



Effect of Ration Type and Addition of Helba (*Trigonella foenum-graecum*) Powder on Feed intake, dry matter digestibility, Blood Components and weight gain of Rabbits

Jumaa Barram Jadalla¹, Mawahib Mohammad Mudawwi Imam², Saliha Hammad Kafey³, Nursa Eldukier Koojor Hussein⁴ and Musa Ahmed Musa Tibin⁵

¹Department of Animal Production , Faculty of Natural Resources and Environmental Studies, University of Kordofan, Sudan corresponding author

²Ministry of Animal Resources, South Kordofan State, Sudan

³Department of Food Science and technology , Faculty of natural Resources and Environmental Studies, University of Kordofan, Sudan

⁴Department of Animal Production Faculty of Agricultural Sciences , University of Dallanj, Sudan

⁵Department of Animal Production, Faculty of Natural Resources and Environmental Studies, University of Al Sallam Elfula, Sudan

ARTICLE INFO

Article No.: 082821082

Type: Research

Full Text: [HTML](#), [EPUB](#)

Accepted: 01/09/2021

Published: 03/10/2021

*Corresponding Author

Dr. Jumaa B Jadalla

E-mail: Jumaaaringola2000@gmail.com

Keywords: rabbits; rations additive; *Trigonella foenum-graecum*.

ABSTRACT

This study was conducted to evaluate the effect of feed type and addition of the helba (*Trigonella foenum-graecum*) on feed intake, dry matter digestibility, blood components and weight gain of rabbits. Twenty male rabbits at 4-5 weeks of age and an average weight of 325-335g were used. They were divided into four equal groups each with 5 rabbits. The first and second groups were fed a ration with 18% protein formulated using 52% sorghum grains , 26% wheat bran, 21% groundnut seed cake, 0.50% salt and 0.50% multivitamins. 10g / kg / feed *Trigonella foenum-graecum* seed powder was added to the first group while the second was left without powder. The third group was fed on a diet containing 18% crude protein and was formulated with 31.76% sorghum, 16.81% groundnut seed cake, 47.43% barseem hay, 3% molasses 0.50% multivitamin and 0.50% salt, with 10 g / kg food from the helba and the same diet was provided for the forth group without adding the helba feeding lasted eight weeks and weekly weighed. The data were analyzed via analysis of variance. Feed intake was 308.57, 367.14, 438.57, 457.14g for group I, II, III and IV respectively. Final body weight was 1.438, 1.320, 1.198, 1.072.kg.for group I, II, III and IV respectively .Dry matter digestibility was 53, 52, 55, 49 % for group I, II, III and IV, respectively. Samples blood (5ml) of all rabbits was taken for determination of total protein albumin, globulin, cholesterol, glucose and total fat. The results indicated significant differences ($p \leq 0.05$) in final weight that could be attributed to addition of *Trigonella foenum-graecum* powder on general performance and significant increase ($p \leq 0.05$) in total protein and significant decrease in cholesterol in the first and third group. The study concluded that the type of ration and the addition of helba powder (*Trigonella foenum-graecum*) led to increase in total protein and decreased cholesterol and improved quality of meat. The study recommended further research into the effects of adding higher levels of helba powder and the effect of other additives that can improve the rate of gain in body weight, improve meat quality and reduce the cost of production.

INTRODUCTION

In populous city centers of Sudan like Elobeid, North Kordofan, Sudan, the price of animal protein is driven by very high demand with little supply putting animal protein out of reach of the average citizen. Similar situation prevails in many developing countries (Oyenuga, 1982). In view of the ever-increasing human population, production of animal protein must step up to meet with increasing demand (Delgado *et al.*, 1999). The authors also added that production of fast growing and early maturing animals such as the rabbit would go a long way in meeting the demand for animal protein.

The rabbits breeding project is considered a successful project especially in recent years due to the sharp increase in the prices of red meat and chicken. The advantage of rabbit meat production is also attributed to the species prolificacy and its distinction of rapid growth and abundant quantity and good quality of the produce. Therefore, it is an investment field for all and as an important and cheap protein food source for consumers (Oyenuga, 1982).

Rabbits are characterized by high fertility, increased litter size short pregnancy, short birth interval together with very short fattening period. The animal has relative advantage over chicken and other bird poultry species in that it is a herbivore. Rabbits have additional advantage with the benefit of byproducts such as fur and organic fertilizer (Afifi and Khalil, 1992).

Rabbits are in a permanent state of reproduction where females can be mated within one day of birth, where the rabbit's uterus returns to normal after 6-10 hours of delivery, which has the ability to conceive and breastfeed at the same time. The female gives 35-40 births a year. It can produce 20 - 25 times as much as its meat weight per year. Rabbits can be acquired and cared for at any level according to the potential of the breeder. For housing rabbits do not need large areas to raise them (Adegbola *et al.*, 1985).

