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THE GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY OF PIGS FED RAIN TREE (*ALBIZIA SAMAN*) PODS AS A REPLACEMENT FOR MAIZE

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Abstract: The growth performance and nutrient digestibility of pigs fed diets containing rain tree pods (RPs) were evaluated using 20 pigs. Five diets were formulated with RP replacing maize in the control diet at 10, 20, 30 and 40%. The pigs were randomly allotted to the 5 dietary treatments, with 4 replicates of one (1) pig per replicate, and fed *ad libitum* for eight weeks. Data were collected on initial weight, final weight (FW), daily feed intake (DFI), daily weight gain (DWG), feed conversion ratio (FCR), cost per kilogram feed (CKF), and feed cost per kilogram weight gain. At week eight, the pigs were moved into individual metabolic crates for a digestibility trial. Rain tree pods, feed and fecal samples were analyzed for proximate composition, and metabolic energy was calculated following standard procedures. The apparent digestibility of dry matter, crude protein, ether extract, ash, and nitrogen-free extract were calculated. Data generated were analyzed using a one-way analysis of variance. The growth performance of pigs fed a 10% RP diet was similar to those fed a control diet. As the dietary inclusion of RP increased, the DFI, DWG and FW of the pigs decreased ($p<0.001$). The FCR increased while CKF reduced significantly ($p<0.001$) with an increasing level of RP in the diets. Apparent nutrient digestibility was depressed ($p<0.01$) with the inclusion of RP in the diets of pigs. This study concluded that the inclusion of 10% RP as a replacement for maize in the diet of growing pigs gave optimal growth performance and reduced feed cost.

Key words: growing pigs, alternative feed resource, nutritive value, feed costs.

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Introduction

The performance of animals is influenced by their nutrition, weight, age, and physiological state. During the growing phase, pigs consume more feed, gain more weight and have better feed efficiency than those at other physiological stages. This implies that more cost is expended on pig production at this phase having in mind that 70% of total production cost is expended on feed. The reduction of feed cost, as long as performance is not hampered, will contribute substantially to maximizing the profits of the pig farmer. Hence, a regular supply of feed at reasonable prices is essential. Furthermore, a large proportion of feed cost is expended on energy. However, because pigs are bulk feeders, conventional energy feedstuffs (especially maize) are often too expensive in their rations (Adesehinwa, 2008) in this part of the world. Maize is the major energy feedstuff for pigs and constitutes about 40% or more of the diet. It, however, has conflicting demands for human consumption, industrial use and animal feed.

In most developing economies, most of the maize produced is used for human needs, as deduced from the report of FAO (2018), while excesses are insufficient for livestock use. Maize is usually in short supply and very expensive to use for feed production, while the price keeps fluctuating and can be unpredictable. The global price per tonne of maize was 159USD as of 2016, rose to 175USD by December 2017, and again fell to 161USD by June 2018 (FAO, 2018). Locally, in Nigeria, the price of maize was ₦65,000.00/tonne in 2010 but the price almost doubled (₦110,000.00/tonne) in 2019. Therefore, exploring the use of relatively cheaper, readily available and less competitive alternatives becomes crucial to economic pig production. As opined by Irekhore et al. (2016), the utilization of locally available alternative feedstuffs will ensure success and profitability in pig production. *Albizia saman* (rain tree) pods could be a potential alternative feedstuff for pigs following the report of De la Cruz (2003) that rain tree pods could substitute up to 35% of maize in animal rations because of the close similarity in their nutritional composition.

