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Research Paper

Feed intake, body weight changes and haematology of Uda ramsfed graded levels of Xylopiaaethiopica (Ethiopian pepper) fruit

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ABSTRACT: *An 84-day study was carried out with 16 yearling Uda rams to determine the effect of Xylopiaaethiopica fruit on feed intake, body weight changes and haematology of the Uda rams. Four diets were formulated such that diets T1, T2, T3 and T4 contained Xylopiaaethiopica0%, 2.5%, 5.0% and 7.5% (0, 2.5, 5.0 and 7.5g/kg respectively). The diets were offered to the rams, which were randomly divided into four groups of four rams each in a completely randomized design. Average daily feed intake (ADFI), average daily weight gain (ADWG), feed conversion ratio (FCR) and heamatology of the animals were determined and data were subjected to analysis of variance (ANOVA),where significant difference exist least significant differences (LSD) was used to separate the means. Results indicated no significant difference in ADFI, ADWG and FCR(p=.05) however, feed intake as % body weight is significantly higher (p<0.01) for animals fed 5.0% Xylopiaaethiopicaper 100 kg diet. The Heamatological parameters were significant only in the platelets (P<0.01). It was concluded that increasing the level of Xylopiaaethiopicain the diets of Uda rams more than 2.5% (2.5 g/kg) might significantly reduce performance.*
Key words:*body weight changes, feed intake, haematology, Xylopiaaethiopica, Uda rams*

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I. INTRODUCTION

In an intensive system of animal production, farmers use to feed their animals with ration rich in starch and high quality protein in order to improve the animals performance, this diet ferments rapidly. It is well known that the rapid degradation of starch leads to ruminal acidosis. The rapid breakdown of dietary protein to ammonia increase nitrogenous excretion rather than contributing directly to the animal's nutrient requirements. In order to delay ruminal protein degradation, dietary proteins were denatured by treatment with formaldehyde or controversially antibiotics were used to suppress the bacterial population responsible for the rapid protein fermentation. But the use of such compounds has been criticized, as they may leave harmful residues in the food chain and promote the spreading of resistance genes [1]. Recently, several researchers have used some plant extracts to manipulate rumen fermentation [2-4]. But obtaining these extracts from plants will be costly as the extraction process will require expensive instruments and the farmers from developing countries will not be able to afford such technology. Besides, only a small quantity of these plants will be available as extracts and the rest of such plants will be unused and wasted. Furthermore, the whole spices may contain some other useful components that can differ from their small amounts of extracts and these also can have more desirable impacts on degradability and fermentation.

The demand for animal protein is increasing as a result of increased human population and economic growth [5]. The challenge in the millennium is to sustain the livestock industry amidst shortage so as to boost animal protein intake worldwide. There has been a growing trend in developing countries to exploit natural bioactive extract or products of plant origin as an alternative to chemical feed supplements.

Feed supplementation with spices such as Xylopiaaethiopica(Ethiopia pepper, Negro pepper, West African pepper) [6] (with growth promoting activity increase stability of feed and beneficially influence gastrointestinal ecosystem mostly through growth inhibition of pathogenic microorganism, thus consequently helps to increase the animal's resistance to stress and increase the absorption of essential nutrients [7].

The immune system of animals generally benefits from plant products rich in phytochemicals such as Xylopiaaethiopicafruits. These plant products can also improve the activity of lymphocytes, macrophages and NK cells; they increase phagocytosis or stimulate the interpheron synthesis [8]. Haematological traits are essential parameters for evaluating the health and physiological status of animals and herds [9]. According to [10], haematological values could serve as a baseline information for comparison in conditions of nutrient deficiency, physiology and health status of farm animals especially those kept under native husbandry system in Nigeria.

