

Farmer's Preference and Effect of Feeding Selected Local Forages with Concentrate on the Dry Matter Intake and Weight Gain Performance of Bonga Sheep under Alarigeta Farmer's Management

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Abstract

A study was conducted at Alarigeta kebele which is located in southwestern Ethiopia of Kaffa Zone, Adiyo woreda. In an effort to address feed problem, this study was carried out with the objective of identifying farmers preference of local forages for sheep and evaluating the effect of feeding selected local forages on the dry matter intake and weight gain performance of Bonga sheep reared under farmers management. Group discussion was conducted to listing and ranking of the preferred plant species was done through a questionnaire that was administered through a reconnaissance survey. Thirty intact male yearling sheep were divided in to six groups of five sheep based on their initial body weight in randomized complete block design (RCBD). Treatments were consist of six different local forages selected by farmers in study area; T1 (*Convolvulus kilimandschari* Engl.), T2 (*Commelina benghalensis* L.), T3 (*Basella alba* L.), T4 (*Brugmansia suaveolens* Bercht.), T5 (*Bothriocline schimperii* Olivo) and T6 (*Triumfetta tomentosa* Boj.). A daily dry matter intake of T3 (4301 g/day) and T (4400 g/day) are significantly higher ($P<0.05$) than other groups. The greatest body weight of sheep was recorded in T3 (9.6 kg) and T4 (9.4kg) as compared to other treatment groups ($P<0.05$).

Keywords: Bonga sheep, Dry matter intake, local forage *Convolvulus kilimandschari* Engl, *Commelina benghalensis* L, *Basella alba* L, *Brugmansia suaveolens* Bercht, *Bothriocline schimperii* Olivo, *Triumfetta tomentosa* Boj

1. Introduction

Feed shortage is among the prominent setbacks of the livestock sector in Ethiopia resulting in a low contribution of the sector for the nationwide gross domestic product which is in contrary to the large population of livestock species in the country. The major feed resources in the country are crop residues and natural pasture with agro-industrial manufactured feeds contributing much less [1]. The highland areas of the nation which have dominantly crop-livestock production systems are recognized to be under stress because of shrinking cultivated areas per household, land degradation and reduced feed availability [2]

Though increased utilization of agro-industrial by-products has been reported [3], they are not available, affordable or feasible for most of the farmers in the highlands of Ethiopia. Specifically to study area, since the bulk of the population is depends on relief for subsistence of life supplementary feeding to animals is either very costly or unavailable. Consequently it is imperative to search for low cost and alternative feed resources for the poor farmers of the area.

Exotic fodder species are increasingly being used to overcome shortage of fodder, however local forage species have advantages over exotic spp, which can fit with the existing farming system and are well adapted with the environment and with the economic realities of farmers, are best candidates for so. The main features of such plants as a feed resource is their high crude protein content (CP). Previous studies have shown that a range of 5% to 20% CP was recorded for the browse species in tropical countries [4, 5 & 6]. Current works in Ethiopia have also reported a range of CP content of local forages between 9.7% and 24.5% [7, 8 & 9].

South western Ethiopia is well known in origin of coffee in the world and huge number of localplants.Thus it is crucial to ameliorate the severe feed shortage of the area through efficient utilization of local forage by supporting the local feed utilization knowledge of the local farmers with scientific research outputs. This research was done to investigate the farmer's preference and nutritional qualities of majorlocal foragein the area which will serve as a launch pad for future propagation and utilization.

Objective

- To study the effect of locally available local feeds on weight gain of Bonga sheep in farmers management
- To demonstrate and promote cost-benefit, short term and market oriented fattening strategies

2. Methodology

2.1 Location of study

The experiment was conducted in south western Ethiopia, Kaffa Zone Alarigeta. Alarigeta kebele is located in Adiyo wereda 28 Km from Bonga town. Adiyo wereda has huge potential in sheep production.

2.2 Group Discussion

The listing and ranking of the preferred plant species was done through a questionnaire that was administered through a reconnaissance survey. The questionnaire was administered to households that were selected through a systematic sampling method in Alarigeta Bonga sheep improvement cooperative members. The respondents were asked to mention the most important cattle feed materials in the study area while the ranking was done through the pair wise ranking method [10].

