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Enzymes Effects On Carcass- Attributes, Organ- Characteristics, Meat- Qualities And Sensory -Evaluation In Broiler (*Gallus Domesticus Brizzen*) Fed *Gliricidia Sepium* (Jacq) Leaf Meal

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Abtsract
An eight weeks feeding trial was conducted to evaluate the Carcass and Organoleptic properties of broiler birds fed Gliricidia leaf meal with enzymes supplementation. *Gliricidia sepium* (jacq) is a multipurpose browse tree. Four broiler diets were formulated to contain 0% GLM without enzyme, 5% GLM without enzyme, 5% GLM with enzyme (Roxazyme G2®), 5% GLM with enzyme (Maxigrain®). Ninety six day old chicks Rock cornish strain were distributed into four treatments of three replicates each using complete randomized design (CRD). Data was collected on Organoleptic, Sensory evaluation, and Carcass attributes. There was significant differences (p>0.05) in Sensory evaluation among the control diet (0.0% GLM without enzyme) and treatment 4 (5% GLM with enzyme (Maxigrain®) which was observed to be better than the control diet (0% GLM without enzyme). Organoleptic characteristics of birds on 5% GLM with enzyme (Maxigrain®) diet did not significantly differ (p>0.05) from birds on 0% GLM without enzyme supplementation. There were significant differences (p>0.05) in the Carcass attributes and Organ characteristics of the experimental birds. This result suggests that 5% of GLM with enzyme (Maxigrain®) can be fed to broilers and doesn't have any residual or adverse effect on raw, eating and cooking quality of meat and hence is safe for usage.

Key words: Broiler, Carcass-Studies Enzymes, Gliricidia,

INTRODUCTION

Recently, poultry industry has become a rapidly developing enterprise among the other sector of meat industries in Nigeria. Poultry meat offers considerable potential for bridging the gap in view of the fact that high yielding exotic poultry are easily adaptable to our environment and the technology of production is relatively simple with returns on investment appreciably high (Madubuike, and Ekenyem**,** 2006). Feed accounts for 70-85% of the production cost of poultry (Opara, 1996). The bulk of the feed cost arises from protein concentrate such as ground nut cake, fish meal and soybean meal. Prices of this conventional protein sources have soared show high in recent times that it is becoming uneconomical to use them in poultry feeds. (Esonu *et al.*,2001). There is need; therefore to look for locally available and cheap sources of feed ingredients, particularly those that do not attract competition in consumption between human and livestock such as Gliricidia. *Gliricidia sepium* (Jacq) is a multipurpose tree legume that is second only to *Leucecanea leucocephala* in worldwide popularity. Gliricidia possess the ability to provide large quantities of high quality forage matter all-year-round as well as the ability to maintain a sustainable environment through nitrogen fixation thus replenishing the soil (Chadokar, 1982). The leaves of *Gliricidia sepium* have a high feeding value, with crude protein comprising 20-30% of the dry matter, a crude fiber content of about 15%, and *in vitro* dry matter digestibility of 60-65% (Adejumo and Ademosun, 1985,). At the same time, the leaves also contain anti-nutritional factors like condensed tannins, coumarins, and cyanogenic glycosides (Ahn *et al*., 1989). Besides these antinutritional factors that can impair both nutrient metabolism and other physiological processes, another important factor in Gliricidia feeding is the repulsive smell that put animals off at first introduction (Lowry, 1990). It is a perennial browse plant having in vitro dry matter of 89.65%, crude protein 24.38% of dry matter, a crude fiber content of 12.45%, ether extract 1.75% and NFE 43.36% (Esonu *et al*., 2001). There is need therefore to investigate the effect of these unconventional feed resources on the carcass quality, organoleptic characteristics and performance of broiler and therefore suppresses its anti-nutritional effects by supplementing the diets with exogenous enzymes. The addition of exogenous enzymes to feeds that contain this alternative energy and protein sources could be a potential tool for improving feed efficiency and thus increase the use of low cost, high fiber and proteinaceous feedstuffs. Exogenous enzyme supplements (classical feed biotechnological method) are now widely used in poultry diets in an attempt to improve nutrient utilization, health and welfare of birds, product quality and to reduce pollution as well as increase the choice and contents of ingredients which are acceptable for inclusion in diets (Acamovic and Sewart , 2000). Hence, this study was to determine the effect of *Gliricidia sepium* on carcass-, meat- quality, organ quantity and sensory performance of broiler fed *Gliricidia sepium* leaf meal with different enzymes.

