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Effects of Dietary Inclusion of Differently Processed *Leucaena leucocephala* Leaf Meal on Carcass Characteristics of Rabbits (*Oryctolagus cunniculus*)

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Abstract The prices of feed sources from conventional protein have been on the increase creating inadequate supply of animal protein. *Leucaena leucocephala* can be used in diets to replace or in combination with protein source conventional feed ingredients. Its use has been limited to a very low level of inclusion because of inherent anti-nutritional factor (mimosine) which either by themselves or through their metabolic products interfere with feed utilization and affect the health and production of the animal. Effects of different processing methods were investigated in rabbits fed diets containing 40% level of *Leucaena leucocephala* inclusion. The leaves were collected and subjected to four different processing methods; air-drying (ADLL), soaking in fresh water for 36 hours at room temperature (FWLL), soaking in 60℃ hot water for 24 hours (HWLL) and fermentation of the leaves for 5 days before drying and milling. The result showed that there were significant ($P<0.05$) differences in the ability of the different processing methods in reducing the anti-nutritional factors in the leaves. Carcass yield and organ characteristics of the rabbits were also observed to show significant ($P<0.05$) differences in most of the parameters measured. It was concluded that soaking *Leucaena leucocephala* leaves in fresh water for 36 hours at room temperature, soaking the leaves in 60℃ hot water for 24 hours and fermentation of the leaves for 5 days were effective in reducing anti-nutritional factors in the leaves and were recommended for use at 40% inclusion in rabbit production.

Keywords *Leucaena leucocephala*, Mimosine, Rabbit production, Carcass yield and organ characteristics

1. Introduction

Livestock production in Nigeria is mostly centred on cattle, sheep, goat and poultry, these animals have not been able to meet the demand for the needed proteins of animal origin due to a number of factors such as increased competition for basic raw materials which include maize and sorghum by man, animal and industry, inadequate grazing land especially for ruminants, diseases and pest infestation and poor government policies. These factors are largely responsible for the inadequate supply of protein of animal origin and the attendant high cost of the available quantities in the market. Thus the high protein requirement cannot easily be met by large animals.

To address this problem, efforts are being directed towards short cycled animals such as rabbits, grass cutters, snails and other micro livestock which have been described as highly prolific animals with a short gestation period capable of attaining maturity within a very short time. These animals are associated with great biological efficiency in the utilization of cheap and locally available feedstuffs (Ologhobo *et al.,* 2003) and are therefore potentially capable of playing a key role in solving the problem of inadequate protein intake.

Soya bean meal and fish meal have been widely used as conventional protein sources for livestock; however, the prices of these feed ingredients have been on the increase with instability in their supplies in the market. Currently, research efforts in Nigerian livestock industry are geared towards identifying and exploiting novel feed ingredients which are not in strict competition with man's dietary need. These novel feed ingredients include: industrial by-products and leaf meals of tropical browse plants such as *Microdesmis spp* (Esonu *et al*., 2002), Paw paw leaf meal (Bitto *et al*., 2006), *Mucuna pruriens* (Emenalom *et al*., 2009), *Leucaena leucocephala* (Herbert *et al*., 2005) and *Azadirachta indica*. (Esonu *et al*., 2006; Ogbuewu *et al*., 2009).

Leucaena leucocephala is one the highest quality and most palatable fodder trees of the tropics, often being

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described as the 'alfalfa of the tropics'. The leaf quality compares favourably with alfalfa or lucerne in feed value except for its higher tannin content and mimosine toxicity to non-ruminants. Studies on *Leucaena leucocephala* have shown a high nutritional value that could adequately be fed to livestock in place of the conventional protein sources such as soya bean meal, fish meal and groundnut cake for which man and his animals are in keen competition. *Leucaena leucocephala* has been identified to hold the potential to make contributions to rabbit nutrition with the possibility of reducing a total dependence on conventional protein sources (Adama and Adekojo, 2002). Its anti-nutritional factor, mimosine has been reported to cause weight loss, ill health, organ damage and hair loss in rabbits at a level above 7.5 – 20% inclusion when fresh or unprocessed *Leucaena leucocephala* is included in the diet (Fayemi *et al*, 2011; Tange-ndjaja *et al*, 1990. This study therefore evaluated the effects of dietary inclusion of differently processed *Leucaena leucocephala* leaf meal on carcass yield and organ characteristics of rabbits at 40%.