Rain trees (*Albizia saman)* are grown along roadsides and gardens as avenue trees, in parks for shade and ornamentals, and are also planted as pasture trees (Flores, 2002; Hosamani et al., 2005; Aung et al., 2016). They are fast-growing, easy to cultivate (Idowu et al., 2006) and are cultivated and/or naturalized throughout the tropics (Durr, 2001; Staples and Elevitch, 2006). Each tree yields a large quantity of 250–300 kg (Flores, 2002; Hosamani et al., 2005) of free pods annually or even up to 500–600 kg from fully grown trees (Rath et al., 2014) between December and April, depending on the region. The pods can be stored over long periods (Idowu et al., 2006) and are used as a feed supplement for cattle, sheep and goat (Flores, 2002). An earlier report (Hosamani et al., 2005) has indicated that rain tree pods have total digestible nutrients equivalent to cereal byproducts, while Rath et al. (2017) reported that the pods could be good sources of energy and protein. It was also reported that the dietary incorporation of 30% raw or processed rain tree pods did not influence the survival, weight gain and specific growth rate of *Catla catla* fry (Rath et al., 2017). However, there is a dearth of information on its economic viability as feed for pigs. Exploring the potentials of rain tree pods could serve as a means of easing the pressure on maize, lowering feed costs and encouraging a sustained increase in pig production, hence this study.

Material and Methods

Ripe rain tree pods were picked after ripening and falling from underneath trees within the University of Ibadan campus in Ibadan, Nigeria and sun-dried. Representative samples of rain tree pods were collected and analyzed for proximate composition using the method of the Association of Analytical Chemists (AOAC, 1990). The metabolic energy was estimated using the formula of Pauzenga (1985). The amino acid profile of the pods was determined by high-performance chromatography after acidic, alkaline and enzymatic hydrolysis (Dai et al., 2014). The anti-nutrient content of the pods was determined following the methods of Harborne (1998). For the determination of tannins, 1g of the milled pods was weighed into a beaker, and soaked in a solvent mixture comprised of 80 ml of acetone and 20 ml of 10% glacial acetic acid for 5 hours. The sample was filtered through a double-layer filter paper to obtain the filtrate. A set of standard solutions of tannic acid was prepared, ranging from 10 to 50 ppm. The absorbencies of the standard solution and the filtrates were read at 500 nm on a spectrophotometer.

The content of saponins was determined by weighing 2 g of the milled pods into a 250-ml beaker, and 100 ml of isobutyl alcohol were added. It was then left for 5 hours on a UDY shaker to obtain a uniform mixture. The mixture was then filtered through a Whatman No. 1 filter paper. The filtrate was transferred to a 100-ml beaker and was saturated with a magnesium carbonate solution. The mixture obtained was then filtered to obtain a clear, colorless solution and read on a spectrophotometer at 380 nm. 0 ppm to 10 ppm of standard saponin solutions were prepared from a 1000 ppm saponin stock standard solution and saturated with magnesium carbonate as above and also filtered. The absorbencies of the standard saponin solutions were also read at 380 nm to obtain the gradient of the plotted graph.

For alkaloid content determination, 2 g of the milled pods were weighed into a 100-ml conical flask, and 20 ml of 80% alcohol (ethanol) were added to give a smooth mixture which was then transferred into a 250-ml flask and more alcohol was added to make up to 100 ml. Then, 1g of magnesium oxide was added. The mixture was then digested in a boiling water bath for 1.5 hours under a reflux air condenser with occasional shaking. The mixture was filtered while hot through a small Buchner funnel. The residue was returned to the flask and re-digested for 30 minutes with 50 ml alcohol, after which the alcohol was evaporated, and the water was added to replace the alcohol lost. When all the alcohol had been removed, 3 drops of 10% hydrochloric acid were added. The whole solution was later transferred into a 150-ml volumetric flask, after which 5 ml of zinc acetate solution and 5 ml of potassium ferrocyanide solution were added, and the content was thoroughly mixed together to give a homogenous solution. The flask was allowed to stand for a few minutes. The solution was then filtered through a dry filter paper and l0 ml of the filtrate were transferred into a separating funnel, and the alkaloids were extracted by shaking vigorously with five successive 30-ml portions of chloroform. The residue obtained was dissolved in hot water and transferred into a Kjeldahl flask with the solution. Then, 1.2 g of sucrose and 10 ml of concentrated H_2SO_4 and 0.02 g of selenium were added for digestion into a colorless solution to determine the % NH_3 by the Kjeldahl distillation method. The obtained concentration of nitrogen (%) was multiplied by a factor of 3.26 to get the total alkaloid value.

