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Article

The Effect of Supplementing Air-Dried *Moringa stenopetala* Leaf to Natural Grass Hay on Feed Intake and Growth Performances of Arsi-Bale Goats

Aberra Melesse [1,*], Degnet H/Meskel [2], Sandip Banerjee [1], Aster Abebe [1] and Amsalu Sisay [1]

[1] School of Animal and Range Sciences, Hawassa University, P.O. Box 05, Hawassa, Ethiopia; E-Mails: sansoma2003@yahoo.co.in (S.B.); aster_ab2003@yahoo.com (A.A.); amsals2001@yahoo.com (A.S.)

[2] Wachamo University, Hossana, Ethiopia; E-Mail: kukuteme@gmail.com

* Author to whom correspondence should be addressed; E-Mail: a_melesse@uni-hohenheim.de; Tel.: +251-462-206-697; Fax: +251-462-205-421.

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Abstract: The most constraining factor in goat production in the tropics is underfeeding mainly attributed to limitations of feed both in quantity and quality. This study was conducted to assess the effect of supplementing different levels of air-dried *Moringa stenopetala* leaf (MSL) as a protein source on nutrient intake and growth performances of Arsi-Bale male goats. A total of 24 yearling goats with average initial body weight of 13.6 ± 0.25 kg were used in the study. The goats were blocked by live weight into four groups ($n = 6$ per group) and the groups were then randomly allocated into four supplemented treatments. All goats received a basal diet of natural grass hay *ad libitum* and 340 g/head/day concentrate. The treatments were the control diet with no supplementation (Treatment 1, T1) and diets supplemented with MSL at a rate of 120 g/head/day (Treatment 2, T2), 170 g/head/day (Treatment 3, T3) and 220 g/head/day (Treatment 4, T4). The duration of the experiment was 75 days. The results indicated that the average daily feed intake was ($p < 0.001$) higher in goats supplemented with T3 and T4 diets. The total dry matter, organic matter, and crude protein intakes of goats fed with T3 and T4 supplementations were ($p < 0.001$) also higher than those reared in T1 and T2 diets. Goats reared in T3 and T4 diets had lower ($p < 0.05$) feed conversion ratio than those fed with T1 and T2 diets. The final body weight in goats reared in T3 and T4 diets was 18.2 kg and 18.5 kg, respectively, being ($p < 0.05$) higher than those of T1 (15.8 kg) and T2 (16.3 kg). The average daily weight gain in goats fed with T3 and T4 diets was 111 and 114 g/goat/day, respectively, which was ($p < 0.05$) higher than those reared in the control (T1) (54.0 g/goat/day) and T2 (58.1 g/goat/day) diets. It can thus be concluded that goats reared at high level of MSL supplementation (T3 and T4) had better nutrient intake, feed conversion efficiency and growth performances, suggesting its potential as a good protein supplement to natural grass hay at the farmer's management level.

Keywords: Arsi-Bale goats; natural grass hay; *Moringa stenopetala* leaf; nutrient intake; supplementation; weight gain

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1. Introduction

Ethiopia has the largest livestock population among African countries and has different agro-ecological zones ranging from semi-arid to arid environments which are suitable for goat production. There are approximately 570 breeds and types of goats in the world of which 89 are found in Africa [1]. The present estimated population of goats in Ethiopia is 29.3 million [2]. Goats play important roles in communities by improving the livelihood of resource-challenged farmers by creating alternative employment opportunities, enhancing family income by sale of live animals, skin, manure *etc.* Apart from contributing to human nutrition in form of meat and milk, they also act as an income buffer to the risks associated with erratic climatic changes [3]. In addition, demand for goat's meat is on the rise throughout the world, particularly in Ethiopia, due to increased human population coupled with income growth particularly in the cities. Regardless of their good attributes, production of goats remains low due to diseases, poor genotype, management, and nutrition; nevertheless, there is ample scope for improving the productivity of goats [4].

One of the most constraining factors in goat production in the tropics is underfeeding, which is mainly attributed to limitations of feed in both quantity and quality. The situation is exacerbated during the dry season when natural pastures usually dry out and are overgrazed, resulting in low contents of protein and energy in the fodder. As a result, large flocks of productive livestock cannot be maintained on such low quality feeds to meet the basic maintenance requirements of the animals. It is therefore important to supplement the meager available fodder with some amount of concentrates in order to improve intake and digestibility of such poor quality feed resources. However, the use of such supplements is usually limited under smallholder livestock production systems due to their inaccessibility and high cost.