Rabbits can be fed on the green fodder available around the house, cheap agricultural waste, home table remains such as bread, vegetable peel and home fruits and vegetables, thus reducing the cost of nutrition, which constitutes 70% of the cost of production. The rabbit meat is of good quality where it contains 20-21% protein content a low percentage of fat and cholesterol hence being a good meat for the elderly and the sick (Lebas, 1980).

Objective of the study

- To provide high animal protein at the lowest cost
- To encourage citizens to accept the consumption of rabbit meat and encourage

families and investors and draw their attention to the importance of rear rabbits.

- To expand the research to take a commercial approach by providing a market for the sale and marketing of rabbits and slaughterhouses.
- Specifically it is aimed at studying the effects of feeding two types of rations on: Feed intake, Live body weight change, Blood parameters.

The study area

Khartoum State, where this experiment was conducted, is one of the eighteen states of Sudan. Although it is the smallest State by area (22,142 km), it is the most populous (5,274,321 in 2008 census (Geohive, 2008 and population census 2008). It contains the country's second largest city by population, Omdurman, and the city of Khartoum, which is the capital of the State as well as the national capital of Sudan. The State lies between longitudes 31.5° to 34° E and latitudes 15° to 16° N. It is surrounded by River Nile State in the north-east, in the north-west by the Northern State, in the east and southeast by the states of Kassala, Qadarif, Gezira and White Nile State, and in the west by North Kordofan.

Such populous areas are in need for food at low cost. This necessitates looking for investments in poultry and fish farming using locally resources.

The experimental animals and treatments

Local breed of rabbits were purchased from markets in Khartoum North with ages ranging from 4 to 5 weeks and with average initial weight of 325 to 335g. The rabbits were randomly grouped into four similar groups each with five animals and they were assigned to four treatments (rations). The animals were housed in a 2X3 square meter barn. The floor was made of concrete and had an alleviation of half cm for drainage during washing. The rations were provided manually and on a daily basis at 7:00 am and water was provided throughout the experimental period. The amount of feed consumed was estimated by subtracting the amount left from that was offered the previous day. Feces were collected for seven days for digestibility test. The animals were weighed at the beginning of the trial and once weekly thereafter for eight weeks. Blood samples were taken at the last week. The rabbits were fasted overnight and three from each group were slaughtered for carcass evaluation.

The experimental Feed

Two rations were formulated using the ingredients shown in Table (1).

Table (1).ingredients used in formulation of rations used in feeding the Experimental rabbits

Ingredients %	Rations/rabbit groups			
	I	II	III	IV
Sorghum grains	52	52	31.76	31.76
Wheat bran	26	26	0	0
Groundnut cake	21	21	16.81	16.81
Barseem hay	0	0	47.43	47.43
Molasses	0	0	3	3
Multi-vitamin	.50	.50	.50	.50
Salt	.50	.50	.50	.50
Helba	1	0	1	0

1: ration high in sorghum and helba, II= I without helba III= Barseem + sorghum with helba IV=Barseem + sorghum without helba

Two rations were formulated without Helba addition. Percents of ingredients are indicated in table 1 and rations for group I and III were supplemented with *Trigonella foenum-graecum* (Helba) powder. Molasses was added to rations II and IV and free of helba. The

chemical composition of each ingredient was determined prior formulation of the rations as shown in table 2. Molasses was first added as a binding ingredient and its valued was calculated as part of the ration input.

Table 2 chemical composition% of ingredients used in rations for the rabbits

Feed	DM	OM	CP	CF	EE	NFE	ASH
Sorghum grains	92.57	88.77	14.47	2.3	2	70	3.8
Wheat bran	90.78	85.38	16.92	12.5	4	0.13	5.4
Groundnut cake	90.52	79.55	33.30	6.5	4.5	1.44	10.97
Barseem hay	92.70	84.7	13.35	27.18	2.61	41.56	8.8
Molasses	75.36	63.12	3.52	-	1.5	58.1	12.24
Multi-vitamin	-	-	-	-	-	-	-
Helba	92.9	89.14	27.397	15.40	4.2	45.903	3.76
Salt	-	-	-	--	-	-	-

DM: dry matter, OM: Organic matter, CP: crude protein, CF: crude fiber, EE: Ether extract

Table (3).chemical composition of the rations used in feeding rabbit groups

Constituents	RATIONS			
	I	II	III	IV
Dry matter	94.59	93.67	91.66	90.74
Organic matter	85.94	85.5	87.2	86.13
Crude protein	18.08	18.81	18.80	18.51
Crude fiber	5.95	5.8	15.68	15.58
Ether extract	3.07	3.03	2.75	2.79
Nitrogen free extract	37.19	36.73	45.63	45.17
Ash	5.71	5.68	7.88	7.85