MATERIAL AND METHODS

LOCATION OF THE STUDY

This experiment was conducted at the poultry unit of the department of Animal production, College of Agricultural Sciences, Olabisi Onabanjo University, Ayetoro, Ogun state. Ayetoro is located in latitude $7^0 15^i$N Longitude $3^0$3E a deciduous derived savannah zone in Ogun State. Climate sub-humid tropics with an annual rainfall of 963.3mm in 74 days with maximum of 29^0c during the peak of wet season and 34^0c during the dry season; mean annual relative humidity is 81^0c.Ayetoro lies between 90 and 120m above the sea level. The entire area is made up of undulating surface, which is drained majorly by River Rori and River Ayinbo.

MANAGEMENT OF THE EXPERIMENTAL BIRDS

A total of ninety six (96) day-old Rock Harnicks broiler chicks sourced from a reputable commercial hatchery was used for the experiment. Vaccines against New Castle disease were administered to the birds immediately after hatching and when they were 3 weeks old respectively. The birds were selected on the basis of sound health and good records. Preparations were made for the brooding activities. The chicks were randomly allotted to 4 dietary treatments; the experiment lasted for 8 weeks. The four treatment groups were assigned four experimental diets in a completely randomized design (CRD).

PROCEDURE

Prior to the arrival of the birds, the poultry house was cleaned, washed and disinfected. Birds were individually weighed at the beginning of the trials and subsequently on weekly basis to determine their weight gain. Shortly after the chicks' arrival, they were given vitalyte® solution against stress condition. The birds were de-wormed adequately, while antibiotics were also given The chicks were floor brooded for 3 weeks with the dietary treatment feed was provided ad libitum in feeding trays during brooding period. Thereafter, twelve (12) hanging feeders were used for feeding and water was provided in 3- liter plastic drinkers.

EXPERIMENTAL DIETS

TEST MATERIALS GLIRICIDIA LEAF MEAL

Fresh, matured, *Gliricidia sepium* leaves were harvested from the Pasture and Range unit farm of the department. The leaves were air dried for 3 days in order to reduce its moisture content to about 5%, milled to obtain Gliricidia Leaf Meal (GLM) and incorporated into four broiler diets to supplement Soyabean in the diets.

Four experimental diets were formulated;

Diet 1: (control diet) was formulated with 100% Soyabean, 0% Gliricidia leaf meal without enzyme supplementation of other feed ingredients=Control

Diet (2) was formulated with 75% Soyabean, 25% Gliricidia leaf meal without enzyme supplementation of other feed ingredients=GLM

Diet (3) was formulated with 75% Soyabean, 25% Gliricidia leaf meal with RoxazymeG2® supplementation of other feed ingredients=+R

Diet (4) was formulated with 75% Soyabean, 25% Gliricidia leaf meal with Maxigrain® supplementation of other feed ingredients=+M

Table.1; Chemo metrics of test ingredient (*Gliricidia sepium* **)**

Composition	GLM (%)
Moisture content (% cured matter)	6.48
Dry matter (% cured matter)	93.52
Crude protein (%DM)	24.38
Crude fibre (%DM)	12.45
Crude fat (%DM)	1.75
Crude Ash (%DM)	11.58
Organic matter (%DM)	88.42
Nitrogen-free extract (%DM)	43.36

Table 2 Percentage Composition of Experimental Starter Diets

Ingredients (%)	Diet A (Control)	Diet B GLM	Diet C + R	Diet D + M
Maize	45	45	45	45
SBM	20	15	15	15
GLM	-	5	5	5
GNC	8	8	8	8
Fish meal	3	3	3	3
Oyster shell	10	10	10	10
Wheat offal	11.25	11.25	11.25	11.25
Bone meal	2	2	2	2
Vit. Premix	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated chemical composition				
Crude protein	21.45	20.50	20.50	20.50
Ether extract	2.64	3.35	3.35	3.35
Crude fiber	6.79	7.08	7.08	7.08
Ash	2.74	3.02	3.02	3.02
Energy [Kcal/kg]	2644.36	2567.53	2567.53	2567.53