Dried pods were used to formulate five (5) growing pigs' diets at inclusion levels of 0, 10, 20, 30 and 40% as replacements for maize. Diets were formulated to meet the nutrient requirements of growing pigs (Cromwell, 2015). Other ingredients were used at the same rate for all the diets, as shown in Table 1. A sample of each diet was taken to the laboratory and analyzed for proximate composition and metabolic energy. Twenty (20) growing pigs (cross breeds) of approximately 12 weeks of age with an average live-weight of 30.8$\pm$0.17 kg were used for this experiment. The pigs were treated for ecto- and endo-parasites using ivomectin^R (subcutaneous) at a dosage of 0.2 ml/10 kg, and then they were randomly allotted to 5 dietary treatments of 4 pigs/treatment with one (1) per replicate. They were housed in well-ventilated individual pens with low walls, equipped with shallow concrete feeders and drinkers, and fed their respective diets *ad libitum*. Fresh, clean water was supplied daily all through the period of the study, which lasted for 8 weeks. Data were collected on final weight, feed intake, daily weight gain, feed conversion ratio, cost per kilogram of feed and feed cost per kilogram weight gain.

At week 8 of the feeding trial, the pigs were moved into individual metabolic crates where they were fed known quantities of their individual diets. After 3 days of adjustment, the feces voided by each pig were collected on a daily basis for 4 days. The feces collected from each pig per day were weighed, labeled and stored at a temperature of 5 °C. All the feces collected for each pig were bulked, dried, weighed, ground and representative samples were analyzed for proximate composition following the same procedure used for the diets. The apparent digestibility of dry matter, crude protein, ether extract, ash and nitrogen-free extract were calculated using data on feed intake and results of the proximate analysis. The data generated were analyzed using the one-way analysis of variance of the SAS statistical package (SAS, 2002).

Table 1. The composition of diets containing varying levels of rain tree pods as replacements for maize fed to growing pigs.

Ingredients (%)	Diets (Rain tree pod inclusion level)				
	0% (Control)	10%	20%	30%	40%
Cassava meal	6.75	6.75	6.75	6.75	6.75
Wheat bran	25.00	25.00	25.00	25.00	25.00
Groundnut cake	15.00	15.00	15.00	15.00	15.00
Soybean meal	10.00	10.00	10.00	10.00	10.00
Maize	40.00	30.00	20.00	10.00	0.00
Rain tree pod	0.00	10.00	20.00	30.00	40.00
Bone meal	1.50	1.50	1.50	1.50	1.50
Oyster shell	1.00	1.00	1.00	1.00	1.00
Salt	0.50	0.50	0.50	0.50	0.50
*Vitamin-mineral premix	0.25	0.25	0.25	0.25	0.25
Analysed components					
Dry matter (%)	92.15[a]	90.15[b]	90.10[bc]	89.95[c]	89.15[d]
Crude protein (%)	19.40[e]	20.00[d]	20.50[c]	21.55[b]	22.55[a]
Ash (%)	7.10[d]	7.35[cd]	7.45[c]	8.25[b]	8.60[a]
Ether extract (%)	3.90[b]	4.20[ab]	4.35[a]	4.55[a]	4.55[a]
Crude fibre (%)	5.85[d]	6.00[c]	6.25[b]	6.35[b]	6.80[a]
Nitrogen-free extract (%)	55.90[a]	52.60[b]	51.55[c]	49.25[d]	46.65[e]
**Metabolic energy (MJ/kg)	12.64[a]	12.35[b]	12.32[b]	12.21[c]	11.98[d]

*Premix (per kg) comprised of: Vitamin A 10,000,000.00 IU; Vitamin D_3 2,000,000.00 IU; Vitamin E 20,000.00mg; Vitamin K_3 2,000.00mg; Vitamin B_1 3,000.00mg; Vitamin B_2 5,000.00mg; Niacin 45,000.00mg; Calcium Pantothenate 10,000.00mg; Vitamin B_6 4,000.00mg; Vitamin B_{12} 20.00mg; Choline Chloride 300,000.00mg; Folic Acid 1,000.00mg; Manganese 300.000.00mg; Iron 120,000.00mg; Zinc 80,000.00mg; Copper 8,500.00mg; Iodine 1,500.00mg; Cobalt 300.00mg; Selenium 120.00mg; and Antioxidant 120,000.00mg; ** Calculated.