2. Materials and Methods

2.1. Experimental Site

The experiment was conducted at Rabbitry section of the Teaching and Research farm of the Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna, Niger state, Nigeria.

2.2. Experimental Animals, Diets and Management

Seventy five (75) weaned rabbits of local breed and mixed sexes age between 5-6 weeks and weighed 540-610g were randomly allotted to five treatment groups with fifteen rabbits per treatment. Each treatment had three replicates with five rabbits per replicate; five diets were formulated and designated as T_1, T_2, T_3, T_4 and T_5. Diet T_1 was the control diet and contained soya bean meal as the main protein source with no *Leucaena leucocephala* leaf inclusion (NLLM). Diet T_2 contained air-dried *Leucaena leucocephala* leaf meal at room temperature for a week and milled for inclusion in the experimental diets, T_3 contained soaked *Leucaena leucocephala* leaf in fresh water at room temperature for 36 hours, T_4 contained soaked *Leucaena leucocephala* leaf in 60℃ hot water for 24 hours While T_5 contained fermented *Leucaena leucocephala* leaf in airtight container for 5 days.

Diets T_2, T_3, T_4 and T_5 contained 40% fixed level of air-dried, (ADLLM), fresh water processed (FWLLM), 60^0c hot water processed (HWLLM) and fermented (FLLM) *Leucaena leucocephala* leaf meal respectively. Table 1 shows the composition percentage of the experimental diets. All diets were supplemented with equal amounts of bone meal, salt and vitamin-mineral premix. The rabbit were dewormed against endo parasite with the administration of other medication when and where necessary. The diets were supplemented with 10g of *Amanranthus hybridus* (DM) per rabbit each day after the initial concentrate diet allocation to improve the fibre supply in the diets. The rabbit were housed in cages raised from the floor and equipped with drinkers and feeders. Prior to the start of the experiment, the animals were fed common diets and allowed for 7 days adjustment period. The animals were served 60g of the experimental diet. This however increased as the age and feed consumption of the animals increased.

2.3. Data Collection

At the end of the growth studies (84 days) a total of fifteen rabbits were randomly selected as reflected by the average weight of the group. The final live weights of the randomly selected rabbits were recorded after the animals were fasted overnight prior slaughtering. The rabbits were slaughtered by severing the jugular vein and carotid artery at the level of the atlas vertebra. The rabbits were hung head downward for 20 minutes to allow for proper bleeding. The difference between the live weight and the bled weight accounted for the weight of blood. The carcasses were dressed by removing the skins (pelts) and were decapitated at the atlanto-occipital joint. The hind feet were cut along the joint between the tibia calcaneus while the fore feet were cut at the carpal region and the tails were removed close to the base. All these were weighed individually and expressed as the percentage of live weight for analysis. The internal organs (heart, liver, kidneys, lungs, and spleen), the scrotum and the penis were removed and weighed individually. They were also expressed as percentage of live weight according to the method described by Awosanya (1989).

2.4. Data Analysis

All the data taken on carcass characteristics and proximate compositions of the rabbit meat were subjected to analysis of variance (ANOVAS) Using (SAS, 1998) package. The variations in means were separated using the Duncan Multiple Range Test (Duncan, 1955

3. Results and Discussion

The proximate composition of processed *Lecaena leucocephala* leaf meal is presented in Table 1 the crude protein was significantly lower ($P<0.05$) in 60℃ hot water processed *Leucaena leucocephala* leaf with the air dried having the highest value of 29.17%. The crude fibre values ranged from 5.35% in fermented to 13.77% in air-dried *Leucaena leucocephala* leaf meal. Ash content was higher ($P<0.05$) in hot water treated sample (10.78%) followed by the air-dried sample (9.14%), fresh water treated sample (8.13%) and fermented *Leucaena leucocephala* leaf (3.22%). Ether extract was significantly ($P<0.05$) higher in fresh water treated sample (6.13%) followed by 5.83%, 5.66% and 5.59% for hot water treated, air-dried and fermented samples respectively. Nitrogen free extract values showed significant

(P<0.05) difference with air-dried sample having the lowest value of 42.27%, followed by fresh water treated sample (50.21%), hot water (50.93%) with the highest value of 61.05% in fermented sample.

