Effects of Supplementation with Vechilla Pod Tortil, Noug Cake, Wheat Bran and Their Mixture on Feed Intake, Growth and Economic Feasibility (Borana Bucks Fed A Basal Diet of Rhodes Grass Hay)

Sisay Kumsa¹, Tamirat Tasemma², Dereje Teshoma³ & Bikila Nagesa⁴

¹Sisay Kumsa, ²Tamirat Tasemma, ³Dereje Teshoma & ⁴Bikila Nagesa
Oromia Agricultural Research Institute, Yabello Pastoral and Dryland Agriculture Research Center Borana, Ethiopia

Abstract: This study was carried out at Yabello Pastoral and Dryland Agriculture Research Center using 36 male yearling Borana goats with average body weight of 16.91+0.11 kg (Mean ± SD) to evaluate the growth performance, feed intake and economic feasibility of Borana bucks. The study consisted of 14 days of adaptation period to their respective treatment diet for 90 days. All yearling bucks were stratified in to six groups according to their initial body weight in randomized complete block design and assigned to the dietary treatments randomly. The experimental diets composed of T1(250g Noug cake +250g Wheat bran), T2 (150g of wheat bran +150g noug cake +250g Vechilla tortils pod), T3(150g Vechilla tortils pod +275g Noug cake), T4(250g Vechilla tortils pod + 200g noug cake), T5 (250g Vechilla tortils pod+250g wheat bran), and T6 (free browsing). All Experimental animals consume basal diet of Rhodes grass as basal diet. Data on feed offered were taken on daily basis whereas, body weight change measurement was taken every ten days interval. Hay intake was higher in T1,T5,T3,T4 and T2 among the supplemented animals respectively. High dry matter intake was obtained in T1,T5,T2,T3 and T4 than control. Dietary treatments had significantly (P<0.01) influenced the average daily body weight gain of bucks. Bucks in T2 (93 g/d) and T3(85g/d) had shown comparable daily weight gain and higher than T4 and T5 and also free browsing. However, (T1) shows highest average daily weight gain (103.51±37.98g/day) and lowest observed in free browsing T6, (-27.94±7.54g/day). Supplementation of Vechilla tortils pods with different level of concentrates, increased growth rate and showed high profit compared to unsupplemented groups. DM intake (% BW basis) and metabolic body weight(g/kgW⁰.⁷⁰) significant among the treatment diet. Partial budget analysis has shown that T1 is the most profitable ration followed by T2>T3>T5>T4. Experimental T1 and T2 had optimum marginal rate of return than the rest treatments. Generally, supplementation of bucks during feed scarce period is found very crucial to preserve animals in good body condition, increase the demand of market and economically viable, especially in pastoral and agro-pastoral areas where vechilla tortil pods available.

Keywords: Adaptation, Noug cake, Dry matter, Supplementation & Vechilla tortils pod.
1. INTRODUCTION

In Ethiopia, sheep and goat forms an important economic, social and cultural function and represent an important component of the mixed farming systems in highland and extensive pastoral and agro-pastoral production systems of lowlands. Their contribution for income generation, food supply and financial security for the rural population is crucial. Geographic proximity of Ethiopia to high sheep and goat meat importing countries of the middle east countries gives relative advantage in exploiting the organic meat demanding markets. Thus, the high demand for Ethiopian sheep and goat meat in these regions is one of the most important factors encouraging the development of sheep and goats production industry in Ethiopia (Yibra, 2003). Feed and water scarcity in quality and quantity are among noted production constraints along the value chain (Kassahun et al., 1991). Feed production covers requirements only in exceptional good years, the deficit reaching 35% in normal years and 70% in bad years (FAO, 2005).

Inadequate nutrition for livestock is the main constraint contributing to the low animal production in tropical countries. Most natural pastures are generally low in nitrogen (N) and digestible nutrients. This means that unlikely to meet nutritional requirements of livestock in developing countries. Feed resource originated from agro-industrial by-products includes those providing of easily fermentable energy and protein and by products of cereal milling which both are source of protein and energy. Agro-industrial considered valuable livestock feeds and are potential supplement to animals during feed problem (Shapiro et al., 2004). Agro-industrial by-products such as nough cake meal and wheat bran are available for potential utilization as animal feedstuff in some localities and serve as protein rich diet (Ensiumenger, 2002). However, conventional supplements such oil seed cakes and animal by-product meals are rarely used because they are expensive and not readily available.