Furthermore, the inclusion of Xylopiaaethiopicafruits might represent safe and low costalternatives to synthetic compounds such asantioxidant, antibiotics and other growthpromoters use to improved animal performance,more especially by small holder farmers. Despitethe potentials, there is little information on theutilization of the plant in ruminant nutrition. Thestudy evaluated the effect of xylopiaaethiopicaon Feed intake, body weight changes and haematology of Uda rams

II. MATERIALS AND METHODS

2.1 Location of Experiment

The experiment was conducted at the Livestock Teaching and Research Farm of the Department of Animal science, Faculty of Agriculture, located at the main campus of the UsmanuDanfodiyo University Sokoto. Sokoto state is located in the north-western part of Nigeria between longitude 4°8' and 6°54'E and latitudes 12°0'N and 13°58'N and at altitude of 350 m above sea level [11]. The state has a semi-arid climate which is characterized with low rainfall ranging from 500- 1300mm with seasonal variation. Heat is more severe in the state in March and April, but the weather in the state is always cold in the morning and hot in the afternoon except during the harmattan period [12]. The minimum temperature of 13°C has been recorded in January and maximum of 44°C in April [13]. The low humidity of the state makes the heat bearable. Sokoto has two main seasons, the dry, season which starts from October and last up to April, in some part and may extend to May or June in other part. And the wet season begins in most part of the state in May and last up to September or October [12]. Sokoto state has abundant of livestock resources, because the climate is more suitable for livestock production, due to the absence of tsetse - fly on the open grassland. There are numerous species of animals in both wild and domesticated forms in the state. Sokoto ranks second in livestock production in the country with livestock population of over 8 million [13].

2.2 Experimental Feed Sourcing, Preparation and Diet Formulation

The Xylopiaaethiopicafruit was purchased from Sokoto central market together with other feed ingredients which included maize, cowpea husk, cotton seed cake, rice bran, cowpea hay, salt, bone meal and premix. The Xylopiaaethiopica was properly sorted from any possible debris or foreign matter, sun dried and ground by grinding machine. One experimental diet was formulated with the following ingredients maize (38.65%), cowpea husk (15.70%), cotton seed cake (14.70%), Rice bran (0.95%), Cowpea hay (26.50%), Salt (0.50%), Bone meal (2.50%) and Premix (0.50%). The Ethiopian pepper was added at the rate of 0, 2.5, 5.0, and 7.5 kg/100kg diet for diet 1, 2, 3 and 4 respectively. The experimental design is a completely randomized design (CRD). The gross compositions of the experimental diets are shown in Table 1.

2.3 Experimental Animals and their Management

Sixteen (16) Uda rams (yearlings) with an average live weight of 35 kg was purchased from village markets around Sokoto and used in the experiment. The animals were quarantined in the teaching and research farm of the UsmanuDanfodiyo University. Treated against ecto and endo parasites with ivemectin (1 ml per 10 kg livebody weight) and treated with oxytetracyclineHcl (a broad spectrum antibiotic) at dosage rate of 2 ml/10 kg live weight against possible bacterial infection. Faeces and urine of the animals were removed every day from the feeding pens to ensure adequate hygiene and minimal ammonia accumulation. Feed and water troughs were cleaned every morning before feeding. Before the commencement of the experiment, the animals were managed intensively and group fed with cowpea hay and wheat offal.

2.4 Feeding Procedure

Four animals were allocated as treatment in the feeding trials. Each animal is housed in a pen measuring 2 m×1 m, each group was assigned to one of the experimental diets and fed adlibitum in the morning and evening for 12 weeks (84 days). Water and salt lick was offered adlibitum.

2.5 Blood Sample Collection

Blood samples were collected once from all the animals at the end of the experiment. The blood samples were aseptically collected via jugular vein using separate sterilized disposable 5 ml syringe and 23 gauge needle. The samples from each replicate was collected in plain tubes containing 1.0mg/ml

ethyldiaminetetracetic acid (EDTA)and centrifuged for five minutes to separate the serum from the blood at room temperature. The serum was taken to chemical pathology lab of UsmanuDanfodiyo Teaching Hospital for analysis.