GLM = Gliricidia leaf meal, SBM = Soyabean meal, GNC = Groundnut cake,
R = Roxazyme G2®, M = Maxigrain®

Table 3 Percentage Composition of Experimental Finisher Diets

Ingredients (%)	Diets A (Control)	Diets B GLM	Diets C + R	Diets D + M
Maize	41	41	41	41
SBM	20	15	15	15
GLM	-	5	5	5
GNC	8	8	8	8
Fish meal	3	3	3	3
Oyster shell	10	10	10	10
Wheat offal	15.25	15.25	15.25	15.25
Bone meal	2	2	2	2
Vit. Premix	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated chemical composition				
Crude protein	21.59	20.65	20.65	20.65
Ether extract	2.65	3.36	3.36	3.36
Crude fiber	6.49	6.78	6.78	6.78
Ash	2.78	3.06	3.06	3.06
Energy [Kcal/kg]	2675.36	2553.53	2553.53	2553.53

GLM = Gliricidia leaf meal, SBM = Soyabean, GNC = Groundnut cake, R = Roxazyme G2®, M = Maxigrain®

EXPERIMENTAL LAYOUT

Ninety six (96) broiler chicks were randomly distributed into four (4) treatments of three (3) replicates each. Each replicate consist of 8 birds making 96. Each replicates of 8 birds were housed in a pen of 2x3m and were fed for 8 weeks.

CARCASS EVALUATION

At the end of the eight weeks, three birds were randomly selected from each treatment (i.e. one from each replicate), fasted for 16 hours, weighed the following morning and were slaughtered by severing the jugular vein with a sharp knife and allow to bleed for 5 minutes. Later, birds were scalded at 65^0c in water for 30 seconds before defeathering. Then, carcass was eviscerated and data were collected for attributes like, thigh, drumstick, breast, back, neck, and wing as well as organs like abdominal fat, spleen, kidney, heart and gizzard. (Sams, 2001)

ORGANOLEPTIC AND SENSORY EVALUATION

For the consumer sensory testing on the broiler breast fillets, an 8 point hedonic scale (score 8 as excellent and score 1 as extremely poor) as per the method given by Larmond (1977).Tenderness, juiciness, flavor, and overall preference on microwave cooked chicken breast fillets & tenders of two groups were determined. A minimum of 20 panelists were used in this study. Parameters were evaluated by a panel of 5 members. The members were trained on flavor, tenderness, juiciness, color, and overall acceptability .Resultant data were subjected to statistical analysis.

Chemical Analysis

Ground samples of test ingredients was analysed for dry matter (DM) by drying samples at 105 ◦C for 24 h in forced air oven. Crude ash content was measured after igniting samples in a muffle furnace at 550 ◦C for 4 h. The crude protein (CP) was determined by Kjeldahl method (AOAC 1995) crude fat (C fat) was determined by Soxhlet method (AOAC 1995) and crude fibre according to the method of Weende (kim *et al.,* 1967)

STATISTICAL ANALYSIS

Data obtained from these samples were further subjected to analyses using one way ANOVA / completely randomized design procedures as package due to S.A.S, (2002) and significantly different means were separated using least significance difference at 0.5 level of probability in the same package; The general linear model is as defined thus:

$Xy = \mu + \alpha i + eij$

Xy= individual data generated from the fixed treatment (Diets A-D) effects

μ= Grand population mean

αi = the fixed treatments (Diets A-D) effects

eij= the error (replicate) term within each treatment.

RESULTS AND DISCUSSION

As shown in table 1, the chemo assay of the test ingredient indicates that the moisture content is 6.48, this must have been so due to the fact that the sample must have been cured but neither completely fresh nor dried. The values recorded for the chemicals are comparable to ,or with the observations of Carew (1983),Ogungbesan et al.,(2014[a]), Ogungbesan et al.,(2014[b]), Ogungbesan et al.,(2014[c]) and Ogungbesan et al.,(2014[d]).Various factors are responsible for similarities and dissimilarities in feed/forage chemical compositions they include – seedling rate, planting distance, available potentials precipitation. Others include plant part harvested; (stemminess: leafiness ratio), specific variations(legume vs grass), generic variations, edaphic conditions, harvest season, post-harvest treatments, presence of nitrogen fixing bacteria in case of some legumes Also, implicatory factors could be cutting frequency, age of plant, nature of leaves i.e. phyllodinous leaves or bipinnate leaves etc (Ogungbesan et al., 2014[b]).While grazing pressure according to Khan *et al.,* (2006) can affect forage quality, Ball *et al.,(*2001) added temperature during forage growth , daily fluctuations in forage quality and environmental conditions, as well as growing conditions (water, and drought stress, photo periodicity) and laboratory analytical dissimilarities .(Ogungbesan *et al*.,2014[e])