As a result, in order to mitigate the problems associated with the lack of dietary protein, there is a need to look for some alternative but cheap sources of protein. Previous works have reported that leaves of multipurpose trees growing in the backyards of the farmers can be used as a cheap source protein for supplementing livestock [5]. In this regard, leaves from the Moringa tree may serve as a multipurpose protein source for livestock. The uniqueness of this tree is that it does not shed its leaves during the dry season when other sources of fodder become scarce [6]. It is a multipurpose tree cultivated both for human food and animal feed and is found in abundance in certain parts of Southern Ethiopia. Recent studies conducted by [7,8] and [9] have indicated that the leaves of *Moringa stenopetala* are rich in protein (28.2%–36.1%) and contain substantial amounts of essential amino acids as well as macro and trace minerals [10].

There are several studies reporting on the use of the fresh foliage of *Moringa* spp. as a source of livestock feed. According to the report of [11], supplementation of fresh *Moringa oleifera* leaves has resulted in the improvement of milk yield in crossbred cattle. Promising results have been obtained from inclusion of air-dried *M. stenopetala* leaf supplementation to the basal diet of sheep [12] and growing chicken [8,13]. However, information on the feeding value of *M. stenopetala* leaf on the performance of goats in the tropical countries, particularly in Ethiopian, is lacking. Thus, this research was conducted to assess the effect of supplementing air-dried *M. stenopetla* leaf meal to natural grass hay on feed intake and body weight performances of Arsi-Bale goats.

2. Materials and Methods

2.1. Experimental Site

The experiment was carried out at the sheep and goat farm of School of Animal and Range Sciences, Hawassa University (Ethiopia), which lies geographically between 7°5′ N latitude and 38°29′ E longitude at an altitude of 1700 m above sea level. The average rainfall ranges from 800 to 1100 mm. The mean minimum and maximum temperatures in the study area are 13.5 °C and 27.6 °C, respectively [14].

2.2. Preparation of Experimental Feeds

Fresh *Moringa stenopetala* leaves were collected from the trees owned by the farmers in Mirab Abaya (district town) which is situated near Arbaminch city. The district is situated between 6°4′ N latitude and 37°34′ E longitude with the mean altitude of 1220 m above the sea level. The fresh leaves were harvested from the available trees regardless of the age of the tree. The leaves were trimmed from its twigs and then shade dried on a plastic sheet. During the drying process, regular turning of leaves was done to ensure uniform drying. The air-dried Moringa leaves were finally transported to the experimental site and ground into coarse powder which hereafter is referred to as air-dried *Moringa stenopetala* leaf (MSL). The powder was packed in bags of 100 kg and stored until used. Natural grass hay was bought from a nearby private farm and hand chopped into the size of 3 to 5 cm for ease of feeding. Samples of MSL and various ingredients were subjected to chemical analysis before being used in the formulation of experimental diets.

2.3. Experimental Animals and Their Management

In this experiment, 24, about one-year-old (age determined by dentition) Arsi-Bale intact male goats were used with an average initial body weight of 13.6 ± 0.25 kg. Goats were purchased from local market and quarantined for a fortnight, during which they were treated with 250 mg of albendazole (Chengdu Qiankun Veterinary Pharmaceuticals Co. Ltd., Chengdu, China), administered through drenching gun for de-worming the animals. Moreover, 1.5 mL Oxytetracycline (Chengdu Qiankun Veterinary Pharmaceuticals Co. Ltd., Chengdu, China) was provided intravenously for three days to treat the animals from coughing caused due to transportation from the market to the experimental station. The barns were also sprayed with Diazinone (Chengdu Qiankun Veterinary pharmaceuticals col. Ltd., Chengdu, China) to take care of any ecto-parasite infestation.

2.4. Experimental Design and Treatment Diets

The feeding trial was a completely randomized design (CRD) consisting of one control and three supplemental treatment diets with six goats within each treatment. The trial was conducted for 75 days exclusive of 15 days of adaptation period. All the experimental goats had *ad libitum* access to natural grass hay and water. They were also provided with a concentrate at a rate of 2.5% of their body weight; this was done according to the recommendation of [15]. Consequently, as the average initial body weight of goat was 13.6 kg, the calculated concentrate supplied per goat per day was 340 g. The diets therefore contained 340 g concentrate only (treatment, T1), 340 g concentrate plus 35% MSL supplementation (120 g) (treatment 2, T2), 340 g concentrate plus 50% MSL supplementation (170 g) (treatment 3, T3), and 340 g concentrate plus 65% MSL supplementation (220 g) (treatment 4, T4). Accordingly, the total concentrate/MSL mixture offered to T1, T2, T3, and T4 treatment groups were 340, 460, 510, and 560 g/head day, respectively. The concentrate was a mixture of 50% wheat bran, 35% maize, 14% Noug (*Guizotia abyssinica*) seed cake, and 1% salt. Natural grass hay and the concentrate/MSL mixture were offered separately.

