ingested were more effectively converted to one kilogram of pig live weight compared to pigs in other treatment groups. This aligns with previous studies by Hosseinzadeh *et al*. (2023), who observed similarity in the values of weight gain and feed intake but increased FCR in broilers fed MM and rosemary essential oils.

Interestingly, pigs consuming 6%(T_4) and 8% (T_5) MM experienced diarrhoea during the third week of the trial. This potentially stems from the increased intake of phytochemicals present in the aerial parts of MM. Saponins, specifically, are phytochemicals known to cause digestive disturbances, and our prior study (Adebiyi and Lateef, 2022) confirmed their presence in MM extracts. This aligns with research by Hierro *et al.* (2018), highlighting the dose-dependent nature of saponin toxicity.

Haematological parameters

The mean haematological parameters of pigs fed diets containing different levels of MM are represented in Table 3. Notably, the packed cell volume (PCV), red blood cell (RBC) count, and white blood cell (WBC) count remained unaffected by the inclusion of MM, regardless of the inclusion level (low or high). This suggests that different levels of MM supplementation were well-tolerated and did not adversely impact these fundamental blood parameters. However, haemoglobin concentration exhibited a statistically significant difference ($p < 0.05$) within the dietary groups. pigs fed diet containing 4% MM (T3) exhibited the highest haemoglobin value, significantly exceeding those on other dietary regimens. Interestingly, no significant differences ($p > 0.05$) were observed among the

TABLE 3: Haematological parameters of weaned Pigs Fed Different Levels Mexican Mint

Parameters	T1(0%)	T2(2%)	T3(4%)	T4(6%)	T5(8%)	SEM
PCV (%)	35.33	36.67	38.00	32.67	37.00	2.0
Hb (g/dL)	9.63^{b}	11.47^{ab}	12.47^{a}	10.50^{ab}	12.00^{ab}	0.6
RBC(10^6µL)	4.83	5.84	6.14	5.25	6.01	0.3
WBC (10^3/µL)	9.33	8.02	9.05	9.02	8.15	0.12

abcMeans in the same row with different superscripts differ significantly($p<0.05$)

SEM- Standard error of mean, PCV-packed cell volume, WBC- white blood cell, Hb- Haemoglobin,

remaining treatment groups (T1, T2, T4, and T5). It is worth noting that an increase in the haemoglobin concentration could enhance oxygen transportation in the blood since haemoglobin is the protein within red blood cells responsible for binding and transporting oxygen throughout the body. Haemoglobin concentration also serves as a crucial indicator of circulatory red blood cell function and can be used to diagnose anaemia or assess bone marrow's capacity for RBC production (Awodi *et al*., 2015).

CONCLUSION

Including *P. amboinicus* in the diets of weaned pigs at 2% improved the feed conversion ratio while 4% increased haemoglobin concentration. However, a further increase beyond 4% raw *P. amboinicus* is of no added advantage as this study observed that intake of high doses (6-8%) of the raw aerial part of *P. amboinicus* by the weaned pigs could cause diarrhoea.

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