Table 1. Composition of the Experimental Diets

Ingredients	**Treatments (inclusion levels of Xylopiaaethiopica) (%)(g/kg**				
1 (0)	**2 (2.5)**	**3 (5.0)**	**4 (7.5)**		
Maize		38.65	38.65	38.65	38.65
Cowpea husk		15.70	15.70	15.70	15.70
Cotton seed cake	14.70	14.70	14.70	14.70	
Rice bran		0.95	0.95	0.95	0.95
Cowpea hay		26.50	26.50	26.50	26.50
Salt		0.50	0.50	0.50	0.50
Bone meal		2.50	2.50	2.50	2.50
Premix		0.50	0.50	0.50	0.50
Total		100.00	100.00	100.00	100.00
Calculated values:					
Calculated energy (ME/Kg)		2600	2600	2600	2600
Calculated protein (%)		12.00	12.00	12.00	12.00
Calculated fiber (%)		19.80	19.80	19.80	19.80
Added level of Xylopiaaethiopica:	0%	2.5%	5.0%	7.5%	

2.6 Data Collection

The animals are weighed at the beginning of the experiment and subsequently every week on the same day of the week between 8:00-9:00 am after withdrawing feed for 14-16 hours to avoid error due to gut-fill. Daily record of feed intake and weekly body weight was taken throughout the 12 weeks of the feeding trial.

2.7 Proximate and Fibre Analysis of the Experimental Diet and the Test Ingredient

Thoroughly mixed representative sample of the experimental diet and test ingredient was analyzed for proximate composition according to A.O.A.C procedure [14] to determine the moisture content, crude protein (CP), crude fibre (CF), ether extract (EE) and Ash, while fibre fraction was analyze according to procedure described [15].

2.8 Phytochemical Analysis of Xylopiaaethiopica

Grounded sample of Xylopiaaethiopicafruits was used to determine the total phenolic by method described by [16], Saponins by the spectrophometric method of Brunner asdescribed by [16] and alkaloids by gravimetricmethod of Harbone [17]. Tannins was determined by the method of Maga as described by [17]) and phytate by Lucus and Markakas method as described by [18].

2.9 Statistical Analysis

The data generated from the experiment are subjected to analysis of variance (ANOVA) using completely randomized design using stat view statistical package [19]. Where significance difference exists Least Significant Difference (LSD) was used to separate the means.

III. RESULTS AND DISCUSSION

3.1 Proximate and Fibre Components of the Experimental Diet and Test Ingredient (Xylopiaaethiopica)

Proximate composition of the experimental diet contained 94.8% DM, 12% CP, 15.8% CF, 3% EE and 53% NFE. NFE and EE content of Xylopiaaethiopicawere higher than in the formulated diet (Table 2) while DM, CP and Ash were higher in the test ingredient. Neutral detergent fibre (NDF) was observed to be higher in the fibre fraction followed by Hemi cellulose, Acid detergent fibre (ADF), Cellulose and Lignin in that order (Table 2). The crude protein content of the diet obtained in this study is above 8% required to satisfy requirement of ruminant animal [20] necessary to provide minimum ammonia level required by rumen microorganisms to support optimum activity

[21,22]. The crude fibre content obtained in this study is within the range of 15-20% recommended for improved intake and production in finishing ruminants [23]. The ether extract content of the diet is below the recommended range of 4-10% as reported by [24,25]. Nitrogen free extract obtained in this study is higher than 20.34% obtained by [26]. The fibre fraction (ADF, NDF, cellulose and hemicellulose) obtained are higher in diets that may affect DM intake as reported by [27]. The crude protein content of Xylopiaaethiopica obtained in

the present study is higher than 2.10% obtained by [28] but similar to 11.90% obtained by [29]. The lipid content of Xylopiaaethiopicais lower than 14.51% obtained by [29] while ash content is higher than 2.31% and 4.37 obtained by [30,28] respectively. The crude fibre content of Xylopiaaethiopicaobtained in the present study is lower than 14.5%, 12.14% and 38.60% as obtained by [29,27,28] respectively. The nitrogen free extract of Xylopiaaethipica obtained is comparable to 63.41% obtained by [30] but higher than 30.18% obtained by [29]. This variation could be attributed to soil and climatic conditions, plant nutrient status and varieties as observed by [31].