Farmers (Alarigeta sheep cooperative members) will be informed about low-cost, short-term & market-oriented fattening research project. According to willingness to practice fattening, thirty farmers for thirty sheep will be selected. According to previous laboratory result and group discussion, top six local feeds will be selected

2.3 Feeding Trial

Experimental animal and management

Thirty intact male local lambs (yearlings, age less than two years) was selected from Alarigeta cooperative to conduct a feeding experiment. The sheep were ejected from breeding ram selection from Alarigeta cooperative. Selection criteria's of sheep are; general alertness, active feeding, rumination, no visible wound mouth, visible sign of disease. The age of the animal was subjectively determined by looking at their record. The sheep was quarantined for 21 days and during quarantine period, all sheep were dewormed using Albendazol against internal parasites, and vaccinated for pasteurellosis and anthrax with 1ml ovine pasteurellosis vaccine and 0.5 ml anthrax vaccine per sheep, respectively.

Feed preparation and feeding

Six outstanding local forages were selected by previous study and farmer's preference. They were harvested, dried and stored under shed to keep the quality, chopped to approximately a size of 2-3 cm and used as basal diet or control diet throughout the experimental period. Commercial mineral mix was fed 50 g/day/animal based on the recommended level set by manufacturer. Wheat bran (WB) and Peanut (PN) were purchased and mixed at a ratio of 40% PN: 60% WB offered at 300g DM/head/day. The concentrate was mixed in a way that the CP content of mixture is on average 18 % CP on dry matter basis for the fulfillment of protein requirement of growing sheep with body weight of 15-20 kg. Individual feed troughs for natural pasture hay and mineral supplements as well as water troughs were provided separately for each experimental animal

2.4 Experimental Design and Treatments

Randomized complete block design (RCBD) with six treatments consisting of six sheep per treatment were used to conduct the experiment. After 21 days of quarantine period, the experimental lambs were blocked in to four treatment groups based on initial body weight. Treatments were composed of six local forage and commercial mineral mix (50g/ day/head).

Table 1. Treatment feed (local forage selected by farmers preference)

| Treatment | Treatment feed(local forage selected by farmers preference) | Concentrate mix(50g/day/head) |
|-----------|---|-------------------------------|
| T1 | Convolvulus kilimandschari Engl. | CM |
| T2 | Commelina benghalensis L. | CM |
| T3 | Basella alba L. | CM |
| T4 | Brugmansia suaveolens Bercht. | CM |
| T5 | Bothriocline schimperi Olivo | CM |
| T6 | Triumfetta tomentosa Boj. | CM |

2.5 Measurements

Dry matter intake

Following the quarantine period, and after an acclimatization period of 15 days to the experimental pens and diets, the feeding trail was conducted for 90 days. Feeds were offered at 08:00 hours and 16:00 hours into equal portion and water offered free choice. Daily feed offered to the experimental animals and the corresponding refusal of every animal were measured and recorded during the experimental period. Both basal and supplement diets were offered separately and intake were determined by the difference between the amount of feed given and refused every day (24 hours). Samples were taken from batches of feed offered and orts, thoroughly mixed and sub-sampled (10%) for dry matter analysis. The sub-samples were kept frozen (-20 °C) until analyses.

Body weight change and feed conversion efficiency

Initial body weights of each animal were determined by taking mean of two consecutive day's weight after overnight fasting. Body weights of animal were measured during the feeding period of 90 days at ten days interval after overnight fasting. Body weight measurements were taken using spring balance. The weight was recorded for each sheep against its identification number on a weight register book. A body weight change was determined as a difference between the final and initial body weight. Average daily body gain was calculated as

the difference between the final and initial body weight of the sheep divided by the number of feeding days. Body weight gain and average daily body weight gain was calculated as follows:

$$\text{Weight gain} = \text{Final body weights} - \text{Initial body weights}$$

$$\text{Average daily body gain (ADG)} = \frac{\text{Final body weights} - \text{Initial body weights}}{\text{Number of feeding days}}$$

2.6 Statistical Analysis

Data collected was analysed using the frequency and descriptive tools of the Statistical Package for Social Sciences (SPSS) version 20 (SPSS 2013) and weighted using the Likert scale weighting procedures [11].

A two way analysis of variance (ANOVA) was followed for the experimental (feeding trial) data using SAS 2008 version 9.2. The ANOVA procedure followed randomized block design (RCBD). The treatment means were separated by least significant difference (LSD). Mean differences were considered significant when $P \leq 0.05$, whereas $0.05 < P < 0.10$ was considered to show a statistical tendency for difference. The appropriate model used for data analysis was depicted here under:

$$Y_{ij} = \mu + T_i + B_j + e_{ij}$$

Where: Y_{ij} = response variable

μ = overall mean

T_i = treatment effect

B_j = block effect

e_{ij} = random error

3. Result and Discussion

3.1 Farmers performance of local forages

Table 2 shows local forage selected in terms of productivity, adaptation and high nutritive value. According to farmers these local forages have high nutritive value, productivity, adaptability, tolerance and palatability. They used these forages for a long period of time for fattening, milk production and calf growth.