The chemical analysis

The feed ingredients and feces were analyzed via proximate analysis as described by AOAC, (2000). The blood samples were determined according to the methods used to measure the concentration of glucose in the blood and ascitic fluid as determined enzymatically by means of a glucose oxidase-peroxidase procedure (Richterich *et al.*, 1962). The blood samples were taken directly from heart in samples of 5 ml for each rabbit of all groups in plastic containers free of anticoagulant and samples were left for 1-2 hours to form the serum. The blood was separated from the serum by centrifugation (3000 cycles/ min) for five minutes. The serum was isolated

in sealed containers and kept to the following analysis was performed: Total protein albumin Glucose globulin Glucose and cholesterol total fat (Blauärmel and Krüger 1976). The dry matter digestibility was determined according to the methods described by McDonald *et al.*, (2010) in the total feces collection method.

Statistical Analysis

The experimental design was a complete randomized design and the data on feed intake, dry matter digestibility, body weight change of the rabbit groups, blood components were statistically analyzed via analysis of variance. The differences among means

were detected via Least Significance Difference test (LSD). The Analysis procedure is annexed in appendix.

Type of ration and rabbits' general performance

Effect of type of ration on rabbits' general performance is presented in table 4.1. The results showed no significant differences ($P>0.05$) in the final body weight

among the four rabbit groups after feeding for 8 weeks on the experimental rations, the rabbits reached final weight means of 1438, 1032, 1198 and 1072 g respectively. The results also showed no significant differences ($P>0.05$) in the overall weight gain at the end of the experimental period for rabbits in all groups. The results also showed no significant differences ($P>0.05$) among rabbit groups in daily feed intake.

Table (4).Effect of type of ration on rabbits' general performance Treatments

Parameters studied	I	II	III	IV
No. of Animals	5	5	5	5
weeks on trial	8	8	8	8
Initial weight(g)	360	380	332	354
Final weight(kg)	1.438	1.320	1.198	1.072
Total weight gain(kg)	1.078	0.94	0.868	0.718
Dry matter digestibility %	53	52	55	49
Feed intake(g/d)	308.57	367.14	438.57	457.14
Feed conversion ratio%	1.5	2.5	2.6	2.9

Table 5. Weekly Body weight change of rabbits as affected by type of ration

WEEKS	TREATMENTS			
	I	II	III	IV
Initial	532.00	468.00	416.00	464.00
1	92.000	82.000	70.000	56.000
2	150.00	104.00	98.00	98.00
3	62.000	94.000	42.000	6.000
4	122.00	74.00	64.00	30.00
5	72.00±30.145	116.00±30.145	92.50±33.703	58.00±30.145
6	116.00±40.285	46.00±40.285	112.50± 45.040	110.00±40.285
7	292.00±40.285	336.00±64.713	320.00±72.351	248.00±64.713
Overall SE	906.00	852.00	694.00	606.00
				92.806

Table 6. Effects of rations type on blood parameters in rabbits

Blood parameters	TREATMENTS			
	I	II	III	IV
Albumin	3.8300±0.16380	4.4000±.1831	4.8700±0.1831	3.1100±0.1638
Protein	37.747±6.325	44.207±7.635	±76 42.202	± .33 37.747
Lipids	337.64±0.1638	307.35±44.207	417.63±44.207	312.94±39.540
Cholesterol	66.88±5.9804	82.53±6.6863	126.07±6.6863	91.18±5.9804
Globulin	32.328±10.670	95.135±11.930	47.495±11.930	11.850±13.775

DISCUSSION

The Feed Intake of Rabbits

The results of this study have showed that there were significant differences ($P>0.05$) among the four groups of rabbits on two different rations with or without *helba* powder (*Trigonella foenum-graecum*). The results obtained in this study were similar to those reported by Abonyi *et al.* (2012). who obtained a significant increase in weight gain and feed conversion ratio when they added 8 g *helba*/kg feed. They were also similar to the results of the study of Adegobla *et al.*, (2002),

which recorded a significant increase in weight when giving male and female rabbits extract *helba* seeds powder at 2500 mg/ kg body weight and the results also did not differ from Adil and Gaisi (2011) who indicated a significant difference in the rates of live weights. The results are in disagreement with the results of another study who did not find any significant differences in body weights Abonyi *et al.* (2012). The authors showed no significant effect for adding 8 g *helba* per kilogram feed. Nevertheless the weight of hot and cold carcasses increased and the percentage of dressing percentage. The authors explained those differences to the absence of difference in the

productivity traits, despite the presence of increase in live weight and final weight where rabbits gave the first and third treatments higher when the second and fourth treatments were given a diet supplemented by a 1% powder lower weight gain and the feed consumption ratio was higher for the third and fourth treatments of the first and second treatments. The rations with molasses were expected to be preferred by their taste for rabbits. It also reported to improve digestion and contains a high percentage of digestible protein up to 14%. The addition of molasses also lowered ration fiber, increased vitamins and mineral salts especially calcium and phosphorus needed by rabbits. In fact increased feed intake of rabbits is reported being traits of different breeds.