2.5. Data Collection

At the end of the quarantine period, the goats were weighed early in the morning (prior to being offered any feed) for two consecutive days and the body weight was averaged. Then the goats were blocked into control and supplemented groups ($n = 6$ per group) using initial body weight and the groups were then randomly allocated into four supplemented treatments. Animals were ear tagged and housed in individual pens and each animal was provided with feeder and watering trough.

Animals were offered the concentrate/MSL mixture twice a day at 8:00 a.m. and 1:00 p.m. in equal portions throughout the experimental period. Samples of daily feeds offered and refused were collected, measured and pooled over experimental period for each feed and animal and stored in plastic bags. Representative samples of the offered and refused feeds for the different treatments were then taken for chemical analysis. The daily average feed intake of hay and concentrate/ MSL mixture was determined separately by the difference between the amounts of feed offered and refused and then averaged. Body weight of each goat was recorded every fortnight after overnight fasting to determine body weight change. Average individual daily weight gain was calculated as the difference between final body weight and initial body weight of the goat divided by the experimental days.

2.6. Chemical Analysis of the Feed

The analysis of ash and moisture contents was conducted using the method of [16]. The dry matter content of the feed was determined by drying the samples at 105 °C overnight in a force air oven. Ash was determined by combusting the samples at 550 °C for 5 h in a muffle furnace. Nitrogen (N) was determined using the Keldjhal method and then the crude protein (CP) was calculated as N × 6.25 [16]. The acid detergent fiber (ADF) and neutral detergent fiber (NDF) contents were analyzed using the method of [17] in an ANKOM® 200 Fiber Analyzer (ANKOM Technology Corp., Fairport, NY, USA). All samples were analyzed in duplicates at Animal Nutrition Laboratory of Hawassa University.

2.7. Statistical Analysis

The collected data were subjected to the General Linear Models of SAS (SAS, 2010, version 9.3, SAS Institute Inc., Cary, NC, USA). When significant differences were observed among treatment means, they were separated by Duncan Multiple Range Test. Comparisons with $p < 0.05$ were considered significant and all statements of statistical differences were based on this level unless noted otherwise. The following linear model summarizes the statistics employed to analyze the data:

$$Yij = \mu + Ai + Aj + eij$$

where *Yij* is the observed *j* variables in the *i*th supplement, μ is the overall mean of the observed variable, *Ai* is the effect due to *i*th supplement levels (i = 0, 120, 170, 220 g/head/day), and *eij* is the random residual error

3. Results

3.1. Chemical Composition of Experimental Feed

Chemical composition of the experimental feeds is presented in Table 1. The crude protein (CP) content of the *M. stenopetala* leaf was the highest followed by that of the Noug seed cake; however the lowest value was observed for the hay offered. The dry matter (DM) content of the feed was more or less similar across the feed ingredients. The organic matter (OM) content was lowest for the *M. stenopetala* leaf while it was highest for maize. The results also indicated that the ether extract (EE) values were highest for Noug seed cake and lowest for hay. The neutral detergent fiber (NDF) values were highest for hay and the lowest for *M. stenopetala* leaf.

Table 1. Proximate composition of ingredients of the concentrate, natural grass hay, and air-dried *Moringa stenopetala* leaf.

Nutrients (%, DM Basis)	Ingredients of the Concentrate Mix			Natural Grass Hay	MSL
	Maize	Wheat Bran	Noug Seed Cake		
Dry matter	93.3	93.6	93.9	95.6	94.4
Organic matter	98.1	88.5	90.1	94.0	88.0
Crude protein	6.50	16.3	25.0	5.10	29.5
Ether extract	9.60	5.42	11.5	2.86	5.90
NDF	10.0	36.5	32.5	61.2	17.8
ADF	4.90	17.5	21.5	25.7	16.5

MSL: air-dried *Moringa stenopetala* leaf meal; NDF: neutral detergent fiber; ADF: acid detergent fiber; DM: Dry matter.