The significant (P<0.05) differences observed in the proximate composition of processed *Leucaena leucocephala* leaf showed that different methods of processing *Leucaena* leaf were effective, this observation agreed with the findings of Okorie and Amechi (2003), who reported the proximate composition of some selected processed tropical legumes, it equally agrees with the finding of Jiya (2012), who reported significant (P<0.05) differences in the proximate composition of energy content of raw, cooked and fermented tallow (*Detarium microcarpum*) seeds.

The effects of processing on anti-nutritional factors of *Leucaena leucocephala* leaf are presented in Table 2. The result showed that there were significant (P<0.05) differences on the effect of processing methods in reduction or elimination of all the anti-nutritional factors determined. The values of mimosine were significantly (P<0.05) higher in air-dried *Leucaena leucocephala* leaf (0.26 mg/100g) and lowest in 60℃ hot water processed *Leucaena* (0.00 mg/100g). Fresh water treated and fermented samples have (0.10 mg/100g) and (0.14 mg/100g) respectively. The same trend was observed in phytic acid having the highest value of 11.22mg/100g in air drying processing method and lowest value of 5.31mg/100g in 60℃ hot water processed *Leucaena leucocephala* leaf. Tannin and cyanogenic glycoside also have the highest values of 444.90mg/100g and 3.89mg/100g respectively in air-dried samples but with lowest values of 174.50mg/100g and 1.12mg/100g in fermented samples.

The positive effects of the processing methods observed in the reduction and /or elimination of the anti-nutritional factors are in line with the reports of Apata (2003), Olaniyi (2006), Soetan and Oyewole (2009), Fayemi *et al,* (2011) and Jiya (2012). They reported significant (P<0.05) reduction in the contents of tannin, phytate, saponin, cyanogenic glycoside and trypsin inhibitor when cooking and fermentation were used to alleviate toxic substances in feed ingredients. Kumar (1998) also reported that many anti-nutritional factors are liable to heat and that heat treatment and simple washing with water will alleviate some anti-nutritional factors. The finding also corroborated the work of Nuttaporn and Naiyatat (2009), who reported an overall 94% reduction of mimosine and 99.33% of Tannin after processing *Leucaena leucocephala* leaf meal in both, fresh and hot water for 72 and 48 hours respectively. They however indicated that the nutritive quality of soaked leaf meal appears to be limited by other nutritional factors, such as the lack of certain amino acids. This was observed in the effects of different methods of processing on amino acid profile of *Leucaena leucocephala* leaf. There were significant (P<0.05) differences in the contents of alanine, valine, methionine and histidine. Other parameters were not significantly (P>0.05) different but have lowest values in hot water processed *Leucaena leucocephala* leaf. This trend was in agreement with Kumar (1998) who reported that simple washing removes the soluble allelochemicals but nutrients also leach out.

The results of the live weight and carcass yield of rabbits fed diets containing differently processed *Leucaena leucocephala* leaf meal are presented in Table 3. The result showed that different methods of processing had significant (P<0.05) effects on live weight, slaughtered weight, eviscerated weight and dressing percentage of the rabbits. There were no significant (P>0.05) effect on cervico thoraxic, lumber sacral, neck and tail weight expressed as percentage of live weight. Rabbits fed diets with no *Leucaena leucocephala* leaf meal inclusion and those on fermented *Leucaena leucocephala* leaf meal were heavier (P<0.05) in live weight (Figure 1). T_5 has the highest slaughtered weight of 1350.00g, followed by T_4, T_1, T_3 and T_2 having 1316.67g, 1300.00g, 1250.00g and 1033.33g respectively. This trend was also obtained for eviscerated weight. The dressing percentages ranged from 56.26% in T_1 to 58.35% in T_5 and were significantly (P<0.05) affected by the processing methods.