Table 2. Proximate and Fibre Components of the Experimental Diet and Xylopiaaethiopica

Parameters	Experimental diet	Xylopiaaethiopica
Proximate composition		
Dry matter (DM) (%)	94.79	93.83
Crude protein (CP) (%)	12.12	10.59
Crude fibre (CF) (%)	15.77	3.33
Ether extract (EE) (%)	3.00	12.17
Nitrogen free extract (NFE) (%)	53.00	63.08
Ash (%)	11.11	3.83
Fibre components		
NDF	65.77	
ADF	18.78	
Cellulose	18.42	
Hemicellulose	46.99	
Lignin	0.9	

ADF- Acid detergent fibre, NDF- Neutral detergent fibre

3.2 Phytochemical Components of Xylopiaaethiopica

Qualitative analysis of the test ingredient indicated presence of steroids, volatile oils and antraquinones. There was moderate presence of alkaloids and tannins. Adequate presence of saponins was found in the fruits of Xylopiaaethiopica. However, quantitative analysis indicated a higher presence of Saponins and Tannins compared to other phytochemicals (Table 3).

The quantitative value of saponin obtained in this study is higher than 2.93% obtained by [30]. The tannin content also falls below 4.96% obtained by [30] but above 0.24% obtained by [28]. Alkaloids values obtained in the present study is similar to 1.24% reported by [30]. These variations may be due to genetic factors, climaticcondition, soil and cultivation techniques [32,33,34,35].

Table 3. Quantitative and Qualitative Phytochemical Composition of Xylopiaaethiopica

Parameter		Inference
Tannnins		++
Saponins		+++
Alkaloids		++
Glycosides		+
Cardiac glycoside		-
Saponin glycoside		+
Steroids	+	
Volatile oils		+
Antraquinone		+
Balsam		+
Alkaloids		1.29%
Saponins		3.45%
Tannins	2.33%	

Key: + (present), ++ (moderately present), +++
(adequately present) and – (absent)

3.3 Feed Intake and Body Weight Changes of Uda Ram Fed Graded Levels of Xylopiaaethiopica

The Results (Table 4) indicated no significant difference in feed intake, initial weight, final weight, live weight gain, average daily gain and feed conversion ratio ($p=.05$). There was no significant difference between treatments 1, 2 and 4 in feed intake as % body weight ($p=.05$). Feed intake as % body weight was significantlyhigher ($p<0.01$) for animals fed diet containing 5.0% Xylopiaaethiopica.

The weight gain obtained in this study fall within the range 3.40 – 13.70 kg reported by [36]. The protection of dietary protein from degradation in the rumen as a result of presence of tannin in the test ingredient as observed by [37] might be responsible for increased weight gain even at 7.5% inclusion level of Xylopiaaethiopica. Similarly ADG obtained in the present study is lower than 217 – 254 g reported by [38] when sheep was fed with cinnamaldehyde or juniper berry essential oil added to barley based diet at similar concentration. Decreased in body weight from 5% to 7.5% inclusion level of Xylopiaaethiopicais an indication of poor response of the animals. No change in Average Daily Gain (ADG) was observed when sheep were fed diets supplemented with oregano leaves (OriganumvulgareL.) providing 144 or 288 mg of oregano oil (850 mg g-1 of carvacrol) per kilogram of diet DM [39]. These variations may be as a result of difference in nature and the amount of the bioactive compounds consumed by the animals as reported by [40].

The feed conversion ratio obtained in the present study increased with increase in the level of test ingredient coupled with increased intake of saponins and tannins, suggesting decreased efficiency of feed conversion which was equally observed in LWG. Improvement in average daily gain and feed conversion ratio on supplementation of 1.5% level tannin in lambs was also reported [41]. The lower level tannins might be responsible for higher ADG as opposed to the ADG obtained in the present study. This would explain the reason why increased saponin, tannin intake from treatment 2 to treatment 4 brought about decreased LWG although insignificant.

Table 4.Feed Intake and Body Weight Changes ofUda Rams Fed Graded Levels of Xylopiaaethiopica

Parameters	**Treatments (inclusion of Xylopiaaethiopica) (%) (g/kg)**				
1 (0)	**2 (2.5)**	**3 (5.0)**	**4 (7.5)**	**SEM**	
Initial weight (kg)	35.50	35.88	35.67	35.75	4.88
Final weight (kg)	46.50	47.75	44.33	47.50	5.52
Weight gain (kg)	11.25	11.50	11.00	10.00	1.88
ADG (g/day)	133.93	136.91	130.95	119.05	22.36
FCR	8.16	9.03	9.35	9.49	0.45
Feed intake as % body weight	3.79_b	3.67_b	3.61_b	4.54_a	0.23
Average feed intake (kg/day)	1.43	1.48	1.39	1.49	0.17

a, b, c means values with different superscripts in a row denotes significant ($p<0.05$) difference between meanswithin the same rows. ADG- Average daily gain,
FCR- Feed conversion ratio