CONCLUSION

The results of the study indicated that the type of ration had no effect on feed intake, weight gain and the overall performance of rabbits.

It was observed that molasses and hay diets were consumed insignificantly in high amounts and

that could be attributed to their higher nutritional value and were more palatable.

Recommendations

More research in the field of rabbit nutrition, especially rations, ingredients used and different feed of rabbits be carried out to test most suitable rations for the establishment of most suitable and sustainable feeding patterns especially for the small scale production since large farms for raising rabbits are run using commercial technical production packages.

The concept of consumers be changed towards adoption of acceptance of the meat of rabbits its quality and emphasis be stressed on showing the high nutritional importance of this type of meat, making it a basic source of protein

The cost of rabbit meat is low thus consumers' acceptance and ensuring sustainable feeding and production system will enable producers to benefit from raising rabbit.

Different levels of supplementation with helba and other additives can be tried to improve quality of meat produced.



REFERENCES

- Adegbola, T. A. ; Tibi, E. U. ; Asogwa, D. C.,(1985). Research note: feed intake and digestibility of rabbits on all-forage, forage plus concentrate and all- concentrate diets. *J. Anim. Prod. Res.*, 5: 185-191
- Adegobla TA, Okonkwo JC (2002). Nutrient intake, digestibility and growth of rabbits fed varying levels of cassava leaf meal. *Nig. J. Anim. Prod.* 29(1): 21-26.
- Abonyi, F. O. Iyi ,E. O. and Machebe, N. S.(2012). Effects of feeding sweet potato (*Ipomoea batatas*) leaves on growth performance and nutrient digestibility of rabbits *African Journal of Biotechnology* Vol. 11(15), pp. 3709-3712, 21 February, 2012 Available online at <http://www.academicjournals.org/AJB> DOI: 10.5897/AJB11.3103 ISSN 1684–5315 © 2012 Academic Journals.
- AOAC (2000). *Official Methods of Analysis*, 19th Edition AOAC Inter. Inc. Washington, DC Pp 1219.
- Blauärmel H and Krüger I.(1976). Quantitative determination of blood-plasma protein fractions using micro-agar gel electrophoresis in highly pregnant dairy cows close to the day of delivery *Arch Exp Veterinarmed.* 1976;30(6):925-32.
- Delgado, C.; Rosegrant, M.; Steinfeld, H.; Ehui, S. and Courbois, C. (1999) . *Livestock to 2020: The next food revolution.* Food, Agriculture and the Environment Discussion Paper 28.
- Le bas F.(1980). Nutritional requirement of rabbits. *J.Appl. Rabbit Res.* Vol 3 No 2 pp 15
- Le bas, F.and Colin, M.:(1977). Rapeseed oil meal in feeds for growing rabbits. Effect of husking. *Ann. Zootech.*, 26 (1): 93-97
- Oyenuga 1982. Problems and prospect of the Nigerian beef industry. *Proceedings of National conference on beef production held in Kaduna, July 1982.* Pg 58-89.
- Richterich, R. and Colombo, J.(1962). Vereinfachte enzymatische Bestimmung der Blut- Glucose mit 20 microliter Blut. VII. Mitteilung über Ultramicromethoden im Klinischen Laboratorium. *J. Klin. Wochschr.*,40: 1208-1211, .
- Geohive. (2008). Archived from the original on 2014-08-06. Retrieved August 2014. Check date values in: `|accessdate` `=(help)` http://cbs.gov.sd/files/Pop._Proj._by_satates137.pdf
- FAO (1986). *The rabbit husbandry, health and production.* <http://www.fao.org/docrep/x5082e/X5082E00.htm>
- Oyenuga VA (1968). *Nigerian Food and Feeding Stuff, The chemistry and nutritive value.* Ibadan, University Press. 3rd Edn. pp. 10-31. SAS Institute (1999). *SAS/STAT. User's guide for windows.* SAS institute Inc. Cary, NC. USA. p. 8.

Cite this Article: Jadalla JB; Imam MMM; Kafey SH; Hussein NEK; Tibin MAM (2021). Effect of Ration Type and Addition of Helba (*Trigonella foenum-graecum*) Powder on Feed intake, dry matter digestibility, Blood Components and weight gain of Rabbits. *Greener Journal of Agricultural Sciences* 11(3): 151-156.