Table 4 Effect Of Experimental Diet On Carcass Attributes On Broilers

Attributes (g)	Control	GLM	+R	+M	SEM	LOS
Body weight	1997^{b}	1837^{c}	1733^{d}	2190^{a}	2.34	0.38
Dressed carcass (Wt.)	1750^{b}	1650^{c}	1593^{d}	1970^{a}	2.05	0.36
Breast weight	228.17^{b}	201.45^{d}	210.00^{c}	240.00^{a}	0.75	0.27
Thigh weight	218.06^{b}	196.33^{d}	203.09^{c}	228.70^{a}	0.56	0.20
Back weight	267.30^{b}	247.70^{c}	242.17^{d}	295.30^{a}	5.91	0.34
Neck weight	97.13^{a}	97.30^{a}	72.00^{c}	95.67^{b}	5.31	0.48
Wings weight	177.57^{a}	158.47^{c}	179.97^{a}	161.80^{b}	4.39	0 .23
Drumstick weight	175.27^{b}	179.53^{b}	161.40^{c}	200.00^{a}	5.84	0.44

[a.b.c.d] means within the same row bearing different superscripts are significantly different p<0.05).

SEM- Standard Error of Mean, LOS- Level of Significant

Of the attributes as tabulated in table 4, body weight (g), was from + R (1733) to +M (2190). Dressed weight (g) which is more often than not, a function of body weight had same trend of + R (1593) to +M (1970). The breast weight (g) as shown in table had the least value in GLM (201.45) and as usually highest in +M (240.00) this above result shows that Maxigrain®is superior to RoxazymeG2 ®and even better than control which is similar to what was observed by Ademola *et al.,* (2012) and Ogungbesan *et al .,* (2014) [d]. Similarly, thigh weight in grams was from GLM (196.33) to + M (228.70). Back weight (gm) also ranged from + R (242.17) to M + (295.30) and drum stick (gm) from + R (161.40) to (200.00), whereas highest (P<0.05) neck weight was observed in control (97.13) and lowest (P< 0.05) (72.00) was in + R and recorded in GLM, while highest (P< 0.05) (177.97g) was recorded in + R concerning wing weight. This trend go a long way in showing the advantage of enzyme supplementation of leaf meal over even the control, this has been confirmed by Ademola *et al.,* (2012) and Ogungbesan *et al.,* (2014) [d].

Table 5 Effect Of Experimental Diets On Organ Characteristics On Broilers

Attributes (g)	Control	GLM	+R	+M	SEM	LOS
Body weight	1997^b	1837^c	1733^d	2190^a	2.34	0.42
Abdominal fat	20.50^d	26.03^b	25.50^c	31.73^a	1.59	0.39
Liver	35.93	37.53	36.37	36.67	2.13	NS
Kidney	1.87	1.70	1.13	1.46	0.34	NS
Heart	12.23^a	9.53^c	8.97^d	10.33^b	0.94	0.46
Spleen	3.97^a	2.57^d	2.93^c	3.60^b	0.58	0.27
Gizzard	38.93^d	45.73^b	45.60^c	66.30^a	1.78	0.69

$^{a.b.c.d}$ means within the same row bearing different superscripts are significantly different p<0.05).
SEM- Standard Error of Mean, LOS- Level of Significant