The results of the organ weight expressed as percentage of live weight are presented in Table 4, the weight of the liver was significantly (P<0.05) higher in rabbits fed air dried *Leucaena leucocephala* leaf meal (3.47%), followed by those fed fermented *Leucaena* leaf meal (3.09%), then 2.95%, 2.67% and 2.25% for rabbits on fresh water processed *Leucaena,* hot water processed *Leucaena* and no *Leucaena* inclusion diets respectively. The weight of the lung was significantly (P<0.05) lower in T_1 and ranged from 0.51% in T_1 to 0.65% in T_3.

Table 5 shows the results of carcass by products of rabbits fed diets containing differently processed *Leucaena leucocephala* leaf meal expressed as percentage of live weight. The rabbits fed air dried *Leucaena* based diet (T_2) was significantly (P<0.05) lower than those of other treatments in the values of pelt ranging from 8.59% in T_2 to 10.42% in T_1. The value obtained for the head was also significantly (P<0.05) higher in T_2, and ranged from 9.06% in T_1 to 10.71% in T_2.

The slaughter weight values of 1033.33g – 1350.00g obtained in this study were comparable to 1148.25 – 1338.83g obtained by Jiya (2012) when rabbits were fed tallow seed meals but lower than 1305 – 1425g and 1595.83g – 2290.00g reported by Eutace *et al,* (2003) and Biya *et al*, (2008) respectively. The decrease observed in live, slaughter and eviscerated weights for T_2 could be attributed to low quality protein in the diets as it was observed that protein may have been marked by the anti-nutrient factors which could not be reduced appreciably. Similar report was observed by Akinmutimi (2004) when sword bean (*Canavalia gladiate*) was evaluated as an alternative feed resource for broiler chickens. The dressing percentage of 56.26- 58.35% was similar to 56% carcass yield reported by Memieth *et al*, (2004) but higher than 48.57 -54.83% reported by Ijaiya (2002).

The significant (P<0.05) effects on the weight of the lung, liver and kidney agrees with the report of Fayemi *et al*, (2011)

and Awosanya and Akinyode, (2000) who observed abnormalities in the liver of rabbits fed *Leucaena leucocephala* leaves after post-mortem examinations. The rabbits fed air dried *Leucaena leucocephala* leaf meal showed a dense chronic inflammation of the liver (Plate 1), multiple damage of the lung (Plate 2) and enlarged kidneys (Plate 3) which accounted for the highest values obtained. The liver of rabbits fed diets with no *Leucaena leucocephala* leaf meal has the lowest ($P<0.05$) weight of 2.25%. This is an indication that element of toxic substance is still present in the other diets despite the processing methods. This is in agreement with the findings of Ahamefule *et al*, (2006) who reported that increased metabolic rate of the organs in an attempt to reduce toxic or anti-nutritional factors in livestock feeds to non-toxic metabolites may cause abnormalities (increase) in their weights. Datta *et al*, (1986) and Olabamiji *et al*, (2007) also observed significantly ($P<0.05$) higher liver weight when rabbits were fed 20% wild sunflower meal (WSFBLM) which they attributed to possibility of liver overload as a result of anti-nutrients in the wild sunflower leaf meal fed at this level of inclusion. Ahamefule *et al,* (2006) confirmed that the weight of some internal organs like kidney and liver may be used in animal feeding experiments as evidence of toxicity.

The percentage value of 8.59% obtained for pelts in rabbits fed air-dried *Leucaena leucocephala* leaf meal (T_2) was significantly ($P<0.05$) lower than for other treatment groups. This could be attributed to serious loss of hair (alopecia) observed as a result of high mimosine content in the diet fed to the rabbits (Plate 4). This observation agrees with the report of Fayemi *et al*, (2011) who reported prevalence of alopecia (air loss) on rabbits fed 20% sun dried *Leucaena leucocephala* leaf meal. Awosanya and Akinyode (2006) also reported serious loss of hair in rabbits fed *Leucaena leucocephala* leaf meal at high inclusion levels. The Post-Mortem evidence of edema, fragile and even congested liver with necrotic spots indicated a condition of multiple organ failure as effects of tannin and miniosine toxicity on the animals fed air-dried *Leucaena Leucocephala* leaf meal.