Results and Discussion

The dry matter, proximate composition, metabolic energy and selected anti-nutrients of sun-dried ripe rain tree pods

The dry matter, proximate, metabolic energy (ME) and selected anti-nutrients compositions of sun-dried ripe rain tree pods are presented in Table 2. Dried pods had a dry matter (DM) content of 95.10%, a value similar to that reported by Raja et al. (2017) but higher than values ranging between 81.73 and 85.50 reported by Hosamani et al. (2005), Esquivel-Mimenza et al. (2014) and Aung et al. (2016). The high level of DM obtained could be explained by the intensity of drying, which was done to allow for the ease of milling, handling and storage of the pods. The value obtained for the ME (12.07MJ/kg) is in-between the values for maize offal (10.46 MJ/kg) and maize (14.35 MJ/kg). The crude protein content (15.18%) of the pod is similar to the values of 15.31, 15.6, and 15.73% reported by Hosamani et al. (2005), Sotelo et al. (1995) and Esquivel-Mimenza et al. (2014), respectively and falls within the range (12–18 %) reported by F/FRED (1994) and Flores (2002). However, Aung et al. (2016) reported a value of 18.92 %, while Rath et al. (2014) and Raja et al. (2017) reported CP of 22.25% and 19.32%, respectively. The CP value is also higher than that of maize (8–10 %) and maize offal (11%). The value obtained for the ether extract (EE) content of the pods (7.50%) is lower than the value of 10.1% reported by Oduguwa et al. (2000). The EE value is, however, higher than values for maize (4.0%) and maize offal (3.5%). The ash content of the pod is high (10.13%) in contrast to the findings of Sotelo et al. (1995). The crude fibre (CF) content (14.2%) is higher than values ranging from 10.07 to 12.5% obtained by Sotelo et al. (1995), Oduguwa et al. (2000) and Hosamani et al. (2005). The CF value is also far higher than the value for maize (2%) but can be compared to that of maize offal (12%). The NFE (carbohydrates) content (48.13%) of the pods is close to a value of 54.23% reported by Raja et al. (2017). It is, however, low compared to the 69.93% value reported by Hosamani et al. (2005).

The pods contained 20 amino acids with values generally lower than the values reported for seeds by Sotelo et al. (1995). This is obviously so because the crude protein content of the pods was lower than that of the seeds. The combination of glutamic acid plus glutamine had the highest value, 1.36 g/100 g. On an individual basis, leucine had the highest value of 0.71 g/100 g, while the least value of 0.14 g/100 g, which is a little lower than the value for maize and maize offal (0.18%), was recorded for methionine. The value recorded for lysine (0.43 g/100 g) is higher than the values for maize and maize offal.

The pods were found to contain 19.0 mg/kg of tannins. On the contrary, Aung et al. (2016) obtained higher tannin content (1.87%) in RP. The tannin value obtained could be viewed as low in comparison to a value of 7.9% reported by Ukoha et al. (2011) and the range (6–15%) reported to be present in most tropical legumes (Barry, 1999). Variations in tannin content can be attributed to differences in the method of analysis, as tannin yield is dependent on the technique of extraction, temperature, the time during the extraction process as well as pressure. The value (12.5 mg/kg) for the saponin content was also low and could be adjudged as non-detrimental to animals since Oleszek et al. (1999) reported that the lethal dose is 1,100mg/kg of body weight. A value of 21.5 mg/kg was obtained for the alkaloid.

Table 2. The chemical composition of sun-dried ripe rain tree pods.