3.4 Haematological Profile of Uda Ram Fed Graded Levels of Xylopiaaethiopica

The results (Table 1) indicated no significant difference in Haemoglobin, PCV, RBC, MCH, MCV, MCHC and WBC (P=.05). There was no significant difference between treatments 2, 3 and 4 in platelets (P=.05). Platelet was significantly higher for animals that receive feeding without Xylopiaaethiopica(treatment 1). The non-significant difference in Haemoglobin, PCV, MCH, MCHC and MCV composition of the experimental animals irrespective of the level of supplement suggest that even the highest level of supplementation is not detrimental to the animals. The same reason could be attributed to WBC although it is slightly lower than the normal reference value for sheep [42]. However, the WBC values reported in the present study were higher than 6.93 – 12.66 x109/l observed by [43]. This variation could be attributed to variation in diet, environment and the breed of the animals. PCV and RBC values of the animals obtained in the present study were within normal for healthy sheep. [44-47] also made the same observation when testing the effect of spices on immune function and health in ruminants. The change in the Platelets counts could be due to the changes in the immune system as a result of feeding Xylopiaaethiopica. The changes could be attributed to deficiency in Vitamin B12 and iron which Xylopiaaethiopicaposess.

Table 4.Haematological Profile of Uda Ram Fed Graded Levels of Xylopiaaethiopica

Parameter	**Treatments (inclusion of Xylopiaaethiopica) (%)(g/kg)**				
1 (0)	**2 (2.5)**	**3 (5.0)**	**4 (7.5)**	**SEM**	
Haemoglobin (g/dl)	8.47	9.27	8.87	9.40	0.49
PCV (%)	24.17	24.90	25.23	26.03	1.25
RBC	8.93	10.18	9.42	9.99	1.25
MCH	32.1	31.0	30.4	32.65	1.41
MCV	27.13	24.67	26.80	26.23	1.67
MCHC	35.07	37.23	35.10	35.98	0.99

WBC (x 109/L)	70.67	70.00	74.00	73.57	4.11
Platelets (x 109/L)	616.00_a	424.67_b	467.67_b	420.33_b	40.92

a, b means values with different superscripts in a row denotes significant ($p<0.05$) difference between means
within the same rows. PCV-Pack cell volume; RBC-Red blood cell; MCH-Mean corpuscular Haemglobin; MCV-Mean corpuscular volume; MCHC-Mean corpuscular Haemoglobin concentration; WBC-White blood cell

IV. CONCLUSION

It was concluded that high level supplementation of Xylopiaaethiopicacould depress feed intake and LWG. Lower level supplementation of not more than 2.5 g/kg of test ingredient can be incorporated in the diets of Uda sheep.