Table 1. Proximate composition and energy content of processed *Leucaena leucocephala* leaf meal

Parameters	ADLL	FWLL	HWLL	FLL	SEM	LS
Crude Protein	29.17^{a}	25.23^{b}	22.67^{c}	24.69^{b}	0.44	*
Crude Fibre	13.77^{a}	10.32^{b}	9.80^{b}	5.35^{c}	0.24	*
Ash	9.14^{b}	8.13^{c}	10.78^{a}	3.22^{d}	0.15	*
Ether Extract	5.66^{b}	6.13^{a}	5.83^{ab}	5.59^{b}	0.09	*
Nitrogen Free Extract	42.27^{c}	50.21^{b}	50.93^{b}	61.05^{a}	0.55	*
Gross Energy (Kcal/kg)	3366.55^{d}	3568.65^{b}	3468.30^{c}	3927.55^{a}	127.58	*

Means with the same letter(s) within rows are not significantly different ($P>0.05$)

ADLL = Air-Dried *Leucaena leucocephala* Leaf
FWLL = Fresh Water *Leucaena leucocephala* Leaf
HWLL = Hot water *Leucaena leucocephala* Leaf
FLL = Fermented *Leucaena leucocephala* Leaf
SEM = Standard Error of the Mean
LS = Level of Significance
* = Significant

Table 2. Effects of different methods of processing on anti-nutritional factors in *Leucaena leucocephala* leaf

Parameters (mg/100g)	RLL	ADLL	FWLL	HWLL	FLL	SEM	LS
Mimosine	0.42^{a}	0.26^{ab}	0.10^{ab}	0.00^{b}	0.14^{ab}	0.11	*
Tannin	455.30^{a}	444.90^{a}	347.96^{b}	229.64^{c}	174.50^{d}	8.28	*
Cyanogenic glycoside	3.97^{a}	3.89^{a}	1.39^{b}	1.50^{b}	1.12^{b}	0.31	*
Phytic acid	12.02^{a}	11.22^{a}	7.81^{b}	5.31^{c}	6.24^{c}	0.37	*

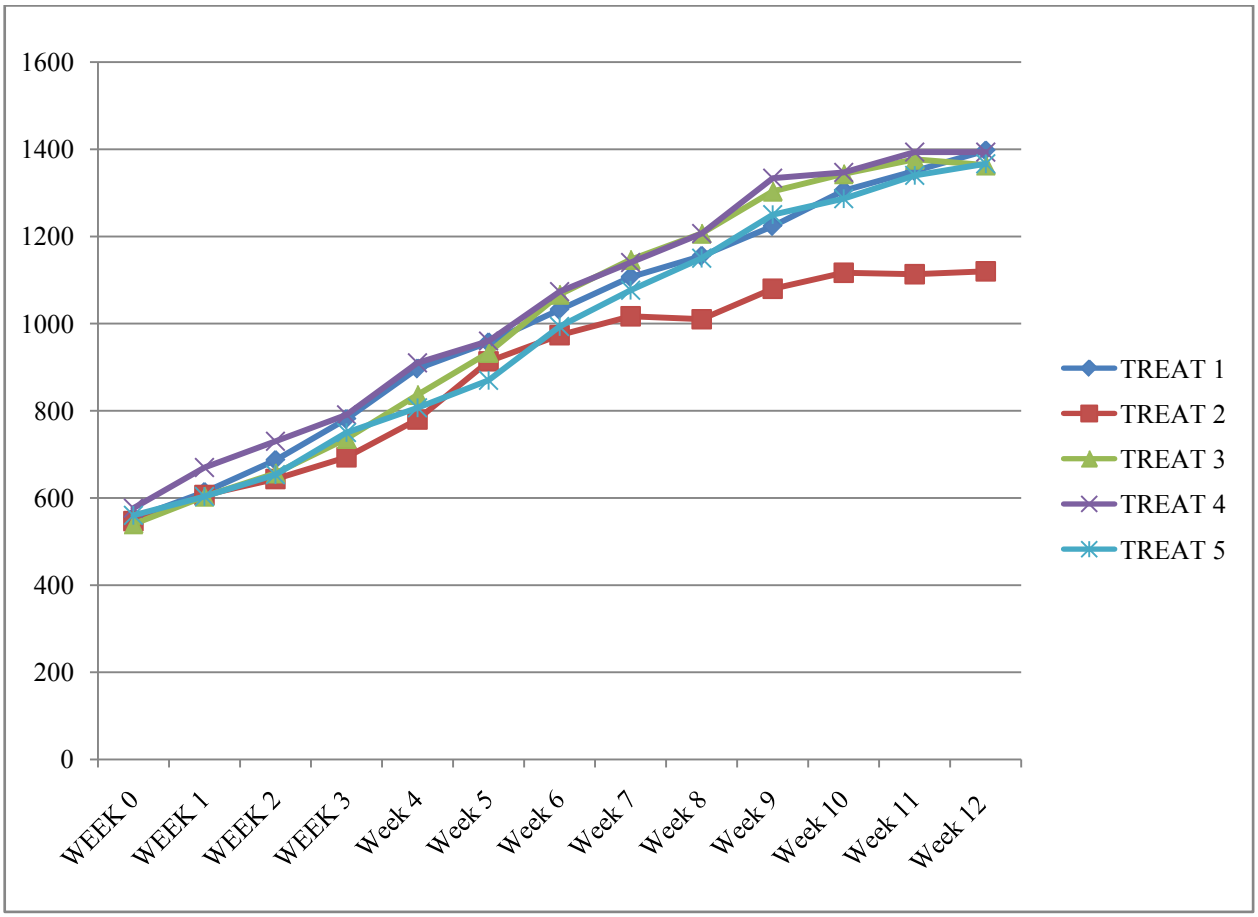
Means with the same letter(s) within rows are not significantly different ($P>0.05$)