Table 2. Outstanding local forages selected by farmers in Alarigeta

| No. | Local Name (<i>Kafenono</i>) | Family Name | Botanical Name |
|-----|-----------------------------------|----------------|---|
| 1 | <i>Yimbiro</i> | Asteraceae | <i>Bothrioclineschimperii</i> Olivo |
| 2 | <i>Nallexo</i> | Commelinaceae | <i>Commelina benghalensis</i> L. |
| 3 | <i>Nophoo</i> | Solanaceae | <i>Brugmansia suaveolens</i> Bercht |
| 4 | <i>Mogne Abeba</i> | Tiliaceae | <i>Triumfetta tomentosa</i> Boj. |
| 5 | <i>Yamesho</i> | Basellaceae | <i>Basella alba</i> L. |
| 6 | <i>Mogecco</i> | Convolvulaceae | <i>Convolvulus kilimandschari</i> Engl. |

3.2 Dry Matter Intake

A trend of daily dry matter intake during the feeding period is presented in Table 3. As depicted in the table, intake of T3 (4301 g/day) and T4 (4400 g/day) are significantly higher ($P < 0.05$) than other groups. This might be associated with increment in body weight and associated increase in intake to satisfy nutrient requirement of the animal. Farmers in the study area also say that, *Nophoo* and *Mogne Abeba* are highly palatable to animals. According to Table 3, statistically there is no significant difference ($P > 0.05$) between T1 (3954), T2 (3954) and T6 (4000), but higher than ($P < 0.05$) T5 (3110).

Table 3. Daily dry matter intake of Bonga sheep fed local forages with concentrate mix

| Intake(g/d) | Treatments, Mean | | | | | SEM | Sig | |
|-------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|----|
| | T1 | T2 | T3 | T4 | T5 | | | |
| CM DM | 300 | 300 | 300 | 300 | 300 | 300 | - | ns |
| LF DM | 3654 ^b | 3900 ^b | 4301 ^a | 4400 ^a | 2810 ^c | 3700 ^b | 0.83 | ** |
| Total DM | 3954 ^b | 4200 ^b | 4621 ^a | 4715 ^a | 3110 ^c | 4000 ^b | 0.12 | ** |

^{a,b,c,d} means within a row bearing a common superscript are significantly different; ns= non-significant/ $P > 0.05$; **= $P < 0.05$; SEM= standard error of mean, DM=dry matter, CM=concentrate mix, LF=Local forage

3.3 Weight gain performance

Live weight gain (g/day) of sheep during the experiment period are presented in Table 3. The greatest body weight of sheep was recorded in T3(9.6 kg) and T4 (9.4kg) as compared to other treatment groups ($P < 0.05$). This could be due to well-balanced mixture of nutrient and palatability of *Basella alba* L. and *Triumfetta tomentosa* Boj Brecht.

Table 4. Body weight parameters of Bonga sheep fed local forages with concentrate mix.

| Parameters | Treatments, MeanSEM | | | | | | Sig | |
|------------|---------------------|-------------------|--------------------|--------------------|-------------------|-------------------|-------|----|
| | T1 | T2 | T3 | T4 | T5 | T6 | | |
| IBW (Kg) | 32.8 | 33.4 | 33.2 | 32.1 | 31.8 | 32.8 | 0.16 | ns |
| FBW (Kg) | 40.6 ^b | 40.8 ^b | 42.8 ^a | 41.5 ^a | 38.4 ^c | 40.7 ^b | 0.330 | ** |
| BWG (Kg) | 7.8 ^b | 7.2 ^b | 9.6 ^a | 9.4 ^a | 6.6 ^c | 7.9 ^b | 0.120 | ** |
| ADG (g/d) | 86 ^b | 80 ^b | 106.6 ^a | 104.4 ^a | 73.4 ^c | 87.7 ^b | 1.160 | ** |

^{a,b,c,d} means within a row bearing a common superscript are significantly different; ns= non-significant/ $P>0.05$; **= $P<0.05$; BWC=body weight change; ADG=average daily weight gain; FBW=final body weight; IBW=initial body weight; Sig=Significance level; SEM=standard error of mean;

4. Conclusion and Recommendation

- The finding of this investigation has shown that farmers prefer local forages according to their palatability and effect on weight gain of animals. Provided that the appropriate entry point is identified, the species investigated can be utilized to ameliorate the ever-increasing feed shortage of the area.
- The dry matter intake and live weight gain of animal which feed T3 (*Basell aalba L.*) and T4 (*Triumfetta tomentosa Boj.*) significantly higher than other groups.
- However their future utilization and management needs some complementary and additional investigations on digestibility, agronomic attributes and carcass evaluation should be conducted

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