REFERENCES

[1]. Hoffmann EM, Muetzel S, Becker K. Effect of Moringaoleioferaseed extract on rumen fermentation In vitro. Arch. Anim. Nutr. 2003;57:65-81.
[2]. Cardozo P, Calsamiglia WS, Ferret A, Kamel C. Effects of natural plant extracts on ruminal protein degradation and fermentation profiles in continuous culture. Journal of Animal Science. 2004;82:3230- 3236.
[3]. Busquet M, Calsamiglia S, Ferret A, Carro MD, Kamel C. Effect of garlic oil and four of its compounds on rumen microbial fermentation. Journal of Dairy Science. 2005;88:4393-4404.
[4]. Patra AK, Kamra DN, Agarwal N. Effect of spices on rumen fermentation, methanogenesis and protozoa counts in invitro gas production test. International Congress Series. 2006;1293:176-179.
[5]. Rosegrant MW, Thornton K. The growing demands for food.In Id 21 Insights. 2008;7:381-385.
[6]. Orwa C, Mutua A, kindt R, Jamnadass R, SA. A tree reference and selection guide. Agroforestree Database. 2009;4(2):2-5.
[7]. Windisch W, Schedle K, Plitzner C, Kroismayer A. Use of phytogenetic products as feed additives for swine and poultry. Journal of Animal Science. 2000; 86:E140–E148.
[8]. Craig WJ. Health-promoting properties of common herbs.Am J ClinNutr. 1999;70:491–9.
[9]. Kral I, Suchy P. Haematological studies in adolescent breeding cocks. Acta. Vet. Bras. 2000;69:189-194.
[10]. Daramola JO, Adeloye AA, Fatoba TA. andSoladoye AO. Haematological and serum biochemical parameters of West African Dwarf (WAD) goats.Livestock Research for Rural Development. 2005;17(8).
[11]. Available:http://www.irrd.org/irrd17/8/dara1 7095.htm.
[12]. Mamman AB, Oyebanji JO, Petters WS. Nigeria: A people united, a future assure (survey ststes) (2nd ed). Calabar, Nigeria: Gabumo Publishing Company Limited; 2000.
[13]. SSMIYSC. Sokoto State Government Diary.Ministry of Information and Youth, Sport and Culture; 2010.
[14]. SSGD. Sokoto State Government Diary.Ministry of youths sport and culture.Sokoto. 2002;33.
[15]. AOAC. Official Methods of Analysis, 7th Edition, Association of Official Analytical Chemists, Washington DC; 1995.
[16]. Van Soest PJ, Robertson JB, Lewis BA. Methods for dietary fiber, neutral detergent fiber and nonstarch polysaccharides in relations to animal nutrition.Journal of Dairy Science. 1991;74:3583-3597.
[17]. Mole S, Waterman PG. A critical analysis of techniques for measuring tannin and the phenolic for ecological studies.Oecologia. 1987;72:137-140.
[18]. Akindahunsi AA, Salawu SO. Phytochemical screening and nutrientantinutrient composition of selected
[19]. tropical green leafy vegetables. African Journal of Biotechnology. 2005;4:497-501.
[20]. Harbone J. Phytochemical methods: A guide to modern techniques of plant analysis. Chapman & Hall, London; 1998.
[21]. SAS statview statistical package (English version). SAS Inc. New York, USA; 2002.
[22]. NRC. National research council.Nutrients requirements of sheep (6th edition).National Academic Press, Washington D.C; 1995.
[23]. Gatenby RM. In: Smith AJ. (ed). Sheep. Macmillan Education, between Towns Road, Oxford OX4 3PP, CTA, Postbus 380, 6700 AJ Wageningen, The Netherlands. 2002;32-33.
[24]. Norton BW. Studies of the nutrition of the Australians goats.Thesis (D. Agric.)University of Melbourne.Australia; 2003.Available:http: 11 word cat.org1 635, 38900
[25]. Burtox DR. Quality related characteristics of forages as influence by plant environmemt and agronomical factors. Animal Feed Science and Technology. 1996;59:37-49.
[26]. Preston TR. Biological and for research workers. Animal feeding In: A manual for research workers. Rome: FAO, 1995. Chap. 1995;191-264.
[27]. Campbell KLM, Garforth C, Heffernan C. Marton J, Parterson R, Rymer C, Upton M. Small stock in development. Natural Resources International Ltd., Aylesford, Kent, UK; 2006.
[28]. Maigandi SA, Nasiru A. Replacement value of Faidherbiaalbidapods (fap) fed to Uda Sheep in a semi-arid zone, Nigeria. In Proceedings of the Nigerian Society for Animal Production. 2006;439–443.
[29]. Miessner HM, Vijoen MD, Van Neirkeki WA. Intake and gigestibility by sheep of athephora, panicum, rhode and smuts finger grass pastures. Proceeding of IVth international rangeland congress. September 1991. Montipellier, France. 1991;648-649.
[30]. Abolaji OA, Adebayo AH, Odesanmi OS. Nutritional qualities of three medicinal plant parts (Xylopiaaethiopica, Blighiasapidaand Parinaripolyandra) commonly used by pregnant women in the Western part ofNigeria. Pakistan Journal of Nutrition. 2007;6(6):665-668.
[31]. Dike MC. Proximate, phytochemical and nutrient compositions of some fruits, seeds and leaves of some plant species at Umudike, Nigeria. Journal of Agricultural and Biological Sciences. 2010;7(5):7-16.
[32]. Yusuf NO, Samuel OO, Maxwell IES, Bassey GO, Ayoade BA. Phytochemical, nutrient composition and serum lipid lowering effect of Xylopiaaethiopicafruit.British Journal of Pharmaceutical Research. 2004;4(17):2096-2105.
[33]. Igwe SA, Afonne JC, Ghasi SI. Ocular dynamics of systemic aqueous extracts of Xylopiaaethiopica(African guinea pepper) seeds on visually active volunteers. Journal of Ethnopharmacology. 2003;86 (2-3):139-142.