Components	Contents
Dry matter (%)	95.10
Metabolic energy (MJ/kg)	12.07
Proximate (%)	
Crude protein	15.18
Ether extract	7.50
Ash	10.13
Crude fibre	14.16
Nitrogen-free extract	48.13
Amino acids (g/100g)	
Aspartic acid + Asparagine	1.13
Threonine	0.39
Serine	0.55
Glutamic acid + Glutamine	1.36
Proline	0.61
Glycine	0.53
Alanine	0.44
Cystine	0.19
Valine	0.58
Methionine	0.14
Isoleucine	0.37
Leucine	0.71
Tyrosine	0.45
Phenylalanine	0.41
Lysine	0.43
Histidine	0.22
Arginine	0.41
Tryptophan	0.15
Anti-nutrients (mg/kg)	
Tannins	19.0
Saponin	12.5
Alkaloid	21.5

Growth performance characteristics

The growth performance of the growing pigs varied ($p<0.05$) with the inclusion of rain tree pods (RPs) in the diets (Table 3). The final weights (FWs) of pigs fed the control and 10% RP diets were similar but higher ($p<0.001$) than FW values for pigs in other treatment groups, with values decreasing as the inclusion rate of RP increased in the diets. The FW was greatly reduced when pigs were fed diets containing RP as a total replacement for maize. Daily weight gain (0.16 to 0.49 kg) was reduced ($p<0.001$) as the inclusion level of RP increased in the diets, which supports the findings of Thomas et al. (1976), who reported reduced weight gains for goats with the inclusion of 30% of RP in concentrates. However, a report of another study (Irekhore et al. 2016) showed that using RP to replace maize offal in the diets of weaned pigs did not affect weight gain. Hagan (2013), in a study on broiler chickens, reported that the dietary inclusion of rain tree pods did not influence growth performance. Decreased daily weight gain with increasing levels of RP in the diets can be attributed to reduced feed intake and nutrient digestibility due to the presence of anti-nutrients. This finding is in agreement with the work of Chang and Fuller (1964) who reported a lower growth rate as a result of the presence of tannins. Alkaloids, even at low levels, have been indicated to be detrimental to performance and well-being (Van Egmond et al., 2009). Nevertheless, the weight gains recorded for the pigs were within the normal range for growing pigs. This result is in accordance with the reports of Boren and Carlson (2005) and Paul et al. (2007), who observed weight gains of between 135 and 331 g/day.

Values recorded for the daily feed intake (0.82 to 1.44 kg) of the pigs followed the same trend as the weight gain. Chicco et al. (1973) also reported decreased feed intake with concomitantly reduced weight gains in pigs fed RP levels above 22%. The past work has revealed that tannins may cause the decreased feed intake and efficiency of feed utilization (Griffins, 1991; McNeil et al., 1998). It has also been reported that saponins may have an adverse effect on the productive performance of non-ruminant animals such as pigs and poultry (Liener, 2003). The growth retardation effect of saponins on poultry and pigs results from reduced feed intake, which is primarily caused by the bitter taste and foaming properties (Soetan and Oyewole, 2009). This implies that the pigs were not able to consume enough feed to meet their nutritional requirements, hence the poor performance. Although the RP diets contain higher CP levels, these could not be utilized for body protein accretion by the pigs, probably due to depressed feed consumption, reduced digestibility and lower ME values, as well as the presence of anti-nutrients which tend to bind proteins and impair their utilization. Furthermore, the high CF values of the diets could militate against higher feed intake, which would have compensated for the lower ME concentration of the diets since pigs eat to meet their energy requirement.

The feed conversion ratio (FCR) for the pigs on the different treatments (2.89–5.33) differed ($p<0.05$). The best values were obtained for pigs fed the control and 10% RP diets, while FCR became poorer as the RP level increased in the diets of the pigs. The amino acid consumed by pigs is influenced by the feed intake and digestibility of energy in the diet, while digestible energy also influences the voluntary feed intake of growing pigs fed *ad libitum* (Chiba et al., 1991a, b). The insufficiency or imbalance of energy and amino acids could cause improper growth, poor feed efficiency and the inadequate rate and efficiency of protein and fat deposition, which explains the poor performance obtained in this study.

The cost per kilogram of feed (₦29.40 to ₦52.20, the equivalent to $0.097 to $0.17) decreased (p<0.05) with increasing levels of RP in the diets. Reduced feed cost is based on the fact that RP was obtained free as pods often go wasted (Hosamani et al., 2005), with the cost incurred on its collection and processing. Feed cost per kilogram of weight gain of the pigs ranged from ₦139.30 to ₦155.82 ($0.45 to $0.51), with a significant (p<0.05) reduction when 30% of RP was included in the diet compared to control.