RLL = Raw *Leucaena leucocephala* leaf
ADLL = Air dried *Leucaena leucocephala* leaf
FWLL = Fresh water processed *Leucaena leucocephala* leaf
HWLL = Hot water processed *Leucaena leucocephala* leaf
FLL = Fermented *Leucaena leucocephala* leaf
SEM = Standard Error of Mean
LS = Level of Significance
*= Significant

Table 3. Composition of the experimental diets

Items	T_1	T_2	T_3	T_4	T_5
Maize	71.55	46.55	46.55	46.55	46.55
Soybean	25.70	10.70	10.70	10.70	10.70
Leucaena	0.00	40.00	40.00	40.00	40.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Vit Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.50	0.50	0.50	0.50	0.50
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

T_1= 0 % *Leucaena leucocephala* leaf meal
T_2= 40 % *Leucaena leucocephala* leaf air dried
T_3= 40 % *Leucaena leucocephala* leaf soaked in fresh water for 36 hours at room temperature.
T_4= 40 % *Leucaena leucocephala* leaf soaked in 60℃ hot water for 24 hours
T_5= 40 % *Leucaena leucocephala* leaf fermented for 5 days.



T_1 = No Leucaena leucocephala inclusion

T_2 = 40 % air dried Leucaena leucocephala inclusion

T_3 = 40 % fresh water soaked Leucaena leucocephala for 36 hours at room temperature.

T_4 = 40 % hot water soaked Leucaena leucocephala at 60℃ for 24 hours.

T_5 = 40 % fermented Leucaena leucocephala for 5 days

Figure 1. Effects of dietary inclusion of differently processed *Leucaena leucocephala* leaf meal on growth performance of rabbits (*Oryctolagus cunniculus*)

Table 4. Effects of dietary inclusion of differently processed *Leucaena leucocephala* leaf meal on carcass characteristics and yield of rabbits (*Oryctolagus cunniculus*)