3.2. Nutrient Contents of the Experimental Treatments

The results from the Table 2 indicate that the CP content was highest in T4 diet supplemented with 220 g/head/day MSL and lowest in non-supplemented control diet (T1). The DM content of the feed was similar across the treatments while the organic matter (OM) and ether extract (EE) content was lowest in the control (T1) and the highest values were observed in the goats supplemented with 220 g/head/day MSL diet (T4) while the reverse was true for ash, acid detergent fiber (ADF), and NDF contents.

Table 2. The average proximate compositions (%) of treatment diets composed of natural grass hay, concentrate supplemented with different levels of air-dried *Moringa stenopetala* leaf.

Treatments	DM	Ash	OM	CP	EE	NDF	ADF
T1	92.3	6.20	88.0	16.0	5.7	69.3	56.1
T2	92.7	7.10	92.0	16.7	6.10	45.5	38.3
T3	93.6	8.01	92.9	17.2	8.70	36.5	23.8
T4	94.8	8.03	93.8	18.7	9.50	33.6	22.5

DM, dray matter; OM, organic matter; CP, crude protein; EE, ether extract; NDF, neutral detergent fiber; ADF, acid detergent fiber; T1, no supplementation; T2, 120 g/head/day supplementation with air-dried *Moringa stenopetala* leaf; T3, 170 g/head/day supplementation with air-dried *Moringa stenopetala* leaf; T4, 220 g/head/day supplementation with air-dried *Moringa stenopetala* leaf.

3.3. Nutrient Intakes

As presented in Table 3, goats reared in T3 and T4 diets had ($p < 0.01$) higher intakes of CP, DM, OM, NDF, and ADF for natural grass hay than those fed with T1 and T2. For concentrate/MSL mixtures, the highest and lowest DM, OM, and CP intakes were observed in goats reared in T4 and T1, respectively. Conversely, the NDF and ADF intakes for concentrate/MSL was highest in goats reared in the control diet (T1), but lowest in those fed with the T3 diet. The total intakes of DM, OM, and CP were ($p < 0.001$) higher in goats fed with T4 than those reared in other treatment diets. These parameters were also ($p < 0.001$) higher in goats reared in T3 than those in T2 and T1 diets and goats fed with T2 had significantly higher DM, OM, and CP intakes than those of T1. On the other hand, goats reared in the control diet (T1) had ($p < 0.001$) higher ADF intake than those supplemented with different levels of MSL. The goats fed with T2 diet had ($p < 0.001$) higher NDF intake than other treatments.

3.4. Body Weight Change and Feed Conversion Efficiency

While there were no significant differences between the supplemented groups at the beginning of the experiment, significant differences in body weight were recorded across the different treatment diets at the later stages of the experiment (Table 4). Accordingly, the non-supplemented goats (T1) had the lowest final body weight while those reared on T4 supplementation had the highest. Goats supplemented with T3 and T4 diets had significantly higher values for the final body weight, total and daily weight gain than those reared in T1 and T2 diets. The values also indicated that there was no significant difference between those receiving T3 and T4 supplemented diets. Moreover, growth parameters of goats reared in T1 did not differ from those of T2, indicating two distinctly truncated categories.

As shown in Table 4, the feed intake values were ($p < 0.001$) higher in goats supplemented with increasing levels of MSL (T3 and T4) than those of the non-supplemented (T1) and less supplemented (T2) groups. No significant differences were noted between goats supplemented with T3 and T4 levels and those fed with the T1 and T2 diets. The FCR value was lower in goats reared in T3 and T4, ($p < 0.05$) than those fed with T1 and T2 diets. However, FCR was similar ($p > 0.05$) between goats reared in T1 and T2 diets; and between those in T3 and T4 diets.

Table 3. The effects of hay supplemented with different levels of air-dried *Moringa stenopetala* leaf on nutrient intakes of Arsi-Bale goats.