Table 3. The growth performance and cost-benefit of growing pigs fed varying levels of rain tree pods as a replacement for maize.

Variables	Inclusion levels of rain tree pods						
	0%	10%	20%	30%	40%	SEM	P-value
Initial weight (kg)	30.75	30.50	30.88	30.75	31.13	0.17	0.66
Final weight (kg)	58.00^{a}	56.25^{a}	51.88^{b}	47.25^{c}	39.75^{d}	1.54	<0.001
Daily weight gain (kg)	0.49^{a}	0.46^{a}	0.38^{b}	0.30^{c}	0.16^{d}	0.03	<0.001
Daily feed intake (kg)	1.44^{a}	1.44^{a}	1.35^{b}	1.20^{c}	0.82^{d}	0.05	<0.001
Feed conversion ratio	2.89^{d}	3.12^{d}	3.60^{c}	4.09^{b}	5.33^{a}	0.21	<0.001
Cost per kilogram of feed (₦)	52.20^{a}	46.50^{b}	40.80^{c}	34.10^{d}	29.40^{e}	1.88	<0.001
Feed cost per kilogram weight gain (₦)	150.60^{a}	147.64^{ab}	147.29^{ab}	139.30^{b}	155.82^{a}	2.09	<0.05
Mortality (%)	0.00	0.00	0.00	0.00	0.00	-	-

[abcd] Means within the same row with different superscripts differ at p<0.001.

Apparent nutrient digestibility

The apparent nutrient digestibility by growing pigs fed diets containing RP as a replacement for maize is presented in Table 4. The values for dry matter digestibility (DMD) ranged between 55.85 and 84.67 % reducing (p<0.05) with the inclusion of RP in the diets. The highest value was recorded for pigs fed the control diet, and this value differed from the values observed for pigs on the other treatments. The values observed for pigs on treatments 10% of RP and 20% of RP were similar. Although the DMD value varied between the pigs on control and those on 10% of RP, the daily feed intake, daily weight gain and feed conversion ratio did not vary between them. The crude protein digestibility (CPD) with values ranging between 78.70 and 91.26 % was depressed (p<0.05) by the inclusion of RP in the diets. Pigs on control had the best value for CPD, while values observed for pigs on 10% of RP and those on 20% of RP were similar to this. Although the RP diets had higher crude protein values, the CPD values showed an inverse relationship with the inclusion of RP in the diets. The depressed CPD could be partly attributed to the tannin content of RP, as tannins have been implicated in depressing digestible crude protein (Brooker, 1999). Aung et al. (2016) also reported depressed DMD and CPD with increased RP inclusion in diets of dairy cows. The higher CF values of the RP diets could have contributed to the lower digestibility as it has been reported that an increase in the dietary level of fibre decreases nutrient digestibility, particularly protein digestibility (Cole et al., 1967; Sauer et al., 1991).

The ether extract digestibility (EED) with a range of 95.1 to 97.5% varied ($p<0.05$) across the treatments. This also followed a downward trend with the increase in the RP content of the feeds. Values for the ash digestibility (48.3–80.3%) and the nitrogen-free extract digestibility (52.1–86.9 %) were also reduced ($p<0.01$) for the pigs that received the RP diets. The depression in the apparent digestibility of the dietary nutrients observed for the pigs fed the RP diets can also be attributed to the anti-nutrient content of RP. Tannins could form soluble, insoluble or sometimes irreversible complexes with proteins, digestive enzymes and possibly starch and inhibit intestinal enzymes (Kumar and D'Mello, 1995; Farrell and Perez-Maldonado, 1999). Furthermore, saponins form bonds with proteins (Livingston et al., 1979), and may bind and inhibit some digestive enzymes (Hagan, 2013) and have presumably reduced nutrient absorption.

Table 4. The apparent nutrient digestibility of growing pigs fed diets containing varying levels of rain tree pods as a replacement for maize.