PARAMETERS	T1	T2	T3	T4	T5	SEM	LS
Live weight (g)	1416.67[a]	1100.00[b]	1333.33[a]	1400.00[a]	1416.67[a]	36.51	*
Slaughtered weight (g)	1300.00[a]	1033.33[b]	1250.00[a]	1316.67[a]	1350.00[a]	30.73	*
Eviscerated weight (g)	715.11[a]	554.31[b]	685.20[a]	717.00[a]	738.40[a]	21.38	*
Dressing %	56.26[b]	56.34[b]	57.38[ab]	56.35[b]	58.35[a]	0.59	*
Fore leg %	9.21[ab]	8.61[b]	9.15[ab]	9.22[ab]	9.49[a]	0.21	*
Hind leg %	13.07	13.79	13.35	13.80	13.56	0.29	NS
Cervico thoraxic %	8.91	8.82	9.68	9.23	9.84	0.45	NS
Lumber sacral %	15.60	15.52	15.77	15.28	15.61	0.15	NS
Neck %	3.40	3.33	3.12	3.31	3.31	0.23	NS
Tail %	0.29	0.29	0.36	0.32	0.32	0.02	NS

Mean with the same letter(s) within rows are not significantly different (P>0.05)

NLLM = No *Leucaena leucocephala* leaf Meal
ADLLM = Air dried *Leucaena leucocephala* leaf meal
FWLLM = Fresh water processed *Leucaena leucocephala* leaf meal
HWLLM = Hot water processed *Leucaena leucocephala* leaf meal
FLLM = Fermented *Leucaena leucocephala* leaf meal
SEM = Standard Error of the Mean
LS = Level of Significance
NS = Not significant
* = Significant

Table 5. Effects of dietary inclusion of differently processed *Leucaena leucocephala* leaf meal on internal organs of rabbits (*Oryctolagus cunniculus*)

PARAMETERS	T1	T2	T3	T4	T5	SEM	LS
Heart %	0.28	0.30	0.28	0.29	0.27	0.02	NS
Lung %	0.51[b]	0.61[ab]	0.65[a]	0.59[ab]	0.60[ab]	0.04	*
Liver %	2.25[c]	3.47[a]	2.95b[c]	2.67[bc]	3.09[b]	0.22	*
Kidney %	0.91[ab]	1.07[a]	0.95[ab]	0.85[b]	0.78[b]	0.06	*
Intestine %	13.37	14.24	13.38	14.03	13.72	0.76	NS
Spleen %	0.07	0.06	0.07	0.06	0.06	0.02	NS
Penis %	0.54[a]	0.25[b]	0.20[b]	0.18[b]	0.23[b]	0.08	*
Scrotum %	0.23	0.20	0.18	0.23	0.31	0.05	NS

Mean with the same letter(s) within rows are not significantly different (P>0.05)

NLLM = No *Leucaena leucocephala* leaf Meal
ADLLM = Air dried *Leucaena leucocephala* leaf meal
FWLLM = Fresh water processed *Leucaena leucocephala* leaf meal
HWLLM = Hot water processed *Leucaena leucocephala* leaf meal
FLLM = Fermented *Leucaena leucocephala* leaf meal
SEM = Standard Error of the Mean
LS = Level of Significance
NS = Not significant
* = Significant

Table 6. Effects of dietary inclusion of differently processed *Leucaena leucocephala* leaf meal on carcass by-products of rabbits (*Oryctolagus cunniculus*)

PARAMETERS	T1	T2	T3	T4	T5	SEM	LS
Head %	9.06[c]	10.71[a]	9.92[b]	9.70[bc]	9.71b[c]	0.24	*
Blood %	7.06	6.06	6.21	5.89	4.65	1.08	NS
Pelt %	10.42[a]	8.59[d]	9.17[c]	10.17[a]	9.63[b]	0.19	*
Fore limb %	0.86	0.89	0.80	0.81	0.75	0.09	NS
Hind limb %	1.62[b]	2.02[a]	1.94[a]	1.96[a]	1.96[a]	0.05	*
Lipid (fat) %	3.30	1.10	1.80	1.40	2.10	300.00	NS

Mean with the same letter(s) within rows are not significantly different (P>0.05)

NLLM = No *Leucaena leucocephala* leaf Meal
ADLLM = Air dried *Leucaena leucocephala* leaf meal
FWLLM = Fresh water processed *Leucaena leucocephala* leaf meal
HWLLM = Hot water processed *Leucaena leucocephala* leaf meal
FLLM = Fermented *Leucaena leucocephala* leaf meal
SEM = Standard Error of the Mean
LS = Level of Significance
NS = Not significant
* = Significant