The wide spread traditional use of browse as a source of feed during the dry season is important to maintain seasonal and yearly stability of livestock production in range area. Grasses grow very fast during the wet season with quick flowering followed by rapid decline in quality by the start of the dry season. Many browse plants are in full leaf and remain the only green vegetation. Developing feeding packages that support the existing traditional production and the emerging private producers and exporter is the timely intervention to increase production and productivity in order to meet the demand for meat and live animal export market (Asfaw et al., 2011). Acacia pod tortil in Borana range land is very abundant. So mixing locally available feed resource with concentrate at different ration will support feed shortage during dry season. Therefore, this study was design to evaluate the effect of local and conventional feed supplement on growth performance and economic feasibility of different feed option under semi-intensive feeding systems.

2. MATERIALS AND METHODS

2.1 Study Area Description

The experiment was conducted at Yabello Pastoral and Dry land Agriculture Research Center (YPDARC) which is located at 564 km from Addis Ababa in Southern Borena Zone of Oromia Regional State. Yabello is located at 1350-1800 meter above sea level (m.a.s.l.) and it is located between latitude 4°30’55.81″ and 5° 24’36.39″ N and longitude 7° 44’14.70″ and 38° 36’05.35″ E. The district covers a total area of 5426 km². Generally, the altitude of the Borena rangelands is within the range of 1000–1500 m above sea level (m.a.s.l) with few hills up to 2000 m.a.s.l (Coppock 1994).

2.2 Experimental Animals and Their Treatments

Thirty six yearling Borana bucks were purchased from local market. The age of bucks were determined by dentition estimation. The bucks were de-wormed and disinfected for internal and external parasites using broad spectrum anthelmintic (albendazol and ivermectin) before the study commencement. The animals were maintained at Yabello Pastoral and Dryland Agriculture Research Center and experimental observations made during dry season. Noug cake (Guizotia abyssinica) and wheat bran were purchased from near market. Seed pods of Vechilla tortilis that was collected during maturity stage (November to December) and sun dried for two to three days and stored properly. The randomized complete block design (RCBD) was used with six treatments and six replications.
2.3 Feed intake measurement
The experimental bucks were supplemental feed every morning. Clean water and minerals salt were offered as adlibitum. After 15 days of adaptation period, the actual experiment was commenced and bucks were weighed at 10 days interval at the same time of the day (8:00 AM) before feeding from the start to till the end of the experimental period. Average daily weight changes of experimental bucks were determined as the difference between final and initial body weight of bucks divided by number of experimental days on feed. The amounts of supplements offered were fixed to supply 65 g CP per head per day after determining the CP content of experimental feed by expecting greater than 50 g average daily gain (Rhanjan, 2000)

Treatment layout
T1 = 250g Noug cake +250g Wheat bran + Rhodes grass adlibitum
T2= 150g of wheat bran +150g Noug cake +250g Vechilla tortils pod + Rhodes grass adlibitum
T3= 150g Vechilla tortils pod +275g Noug cake + Rhodes grass adlibitum
T4= 250g Vechilla tortils pod + 200g Noug cake + Rhodes grass adlibitum
T5 = 250g Vechilla tortils pod + 250g Wheat bran + Rhodes grass adlibitum
T6 = Free browsing

2.4 Chemical Analysis
Chemical analysis of the experimental diets were conducted at HARC National Animal Nutrition Laboratory. Samples of feeds dried in an oven at 65ºC for 72 hours and ground to pass through 1 mm sieve screen size. The ground samples were kept in air-tight plastic bags and pending for chemical analysis. Dry matter (DM), Nitrogen content (N), Organic Matter (OM) and Ash were analyzed according to AOAC (2005) procedure. Crude protein was estimated by multiplying N value by a factor of 6.25 as N*6.25. Neutral detergent fiber (NDF), Acid detergent fiber (ADF) and Acid detergent lignin (ADL) were analyzed using the procedures of Van Soest et al. (1991).

2.5. Methods of Data Analysis
Data were statistically analyzed with SAS (2003) using the general linear model (GLM) procedures according to the following model:

\[ Y_{ij} = \mu + T_i + e_{ij} \]

Where \( \mu \) = general mean,
\( T_i \) = effect of treatment, \( e_{ij} \) = experimental error.

3.6. Economic Analysis
The partial budget analysis was calculated according to Upton (1979) to determine the economic advantage of supplementing the local feeds and concentrate mixture under semi intensive feeding system which was based on the variable cost of the experiment, like feed, labor and veterinary service which was common for all treatments. Costs of concentrate mixture composed of noug cake and wheat bran were determined at their market prices during the experiment. On the other side, purchasing price of bucks were determined by assessing local market price before purchasing and whereas, the selling prices of bucks were determined by multipling one kg price of goat at the market. The difference between purchasing and selling price of bucks were taken as total return (TR) in the analysis. Hence the net income (NI), the change in net income (ΔNI) and the marginal rate of return (MRR) were calculated as follows accordingly

\[ NI = TR - TVC \]
\[ \Delta NI = \Delta GR - \Delta TVC \]
\[ MRR\% = \frac{\Delta NI}{\Delta TVC} \]

