
EFFECT OF FENUGREEK SEED POWDER ON MILK YIELD, QUALITY AND PERFORMANCE OF KANO BROWN GOAT

+#Hanga, H.R., £Garba, Y., and *Baba, M.

+#Department of Agricultural Education, School of Secondary Education Vocational, Federal College of Education, Kano, Nigeria

£Department of Animal Science, Bayero University Kano, Nigeria

*Department of Animal Science, Bayero University Kano, Nigeria

+ [Correspondence email: hadizahanga1981@gmail.com Tel: 08036933322]

ABSTRACT

The present study was aimed to evaluate the effect of fenugreek seed powder (FSP) on performance and milk yield of lactating Kano Brown Goat. Twenty goats in their 1st and 2nd parity were used in the study. Treatments were T1 (0% FSP), T2 (5%FSP), T3 (10%FSP) and T4 (15%FSP). Lactating Kano Brown does were allocated to a treatment in a completely randomized design (CRD). The results indicated a significant variation among treatments in terms of Ash, Crude fibre (CF), Crude protein (CP), Carbohydrate, Dry matter (DM), Ether extract (EE), Nitrogen free extract (NFE) and Energy. A significant ($P<0.05$) variation existed among the treatments in the CP contents of 5.33, 7.10, 6.24 and 4.45%, respectively. T1 and T4 affected the ash content ($P<0.05$). Significant ($P<0.05$) difference existed between T1 and T3 for EE (8.55% vs 6.86%). The highest daily milk yield (237.5ml) was obtained from treatment T3. Among the treatments, milk amino acid profile evaluated showed a highly significant ($P>0.05$) difference. There was a statistical difference ($P<0.05$) in the values for average daily weight gain (ADWG) evaluated in T2 (90.72g/d) and T3 (50.40g/d) and the values for dry matter intake (DMI) evaluated in T2, T3 and T4.. Increase in weight by kids from birth to week 12 in the treatments was observed. However, the higher weight gain was recorded in T3 (7.98Kg). It was therefore concluded that feeding diets containing fenugreek seed powder improved milk yield and its quality.

Keywords: Fenugreek, galactagogue, milk production, Lactation, Goats.

INTRODUCTION

When compared to the milk produced by foreign breeds, the milk produced by our local breeds is quite low. The breeds might not be dairy goats, which could explain this. Galactagogues, including fenugreek, can enhance the quality of milk produced. A member of the Leguminosae family, fenugreek is an annual herbaceous legume that grows well in arid climates. Like other legumes, fenugreek is an excellent source of fat (6.53%), minerals, vitamins, and dietary protein (20–30%) for animal nutrition (Ali, 2015). Fatty acids that range from 5 to 10% are mostly linoleic, oleic, and palmitic acids, which range from 45 to 65%. Galactomannan content in fenugreek seed is 26.8% (Dhull *et al.*, 2020). This might be a galactogous material to boost milk production (Mohanty *et al.*, 2014). In ruminants including dairy goats, water buffaloes, and dairy cows, it has been demonstrated to improve lactation performance (Akbag *et al.*, 2022). Additionally, it can be added to animals as a supplement to boost dietary energy utilisation, enhance performance, and offer an alternative protein source (Balgees *et al.*, 2013). Therefore, the purpose of this study was to find out how the performance, milk yield, and concentration of amino acids in milk of Kano brown goats were affected when fenugreek seed powder was added to their diets. In ruminants including dairy goats, water buffaloes, and dairy cows, it has been demonstrated to improve lactation performance (Akbag *et al.*, 2022). Additionally, it can be added to animals as a supplement to boost dietary energy utilisation, enhance performance, and offer an alternative protein source (Balgees *et al.*, 2013). Therefore, the purpose of this study was to find out how the performance, milk yield, and concentration of amino acids in milk of Kano brown goats were affected when fenugreek seed powder was added to their diets.

MATERIALS AND METHODS

Twenty goats in their 1st and 2nd parity were used for the study at the Teaching and Research Farm Department of Agricultural Education, Federal College of Education, Kano. The animals were fed a concentrate and roughage diet throughout gestation period. The lactating does were grouped and offered four treatments containing Fenugreek seed powder (FSP) at 0, 5, 10 and 15% in a completely randomized design. Feed samples were analyzed for dry matter (DM), crude protein (CP), crude fibre (CF), ether extract (EE) and ash according to A.O.A.C (2007) procedures. Dams were hand milked daily at 0800 hour. milk samples were analysed for milk protein (MP), lactose, total solids (TS), solids-non-fat (SNF), fat and ash according to A.O.A.C (2007). Amino acid in milk was determined as described by Kholif *et al.* (2014) using methyl esters. Data collected were subjected to analysis of variance (ANOVA) using Completely Randomised Design in SAS (2015) package at 5% probability level ($P < 0.05$).