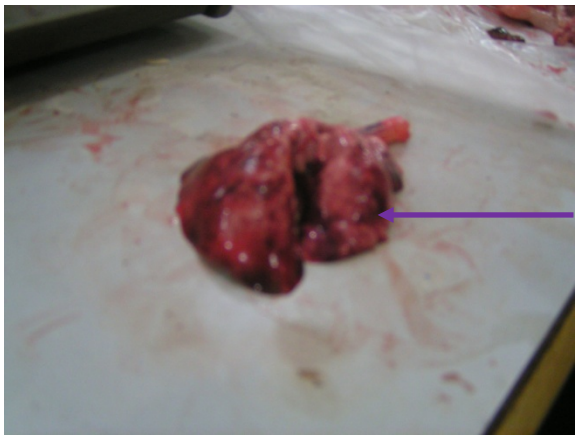


Plate 1. Arrow showing the effect of mimosine on the lungs (multiple organ failure) of rabbit fed air dried *Leucaena leucocephala* leaf meal (T_2) at 12 weeks

Plate 2. Arrow showing enlarged kidneys of rabbit fed air dried *Leucaena leucocephala* leaf meal (T_2) at 12 weeks

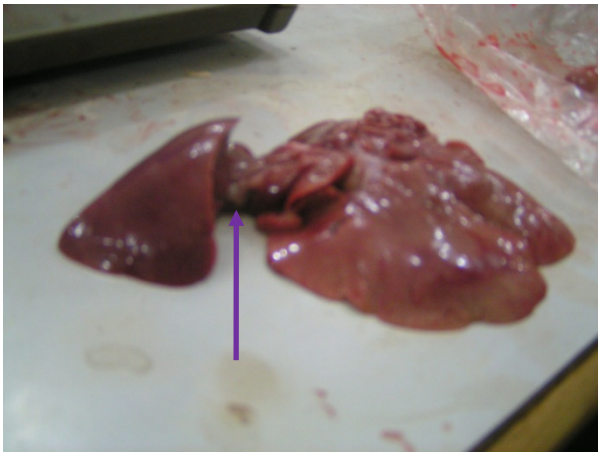
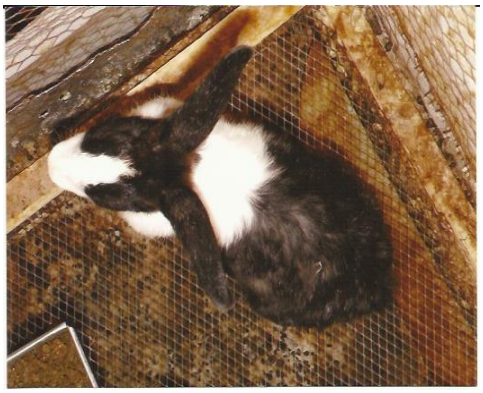


Plate 3. Arrow showing the effects (increased liver) of *Leucaena leucocephala* on the liver of rabbit fed air dried *Leucaena leucocephala* leaf meal (T_2) at 12 weeks

T_1 control (No *Leucaena* inclussion)



T_3 (40% Fresh water *Leucaena*)

T_2 (40% Air-dried *Leucaena*)

T_4 (40%% Hot water *Leucaena)*

T5 (40% Fermented *Leucaena)*

Plate 4. (T_1-T_5): Arrow showing the effects (alopecia) of mimosine on rabbits fed air-dried *Leucaena leucocephala* leaf meal at the 12th week of the feeding trial

4. Conclusions

The poor performance of rabbits fed diets containing air-dried *Leucaena leucocephala* leaf meal in all the parameters measured were direct effects of high mimosine content in the diet due to the inability of air drying method of processing to sufficiently reduce the anti-nutritional factor to a level that will not have deleterious effect on the animals. It was therefore concluded that soaking *Leucaena leucocephala* leaf in fresh water for 36 hours at room temperature, in 60℃ hot water for 24 hours and fermentation of *Leucaena leucocephala* leaf for 5 days are effective processing methods in reducing mimosine and other anti-nutritional factors and can be included in the diets of rabbits at 40%.

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