[34]. Pitarevic I, Kustrak D, Blazevic N. Influence of Economic Factors on the Content and Composition of Essential Oil in Proceeding of the 15th International Symposium on the Eos, Boston. 1985;19- 21.
[35]. Telic I, Sahbaz N. Variation of yield, EO and carvone contents in clones in clone selected from carvone scented landraces of Turkish Mentha species. Journal of Agronomy. 2005;4(2):96-102.
[36]. Orav A, Real A, Arak E, Müürisepp M, Kailas T. Composition of the essential oil of Artemisia absinthium L. of different geographical origin, proc. Estonian Acad. Sci. Chem. 2006;55(3);155-165.
[37]. Bhatti H, Iqbal Z, Shaid SA, Bukharii H. Variation in oil potential and chemical composition of Eucaliptuscrebraamong different distric of Punjab. Pakistan. International Journal of Agricultural and Biological Sciences. 2007;1:136-138.
[38]. Muhammad N. Evaluation of varying energy and protein levels on the performance of growing and fattening Uda sheep in semi-arid zone of Nigeria. Ph.D. thesis.UsmanuDanfodiyo University, Sokoto, Nigeria; 2011.
[39]. Bhatta R, Krishnamoorthy U, Mohammed F. Effect of feeding tamarind (Tamarindusindica) seed husk as a source of tannin on dry matter intake, digestibility of nutrients and production performance of crossbred dairy cows in mid-lactation. Animal Feed Science and Technology. 2000;83:67–74.
[40]. Chaves AVK. Stanford MER, Dugan LL, Gibson TA, McAllister F, Van H, Benchaar C. Effects of cinnamaldehyde, garlic and juniper berry essential oils on rumen fermentation, blood metabolites, growth
[41]. performance and carcass characteristics of growing lambs. Livestock Science.2008; 117:215-224.
[42]. Bampidis VAV, Christodoulou P. Florou- Paneri E, Christaki AB, Chatzopoulou PS. Effect of dietary dried oregano leaves supplementation on performance and carcass characteristics of growing lambs. Animal Feed Science and Techonology. 2005;121:285-295.
[43]. Makkar HPS. Quantification of Tannins in Tree Foliage – A Laboratory Manual (FAO/IAEA Working Document, Vienna, Austria); 2000.
[44]. Dey A, Dutta N, Sharma K, Pattanaik AK. Effect of dietary inclusion of Ficusinfectorialeaves as a protectant of proteins on the performance of lambs. Small Ruminant Research. 2008;75:105–114.
[45]. Njidda AA, Shuai AA, Isidahomen CE. Haematological and serum biochemical indices of sheep in semi-arid environment of Northern Nigeria. 2014;14(2).
[46]. Waziri MA, Ribadu AY, Sivachelvan N. Changes in the serum proteins, hematological and some serumbiochemical pro fi les in the gestation period in the Sahel goats. 2010;80(2):215– 24.
[47]. Kraszewski J, Wawrzynczak S. Wawrzynski M. Effect of herb feeding on cow performance, milk nutritive value and technological suitability of milk for processing. Ann Anim Sci. 2002;2(1):147– 58.
[48]. Greathead SH. Plants and plants extracts for improving animal productivity. Proceedings of the Nutrition Society.2006; 279–90.
[49]. Wawrzynczak S, Kraszewski J, Wawrzynski M, Kozlowski J. Effect of herb mixture feeding on rearing performance of calves. Ann Anim Sci. 2000;27(3):133–42.
[50]. Cardozo PW, Calsamiglia S, Ferret A, Kamel C. Effects of natural plant extracts on ruminal protein degradation and fermentation profiles in continuous culture. J Anim Sci. 2006;82:3230–6.

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