Parameters (g/head/day)	T1	T2	T3	T4	SE	P
Hay intake						
Dry matter	291 ^{b}	272 ^{b}	372 ^{a}	404 ^{a}	22.3	**
Organic matter	287 ^{b}	268 ^{b}	366 ^{a}	397 ^{a}	21.9	**
Crude protein	15.5 ^{b}	14.7 ^{b}	19.8 ^{a}	21.3 ^{a}	1.21	**
NDF	187 ^{b}	174 ^{b}	239 ^{a}	259 ^{a}	14.3	**
ADF	78.3 ^{b}	73.3 ^{b}	100 ^{a}	108 ^{a}	6.00	**
Supplemental intake						
Dry matter	281 ^{d}	321 ^{c}	370 ^{b}	420 ^{a}	3.73	***
Organic matter	267 ^{d}	319 ^{c}	367 ^{b}	417 ^{a}	3.64	***
Crude protein	48.7 ^{d}	57.8 ^{c}	68.0 ^{b}	83.2 ^{a}	0.689	***
NDF	211 ^{a}	158 ^{b}	144 ^{d}	150 ^{c}	1.604	***
ADF	170 ^{a}	133 ^{b}	94.5 ^{d}	100 ^{c}	1.	***
Total intake						
Dry matter	572 ^{c}	594 ^{c}	742 ^{b}	825 ^{a}	23.7	***
Organic matter	544 ^{c}	587 ^{c}	733 ^{b}	814 ^{a}	23.4	***
Crude protein	64.3 ^{d}	72.4 ^{c}	87.8 ^{b}	105 ^{a}	1.55	***
NDF	397 ^{a}	332 ^{b}	383 ^{a}	408 ^{a}	14.9	**
ADF	249 ^{a}	206 ^{b}	194 ^{b}	208 ^{b}	6.355	***

^{a,b,c,d} Means within the same row with different superscript letters are significantly different ($p < 0.05$); ** $p < 0.01$; *** $p < 0.001$; SE: standard error of the mean; NDF: neural detergent fiber; ADF: acid detergent fiber; T1: no supplementation; T2: 120 g/head/day supplementation with air-dried *Moringa stenopetala* leaf; T3: 170 g/head/day supplementation with air-dried *Moringa stenopetala* leaf; T4: 220 g/head/day supplementation with air-dried *Moringa stenopetala* leaf.

Table 4. The effects of supplementation of different levels of air-dried *Moringa stenopetala* leaf on feed intake and growth performances of Arsi-Bale goats.

Growth Performance	T1	T2	T3	T4	SE	P
Initial body weight (kg/head)	13.5	13.8	13.6	13.7	0.481	NS
Final body weight (kg/head)	15.8 ^{b}	16.3 ^{b}	18.2 ^{a}	18.5 ^{a}	0.544	**
Total weight gain (kg/head)	2.27 ^{b}	2.44 ^{b}	4.65 ^{a}	4.80 ^{a}	0.439	***
Average daily gain (g/head)	54.0 ^{b}	58.1 ^{b}	111 ^{a}	114 ^{a}	10.4	***
Average daily feed intake (g/head)	609 ^{b}	632 ^{b}	785 ^{a}	841 ^{a}	24.8	***
FCR (g feed/g gain)	12.6 ^{a}	11.5 ^{a}	7.69 ^{b}	7.41 ^{b}	1.49	*

^{a,b} Means within the same row with different superscript letters are significantly different ($p < 0.05$); * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; SE = standard error of the mean; FCR: feed conversion ratio; NS: Not significantly different ($p > 0.05$); T1: no supplementation; T2: 120 g/head/day supplementation with air-dried *Moringa stenopetala* leaf; T3: 170 g/head/day supplementation with air-dried *Moringa stenopetala* leaf; T4: 220 g/head/day supplementation with air-dried *Moringa stenopetala* leaf.

4. Discussion

4.1. Nutrient Composition of M. stenopetala and Experimental Feed

The CP values of MSL as assessed in the current study are similar to those reported by [7,8,10,13]. The CP values are also similar to the findings of [18] for *M. oleifera* leaves and [10] for *M. stenopetala* leaf meal. However, the CP content in *M. stenopetala* and *M. oleifera* leaves as reported by [19,20] are lower than those obtained from the present study while high values were reported by [9], which may be attributed to the maturity stage of leaves as the young leaves usually have higher protein values than the older ones. The CP content in the Moringa leaves in the present study indicated that they can be considered good protein supplements to low quality forages in the smallholder livestock production system. The EE values in the present study are similar to those reported by [21,22] for the leaves of *M. stenopetala* and *M. oleifera*, respectively. However, lower EE values were reported by [8] for *M. stenopetala* leaf. This could be due to differences in Moringa species, maturity stage of leaves, and type of soils in which the plans were grown.