Organ characteristics (g) as tabulated in table 5 revealed that abdominal fat ranged from 20.50 (control) to 31:73 (GLM) which means that nutrient utilization was more in + M to the extent that there is excess to be stored as fat which is re-confirming the positive influence of Maxigrain®. Liver (Control: 35.93 to GLM : 37.53) and Kidney (+ R (1.13) to control (1.87)) are similar among the different treatments looked at from trophic level stand point, it means there is sufficient nutrients for the development of this organs among all other things as stated by Yang *et al.*, (2009), while at activity level point of view, all organ are similar in weight because there was no excess functionality which could lead atrophy or hypertrophy of respective organs as observed by Yang *et al.,* (2009). Concerning the heart weight, and spleen weight + M (10.33gm) and + M (360gm) respectively were next to control (12.23g) and control (3.97g) that had highest (P< 0.05) which denotes the superiority of Maxigrain® over RoxazymeG2 ®and sole GLM in eutrophication of system in general and vital organs to be specific which is in consonance with the observation of Yang *et al.*, (2009). Gizzard (g) the last organ to be discussed in table 4 was highest (P< 0.05) in + M (66.30) and the lowest (P< 0.05) (38.93) in control. Trophic level explanation would be best apt in discussing the gizzard trend in that musculature activity will be unrealistic because the enzyme would have degraded the cell walls and ANF in the diets combinations, as such, high nutrient levels that facilitated more developed organs would be ideal, as chronicled by Yang *et al.,* (2009)

Table 6 Effect of Experiment Diets on Meat physical Quality of Broilers.

Attributes (%)	Control	GLM	+R	+M	SEM	LOS
Cooking Loss	40^a	34^b	32^c	40^a	2.23	0.42
Thermal shortening	32.5^c	40^a	33.5^b	32.5^c	2.20	0.26
Drip Loss	8.70^a	4.55^b	4.35^b	7.08^b	0.68	0.58
Cold Shortening	22.50^a	13.75^c	21.75^b	22.50^a	1.6	0.39
Scalding loss	4.80^b	5.40^a	3.80^c	4.80^b	0.56	0.23

$^{a.b.c.d}$ means within the same row bearing different superscripts are significantly different p<0.05).SEM- Standard Error of Mean, LOS- Level of Significant

Meat quality as included in table 6 denotes that cooking loss (%) was highest in (P < 0.05) both control and + M, while thermal shortening (32.50) was lowest (P< 0.05) in both control and + M which means the toughness from contraction or shortening will be reduced in both treatments. Drip loss (%) m was also highest (P <0.05) (8.70) in control followed (P <0.05) + M (7.08). For cold shortening (%) highest (P <0.05) (22.50) was also observed in control and + M but for Scalding loss both control and + M are similar (p <0.05) (4.80) and next GLM (5.40) which had the highest (5.40). The post- harvest/slaughtering translation of this is that Maxigrain®

or enzyme inclusion does not impact any peculiar loss effect as shown on the product mentioned because even in control, there are substantial losses.

Table 7 Effect of Experiment Diets on Sensory Evaluation of Broilers.

Attributes	Control	GLM	+R	+M	SEM	LOS
Colour	5.80[b]	6.00[a]	5.60[c]	4.20[d]	0.45	0.37
Flavour	6.80[a]	5.60[d]	5.80[c]	6.40[b]	0.52	0.25
Tenderness	4.40[c]	6.60[a]	3.60[d]	6.00[b]	0.56	0.49
Juiciness	4.60[c]	6.60[a]	3.20[d]	5.80[b]	0.44	0.46
Texture	6.20[a]	5.80[b]	4.80[c]	6.00[ab]	0.53	0.32
Overall acceptability	4.20	4.40	4.00	4.20	0.55	NS

[a.b.c.d] means within the same row bearing different superscripts are significantly different P<0.05).SEM- Standard Error of Mean, LOS- Level of Significant