	Inclusion levels of rain tree pods						
Digestibility parameters	1(0%)	2(10%)	3(20%)	4(30%)	5(40%)	SEM	P-value
Dry matter	84.87^{a}	74.91^{b}	74.25^{b}	65.41^{c}	55.85^{d}	3.33	0.0011
Crude protein	91.26^{a}	85.90^{ab}	87.30^{ab}	82.10^{bc}	78.70^{c}	1.52	0.01
Ether extract	97.54^{a}	97.22^{a}	97.32^{a}	95.44^{b}	95.13^{b}	0.36	0.0091
Ash	80.31^{a}	66.71^{b}	65.87^{b}	58.57^{bc}	48.31^{c}	3.66	0.0067
Nitrogen-free extract	86.86^{a}	76.68^{b}	75.63^{b}	65.74^{c}	52.12^{d}	3.96	<0.001

^{abcd} Means within the same row with different superscripts differ at $P<0.01$.

Conclusion

The inclusion of 10% of rain tree pods in the diets of growing pigs compared favourably with the maize-based diet. However, the growth performance (in terms of final weight, feed intake, weight gain and feed conversion ratio) of the pigs was negatively influenced by the replacement of maize with rain tree pods in their diets beyond the 10% of inclusion rate. Cost per kilogram of feed reduced as the inclusion level of rain tree pods increased in the diets. Apparent nutrient digestibility was depressed with the inclusion of rain tree pods in the diets. To reduce competition for maize and to achieve optimal growth performance and cost-effective production of pigs, rain tree pods can be utilized in pigs' diets at a level of 10%.

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PERFORMANSE U TOVU I SVARLJIVOST HRANLJIVIH MATERIJA KOD SVINJA HRANJENIH MAHUNAMA KIŠNOG DRVETA (*ALBIZIA SAMAN*) KAO ZAMENE ZA KUKURUZ

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R e z i m e

Performanse u tovu i svarljivost hranljivih materija kod svinja hranjenih mahunama kišnog drveta, determinisano je u istraživanju na 20 svinja. Pet smeša je formulisano tako što je kukuruz iz kontrolne smeše zamenjen sa 10, 20, 30 ili 40% mahuna kišnog drveta. Svinje su nasumično raspoređene u 5 tretmana ishrane, sa 4 ponavljanja i jednim grlom po ponavljanju, pri čemu su hranjene *ad libitum* tokom osam nedelja. Registrovani su podaci o početnoj telesnoj masi, završnoj telesnoj masi (ZTM), dnevnom konzumiranju hrane (DKH), dnevnim prirastima (DP), konverziji hrane (KH), ceni hrane (CH) i troškova ishrane po kilogramu ostvarenog prirasta. Tokom osme nedelje, svinje su prebačene u pojedinačne metaboličke kaveze radi ispitivanja svarljivosti. Mahune kišnog drveta, uzorci hraniva i fecesa analizirani su standardnom hemijskom analizom, dok je metabolička energija izračunata korišćenjem standardnih procedura. Izračunata je prividna svarljivost suve materije, sirovih proteina, sirovih masti, pepela i bezazotnih ekstraktivnih materija. Dobijeni podaci su analizirani korišćenjem jednofaktorske analize varijanse. Proizvodne karakteristike svinja koje su hranjene smešom sa 10% učešća mahuna kišnog drveta, bile su slične kontrolnoj grupi. Povećavanje učešća mahuna kišnog drveta u smešama, dovelo je do smanjenja DKH, DP i ZTM svinja ($p<0,001$). Utrošak hrane za jedinicu prirasta se povećevao dok se CH značajno smanjivala ($p<0,001$) sa povećanjem nivoa mahuna kišnog drveta u obroku. Prividna svarljivost hranljivih materija bila je smanjena ($p<0,01$) sa uključivanjem mahuna kišnog drveta u konzumiranim smešama. Iz ovog istraživanja se može zaključiti da uključivanje 10% mahuna kišnog drveta kao zamene za kukuruz u obroke za svinje u porastu daje optimalne tovne performanse uz smanjene troškove ishrane.

Ključne reči: svinje u porastu, alternativna hraniva, hranljiva vrednost, troškovi ishrane.

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