The contents of NDF and ADF in MSL in the present study are comparable to the observations of [8] for the same Moringa species; but were higher than those of *M. oleifera* leaf meal reported by [22,23] The ash content in MSL as observed in this study is similar to the observations of [8,19] for *M. stenopetala* leaves. The ash content was also similar to those reported by [10,24] for *M. oleifera* leaves. However, the ash content of MSL in the present study was higher than those reported by [7,21,25]; and lower than those of [22] for *M. oleifera* leaves. Similarly, [18,26] have reported high contents of ash (14.1% and 14.8%, respectively) in the leaves of *M. oleifera.*

The comparatively high NDF and ADF contents of the natural grass hay in the present study indicate that it is of a poor nutritional quality and is not adequate to support maintenance requirements of goats as the CP content is well below the minimum level (7%) required for the microbial function [27]. The CP, DM, and OM contents of the hay used in the current study were consistent with the reports of [28]. The CP, NDF, and ADF values for wheat bran and Noug seed cake were found to be similar to those reported by [29]. The average contents of DM and ADF in Noug seed cake were comparable with the reports of [30]. However, the values for CP and ash in Noug seed cake reported by [30] were lower than observed in the present findings which might be due to the maturity stage of the Noug seed and type of soil in which the plants were grown. The CP, EE, and NDF values of wheat bran as assessed in the current study were comparable with the observations of [31].

4.2. Nutrient Intake

Feed intake is an important parameter in determining the nutritive value of animal's feed as it account for nutrient supply. In the present study, there is significant difference in intakes of DM, OM and CP and these parameters increased with increasing supplementations level of MSL which is consistent with the findings of [11]. Sánchez [11] observed increased intake in cows supplemented with *M. oleifera* leaves to a basal diet of grass hay. Similar results have also been reported by [12] and [32] who found that supplementation of sheep with *M. stenopetala* fed with a basal diet of grass hay improved intake of DM, OM, and CP. The increased DM, OM, and CP intake with increasing levels of *M. stenopetala* supplementation may possibly be due to the lower fiber and higher CP contents of the leaves thereby enhancing the palatability of the feed. This could lead to an increase in microbial population and efficiency, thereby facilitating the rate of breakdown of the digesta which eventually leads to increment in feed intake. The low total nutrient intakes observed in non-supplemented goats might be due to the low level of CP in the hay.

4.3. Body Weight and Gain

There was improvement in final body weight, total weight gain, average daily weight gain, and feed conversion efficiency in the treatment groups with high levels of MSL supplementations (T3 and T4). The findings are consistent to those of [5] and [12] who reported increased body weight values in sheep receiving supplement containing *M. stenopetala* leaf meals. Studies by [33] also indicated linear increase in body weight of sheep supplemented with *Gliricdia sepium* leaf meal when fed a basal diet of elephant grass and Rhodes grass.

The average daily weight gain as were observed among the goats reared on T3 and T4 diets were in the range of values reported by [34] in sheep fed on a basal diet of Rhodes grass hay and those of [35] where the *M. oleifera* leaf was used as a supplementary feed for goats. The average daily weight gains are also in accordance with the reports of [36], who supplemented *M. oleifera* leaf meal to goats. Increment in body weight was also reported in goats fed with cassava leaf meal as compared to those reared on grass hay alone [37].

The difference in feed conversion ratios among the treatment groups are comparable with the observations of [38], who reported significantly higher values of efficiency in rabbits fed with *M. oleifera* leaf meal than those of the control diet. In this study, goats supplemented with high levels of MSL (170 and 220 g/day and goat) consumed less feed but gain more weight as compared to those reared in the control and less supplemented (120 g/head/day) groups. This implies that due to the year round availability and easy access of *M. stenopetala* tree by smallholder farmers, the leaf can be used as a very useful protein supplement to small ruminants, particularly during the dry season, where most of local feed resources become scarce.

5. Conclusions

The supplementation of *Moringa stenopetala leaf* to natural grass hay has considerably improved the nutrient intake and body weight gain of Aris-Bale goats as compared to those of the non-supplemented goats. Therefore, supplementation of low quality feed resources such as natural grass hay with Moringa leaves is a viable option for improving the productivity of local goats under smallholder farmer conditions where conventional protein supplements are beyond the reach of local farmers.

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Author Contributions

The first author prepared the research proposal and solicited fund. He together with the third author closely monitored and supervised the second author who has been mainly involved in data collection and organization as a part of his Master thesis. Moreover, the first author analyzed the data using appropriate statistical packages and prepared the manuscript. The forth and third authors assisted the first author during the preparation of the research proposal.

Conflicts of Interest

The authors declare no conflict of interest.

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