Result and DISCUSSION

The result of chemical composition of experimental diets offered to lactating Kano Brown goats is presented in Table 1. A significant ($P < 0.05$) variation existed among the treatments in the CP contents. The percentage DM differed significantly ($P < 0.05$) between the treatments evaluated. The values of DM recorded were in line to the reported 88.23 to 89.71% (Yahaya, *et al.*, 2021) but generally higher than the reports by authors Akbag *et al.* (2022) and Akinfemi and Mukhtar (2012). The values for CP were higher than the records by various authors (Sani *et al.*, 2017 reported 14.19 to 17.75%; (Yahaya, *et al.*, 2021) reported 13.14 to 16.11 %).

Table 1: Chemical composition of experimental diets offered Kano brown dams.

| Constituents | Treatments | | | | SEM |
|-----------------------|---------------------|---------------------|---------------------|---------------------|------|
| | T ₁ | T ₂ | T ₃ | T ₄ | |
| Ash | 5.33 ^b | 7.10 ^a | 6.24 ^a | 4.45 ^c | 0.08 |
| Dry matter | 86.73 ^b | 84.58 ^c | 85.12 ^c | 90.23 ^a | 0.12 |
| Crude Protein | 21.35 ^C | 26.06 ^a | 24.11 ^a | 19.43 ^d | 0.08 |
| Crude Fibre | 33.17 ^a | 28.79 ^c | 31.65 ^b | 23.25 ^d | 0.34 |
| Ether Extract | 8.55 ^b | 6.92 ^c | 9.08 ^a | 6.86 ^c | 0.01 |
| Carbohydrate | 55.13 ^b | 53.44 ^c | 56.20 ^a | 44.21 ^d | 0.08 |
| Nitrogen free extract | 31.60 ^b | 31.13 ^b | 28.92 ^c | 46.01 ^a | 0.06 |
| Energy | 288.75 ^b | 291.49 ^b | 293.73 ^b | 323.25 ^a | 0.56 |

*abc Means with different superscripts along same row are significantly different ($P < 0.05$). T₁- 0%FSP; T₂- 5%FSP; T₃- 10%FSP; T₄- 15%FSP; FSP- Fenugreek Seed Powder.

Table 2: Chemical composition of milk produced by Kano brown goats fed graded levels of fenugreek powder in their diet at various stages of lactation.

| Constituents | Treatments | | | | SEM |
|----------------|--------------------|--------------------|--------------------|--------------------|-------|
| | T ₁ | T ₂ | T ₃ | T ₄ | |
| DMY | 193.5 ^d | 226.6 ^b | 237.5 ^a | 217.5 ^d | 0.000 |
| Ash | 0.37 ^d | 0.41 ^c | 0.43 ^b | 0.47 ^a | 0.002 |
| Lactose | 4.24 ^c | 4.29 ^b | 4.30 ^c | 4.00 ^a | 0.000 |
| Fat | 3.90 ^a | 3.80 ^a | 3.70 ^a | 3.30 ^b | 0.100 |
| p ^H | 6.85 ^a | 6.85 ^a | 7.00 ^a | 6.15 ^b | 0.087 |
| Protein | 4.50 ^a | 4.30 ^{ab} | 4.40 ^a | 4.15 ^b | 0.112 |
| SNF | 9.11 ^b | 9.00 ^c | 9.13 ^a | 8.56 ^d | 0.000 |
| TS | 13.01 ^a | 12.80 ^c | 12.83 ^d | 11.86 ^d | 0.000 |

*abc Means with different superscripts along same row are significantly different ($P < 0.05$) SNF-Solid-non-fat, TS-Total solids. T₁-0%FSP; T₂-5%FSP; T₃-10%FSP; T₄-15%FSP; FSP- Fenugreek Seed Powder.

The result for milk yield and chemical composition of milk from Kano Brown does fed diets containing fenugreek seed powder is presented in Table 2. The result indicated a significant difference within the treatments in the daily milk yield recorded. Effect of treatment showed a significant

($P < 0.05$) difference in the ash contents. Similarly, the results indicated that the values for fat and protein in treatment T_4 were significantly different ($P < 0.05$) from T_1 , T_2 and T_3 . The higher values observed were 3.90% and 4.50% respectively. The supplementation of fenugreek seed in this study was consistent with the report in previous studies (Hassan *et al.*, 2012; Balgees *et al.*, 2013; El-Rawi and Salh, 2014; Hasin *et al.*, 2019). In line with the findings of the present study, Ahmad and Al-Janabi (2012) reported a decrease Milk fat percentage compared to the control group, Balgees *et al.*, (2013) and El-Tarabany *et al.*, (2018) who found lower Milk fat concentrations with fenugreek seed supplementation.