Table 7 displays the organoleptic or sensory panelist evaluation in which Maxigrain® had least color (red). This from human health view point is desirable because the redder the meat, the more unfriendly to the heart. More so that meat redness is associated with myoglobin which can be oxidized to ferric myoglobin in brown color under long term storage or too much oxidation and elevated tissue thiobarbituric reactive substances (TBARS) level whose high level indicates the severity of the deteriorativeness of the meat as reported by Wang *et al .,(*2006) Concerning flavor, that of + M (6.40) was next to the control (6.80) which was the highest. In tenderness too, + M (6.00) was also second (P< 005) behind GLM (6.60) which means that enzymes (Maxigrain®) also impart tenderness tendencies to the resultant products. Juiciness, too is not being adversely affected by enzyme (Maxigrain®) in that + M (5.80) was next to the highest value (P< 0.05) in GLM (6.60) while texture of the product is also improved by Maxigrain® because control had 6.20 and the second highest was in + M which had 6.0 which means that Maxigrain® inclusion also support the suppleness of the meat. In the same vein, lastly, overall acceptability was highest (P< 0.05) and similar in both control (4.20) and + M (4.20). All this finding are alluding and testifying to the fact that Maxigrain®(For the following are active ingredients in Maxigrain® enzyme and their effect on target substrate;α-amylase:Hydrolyzes glycosidic bonds from starchy material liberating metabolizable sugar.;Xylanase :Acts on residues of arabinoxylans and mannans,;β-Glucanase: Hydrolyzes beta glucans,;Exo-Cellulase:Hydrolyzes glycosidic bonds to liberate metabolizable sugar,;Pectinas:Hydrolyzes pectic acid, ;Protease :Acts on proteins to liberate peptides and amino acids,;Phytase:Hydrolyzes phytic acid to release phosphorus,;Lipase:Complements indigenous lipases to digest extra fat added to the feed. Hence ,benefits of Maxigrain® enzyme **,**optimizing the use of non-conventional feed ingredients, Improving weight gain, Improve litter quality and dropping consistency, improving feed conversion ratio (FCR),improves egg production and shell quality and reduces levels of DCP incorporation in the feed substantially(Ogungbesan *et al.,* 2014 [d]) is better than RoxazymeG2® an d much advantageous in the sense that according to Fasuyi and kehinde (2009) its active ingredients synergistically work to reduce energy loss via heat increment and as volatile fatty acids as a result of energy- inefficient microbial fermentation process in the excreta and as such much energy is conserved to more productive purposes with concomitant reduced feed intake because poultry generally eat to satisfy their energy requirement and less costly (Ogungbesan *et al.,* 2014 [d]) than even control or GLM. In case lack of response to enzyme supplementation is observed, reasons like the following could be advanced: i)The likelihood/possibility of the diet being fed be of extremely good quality and allow the animals to perform close to their genetic potential.

ii)That enzyme has the incorrect main specificity (amylases,pectinases, β- lucanases, arabinoxylases, cellulases, hemicellulases, acidproteases,alkalineproteases,phytases,esterases,lipases)and s attendant supplementary activity for the substrate.
iii) Denaturation of the enzyme before the diet is consumed, or supplementation of the diet with wrong enzyme.
IV) Variation within an ingredients in the concentration or activity of proteinaceous antinutrients to the enzyme.
V) Variation in the quality of feed ingredients
vi) Animal stage of growth /maturity.

Furthermore, It must be emphasized, however that for commercial use, exogenous enzymes must be able to survive the rigours of feed processing (Temperature, Pressure, and Moisture)and the in-hospitable. Not only do these enzymes have to survive the fluctuations of pH and proteolytic attack by enzymes, but they also have to operate in these conditions at a meaningful rate in order to accomplish the necessary degrees of digestion of the intended substrate (Ogungbesan *et al.,* 2014 [d])

CONCLUSION AND RECOMENDATION

The replacement of Soyabean with Gliricidia leaf meal supplemented with enzyme Maxigrain ®have positive impact in improving organoleptic characteristics of meat in addition to improving dressing % and do not exert any adverse effect on the quality or acceptability of meat (with reference to appearance). Color and flavor of cooked or raw poultry meat is important because consumers associate it with the product´s freshness, and they decide whether or not to buy the product based on their opinion of its attractiveness. It can be concluded that replacement of Gliricidia leaf meal for Soyabean meal with Maxigrain® supplementation is efficacious in improving overall meat quality attributes such as carcass yield, dressing %, breast weight, tender yield, sensory raw meat characteristics, organ values, organoleptic cooked meat parameters, overall palatability and acceptability of meat. This test ingredients doesn´t have any residual or adverse effect on raw, eating & cooking quality of meat and hence is safe for usage .Furthermore, *Gliricidia sepium* being a legume has inherent chemical properties: pigments imparting carotenoids and anthocyannins, anticoccidial properties, antinemathelminthic properties, pyhto –oestrogenic properties, antihypercholesteroaemic properties and moulting enhancing constituents while botanically/phytologically it has the following desirable usefulness:medicines,fuelwood,shelter,timber,income,food,employment,protect/conserve the environment(wind and water erosion),shield against atmospheric pollution ,store genetic diversity, regulate climate ,sustain intensification of agriculture, provide habitat for wild life and provide a highly valuable fodder for livestock as well as sustain animal production.

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