Table 3 presents milk amino acid concentration of Kano brown does fed diets containing fenugreek seed powder. The concentration of ASP and ILE represents a highly significant difference ($P > 0.05$) between the treatments examined. Significantly higher ASP value (176.25%) was observed in T_4 . The current result was in agreement with the findings of Landi *et al.* (2021) who studied the total amino acid content in milk of Cow, Sheep and Goat in two locations and recorded Glutamic acid, lysine, leucine and proline as the most abundant amino acids compared to other amino acids evaluated.

Table 3: Amino acid concentration in milk of Kano brown goats fed diets containing fenugreek seed powder.

| Amino acid (%) | Treatments | | | | SEM |
|----------------------------------|----------------------|----------------------|-----------------------|-----------------------|-------|
| | T_1 | T_2 | T_3 | T_4 | |
| <i>Essential amino acids</i> | | | | | |
| Isoleucine | 8.54 ^d | 81.50 ^c | 119.33 ^b | 139.85 ^a | 1.08 |
| Lysine | 129.33 ^b | 135.60 ^{ab} | 142.68 ^a | 146.06 ^a | 1.91 |
| Tryptophan | 0.87 ^b | 18.05 ^a | 18.28 ^a | 19.89 ^a | 7.25 |
| Phenyl alanine | nd | 134.78 ^c | 163.63 ^b | 192.28 ^a | 2.11 |
| Histamine | 23.46 | 16.65 | 28.02 | 10.13 | 12.91 |
| <i>Non-essential amino acids</i> | | | | | |
| Aspartic acid | 21.31 ^d | 122.59 ^c | 141.12 ^b | 176.25 ^a | 2.25 |
| Proline | 8913.00 ^b | 8787.00 ^b | 9543.00 ^{ab} | 10059.70 ^a | 150.1 |
| Cystine | 61.06 ^a | 26.44 ^b | 24.02 ^b | 29.80 ^b | 1.06 |
| Alanine | nd | 9.60 ^c | 10.56 ^b | 11.63 ^a | 0.09 |

*abc Means with different superscripts along same row are significantly different ($P < 0.05$). Treatments T_1 - Control, T_2 - 5% FSP, T_3 -10% FSP, T_4 - 15% FSP, FSP- fenugreek seed powder, nd-not detected

The result showing Performance of lactating Kano brown goats is presented in Table 4. There was a significant difference within the values for Dry matter intake (DMI) evaluated in T_2 , T_3 and T_4 . The present result revealed a statistical difference ($P < 0.05$) in the values for average daily weight gain (ADWG) evaluated in T_2 (90.72g/d) and T_3 (50.40g/d). Effect of Fenugreek seed powder in the diet did not influence dry matter intake (DMI) in this experiment. This was in agreement with previous studies (Akbag *et al.*, (2022); Anmar and Al-Wazeer, 2017;). Final live weight showed a significant increase with increase fenugreek level in the lactating animals' diet. This was not in line with Dida *et al.*, (2019) who reported a non-significant effect of supplement on final Body Weight gain.

Table 4: Performance and weight gain of Kano brown does fed diets containing fenugreek seed powder.

| Parameters | TREATMENTS | | | | SEM |
|------------------------------|---------------------|---------------------|---------------------|---------------------|------|
| | T_1 | T_2 | T_3 | T_4 | |
| Initial Live body weight (g) | 19.50 ^a | 17.83 ^b | 20.00 ^b | 20.99 ^b | 0.67 |
| Weight gain (g) | 2.15 ^b | 6.19 ^a | 6.19 ^a | 2.12 ^b | 0.47 |
| Final live weight (g) | 21.65 ^a | 24.02 ^b | 23.91 ^b | 23.11 ^b | 0.15 |
| Average daily weight gain(g) | 25.59 ^b | 90.72 ^a | 50.40 ^{ab} | 25.20 ^b | 7.95 |
| Dry matter intake (g) | 650.60 ^a | 639.05 ^a | 590.48 ^b | 554.42 ^c | 4.61 |

*abc Means with different superscripts along same row are significantly different ($P < 0.05$).

T_1 - Control, T_2 - 5% FSP, T_3 -10% FSP, T_4 - 15% FSP, FSP- fenugreek seed powder

CONCLUSION AND RECOMMENDATION

The study showed that feeding diets containing fenugreek seed powder improved milk yield and its quality, amino acid in milk of Kano brown does and kids suckled by dams fed fenugreek seed powder in their diet had the higher weight gain.

REFERENCES

- A.O.A.C. (2007). Association of Official Analytical Chemists. Official Methods of Analysis 18th Ed. Benjamin Franklin Station Washington, D.C, USA.
- Akbag, H.I., Savas, T. and Yüceer, Y.K. (2022). The effect of fenugreek seed supplementation on the performance and milk yield of dairy goats. *Archives Animal Breeding*, 65: Pp 385–395,. Retrieved from <https://doi.org/10.5194/aab-65-385>, on 22 March 2023.
- Akinfemi, A. and Ogunwole, O. A. (2012). Chemical composition and in vitro digestibility of rice straw treated with *Pleurotus ostreatus*, *Pleurotus pulmonarius* and *Pleurotustuber-regium*. *Slovak Journal of Animal Science*, 45(1): 14-20.
- Ali, H.A.M. (2015). Effects of fenugreek (*trigonella foenumgraecum*) seeds in the diets of Sudan Nubian goat (*capra aegagrus hircus*); their feed intake and digestibility of nutrients. *Journal of Natural Resources and Environmental Studies*, 3: 2(6):16-20.
- Al-Janabi, A. A. F. (2012). Feeding Effect of Fenugreek Seeds (*Trigonella foenum greacum*) on lactation performance, some serum constituents and prolactin hormone level in damascus Crossbred Goats. *Diyala Agricultural Sciences Journal*, 4(1): 1-8.
- Anmar, A. and Al-Wazeer, M. (2017). Effect of fenugreek seed supplementation on growth performance, digestion coefficient, rumen fermentation and some blood metabolites of Awassi lambs. *Kufa Journal of Veterinary Medical Sciences*, 8, 1.
- Balgees, A., Nuha, A.E, Jame, M., Rahmatalla, S.A., Amasiab, E.O., Mahala, A. (2013). Effect of fenugreek (*Trigonella foenum graecum*) seeds on feed intake, some metabolic hormones profile, milk yield and composition of Nubian goats. *Research Journal of Animal Sciences*. 7, 1-5.
- Dida, M. F., Challib, D.G. and Gangasahay, K. Y. (2019). Effect of feeding different proportions of pigeon pea (*Cajanus cajan*) and neem (*Azadirachta indica*) leaves on feed intake, digestibility, body weight gain and carcass characteristics of goats. *Veterinary and Animal Science*, 8 (2019) 10079. Retrieved from: <https://doi.org/10.1016/j.vas.2019.100079>
- El-Rawi, E. A. (2012). The relationship between added Fenugreek seeds and chemical composition of milk and blood biochemical traits, parameters of Awassi ewes. *Al-Anbar Journal of Veterinary Science*, 5 (2): 229-236.
- El-Tarabany, A., Teama, F. E. I., Atta, M. A. A., and El-Tarabany, M. S. (2018). Impact of dietary fenugreek seeds on lactational performance and blood biochemical and b c hematological parameters of dairy goats under hot summer condition. 68, 214-223. Retrieved from: <https://doi.org/10.15567/mljekarstvo>.
- Hasin, D., Pampori, Z. A., Sheikh, A. A., Aarif, O., Bhat, I. A., and Abdullah, M. (2019). Milk production and hormonal profile as affected by fenugreek supplementation in lactating goats of Kashmir valley. *Biological Rhythm Research*, 52: 986–993.
- Hassan, S. A., Shaddad, A. I. S., Salih, K., Muddither, A., Kheder, S. I., and Barsham, M. A. (2012). Effects of oral administration of *Trigonella foenum L.* (fenugreek seeds) on galactogue, body weight and hormonal levels in Sudanese desert sheep. *Journal of Pharmaceuticals Biomedical analysis*, 22: Pp 1–4.
- Kholif, A.E., Khattab, H.M., El-Shewy, Mariezcurrena, M.D. (2014). Nutrient digestibility, ruminal fermentation activities, serum parameters and milk production and composition of lactating goats fed diets containing rice straw treated with *Pleurotus ostreatus*. *Asian Australas Journal of Animal Science*. 27: Pp 357–364.
- Mohanty, I., Senapati, M.R., Jena, D., and Behera, P.C. (2014). Ethnoveterinary importance of herbal galactogogues.A review. *Veterinary World*, 7: 325-330. retrieved from: <https://doi.org/10.14202/vetworld>.

- Sani, R.T., Lamidi, O.S. and Dung, D.D. (2017). Performance of yearling bunaji bulls fed diets containing graded level of palm kernel cake. *Nigerian Journal of Animal Science*, (2): Pp 235 – 246.
- Yahaya, Y.A., Sadiq, M.S. and Muhammad, I.R. (2021). Performance of Red Sokoto goat fed graded level of *Ziziphus mauritiana* (Magarya) leaves as milk enhancer. *Nigerian Journal of Animal Production*, 48(3):173-180