Where, \( NI \) = net income, \( TR = \) Total return, \( TVC = \) Total variable cost, \( \Delta NI = \) change in net income, \( \Delta GR = \) change in gross return, \( \Delta TVC = \) change in total variable cost, \( MRR = \) marginal rate of return.
4. RESULT AND DISCUSSION

4.1. Chemical composition of feed experiments

The chemical compositions of the treatment feeds are given in Table 1. In the current experiment, the DM content of feed supplements was 91.95%. The crude protein content of noug seed cake in the current study is lower than the crude protein reported by McDonald (2002), but similar with crude protein reported by Seyoum (1995) which is 23.9 and 26.8, respectively. However, it was lower than the result reported by Bhuyane et al. (1996) and Temesgen (1995) with values of 41.02 and 44.5%, respectively. The Variation might be due to the effect of processing factory and the quality of the seed used in the factory. The relatively lower the CP content of noug cake in the present study could be due to the partial dehulling during the process of oil extraction. The NDF and ADF contents of noug cake were 49 and 42 DM % basis respectively. The crude protein contents of wheat bran in this study were similar with the values of 16.5, 16.41%, 16.82% reported by Solomon (2004), Awet (2007), and Tesfaye (2007), respectively. Crude protein content of Vechilla tortil pods of the current study agreed with the values of 17.78% reported by Aster et al. (2012). The value of ADF and NDF of the current study was higher than the value of 15.47 and 21.76% DM reported by Aster et al. (2012), respectively. A CP content of 70 g/kg DM in the feed was indicated by NRC (1981) as the minimum level for microbial growth and roughage intake.

Table 1. Nutritional composition of local and conventional feed supplement (on a %DM basis)

<table>
<thead>
<tr>
<th>Feed type</th>
<th>DM</th>
<th>OM</th>
<th>CP</th>
<th>NDF</th>
<th>ADF</th>
<th>Ligni</th>
<th>DOMD</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTP</td>
<td>91.95</td>
<td>93.86</td>
<td>15.6</td>
<td>39.62</td>
<td>33.36</td>
<td>7.12</td>
<td>58.24</td>
<td>6.14</td>
</tr>
<tr>
<td>NC</td>
<td>92.33</td>
<td>91.16</td>
<td>25.6</td>
<td>49.13</td>
<td>42.06</td>
<td>7.10</td>
<td>65.43</td>
<td>8.84</td>
</tr>
<tr>
<td>WB</td>
<td>90.13</td>
<td>95.07</td>
<td>17.01</td>
<td>48.62</td>
<td>16.2</td>
<td>3.78</td>
<td>71.91</td>
<td>4.93</td>
</tr>
</tbody>
</table>


4.2. Growth Performance (Live weight change)

The body weight parameters of the experimental bucks fed the different treatment are presented in table 2. The supplemented treatments had higher (P<0.001) final body weight and average daily weight gain as compared to the control. Among the supplemented bucks, bucks in T1, had recorded highest final body weight. There was no significance difference between treatment T2 and T3 as compared to T5 but had higher (P<0.001) daily body weight gain goat in T4. This could be attributed to the better dry matter and crude protein intake in these treatments. The highest mean daily body weight gain (103.51 g/d) was recorded in T1. Different proportions of local to concentrate mixes supplementation resulted in differences in mean daily body gain. This indicates the importance of manipulating the ratio of local and conventional ingredients for a better animal performance.

The present experiment indicated that mixing Vechilla tortil pods with wheat bran and noug cake supplementation promoted better (P<0.001) mean daily body weight gain as compared to control. A research conducted to investigate the effect of supplementation on growth rate and efficiency of post weaning native goats showed that animals supplemented with concentrates comprising 69% wheat bran, 30% noug cake and 1% salt had gained more weight (71.89 g/day) compared with non supplemented ones (51.2 g/day) (Abule et al., 1998). Moreover, both mixtures of wheat bran and with noug cake tended to improve (P<0.001) mean daily weight gain of bucks compared to Vechilla tortil pods mixed with wheat bran and noug cake supplementation mixture. This might be due to the higher crude protein and energy content of concentrate. Similar finding to the present study was reported by Getenet (1998) in which Somali does supplemented with a mixture of peanut cake and wheat bran with higher proportion of peanut cake in the supplements mixture resulted higher in mean daily body weight gains than does supplemented only with wheat bran. In the current study, it was observed that mixing local available feed with concentrate satisfactory change of body weight.

Ngwa and Tawah (2002) reported that sheep fed a basal diet of rice straw and supplemented with either 300 g of groundnut haulms or 45 g of cotton seed cake or 210 g of chopped cow pea vines per animal per day, gained 48.93 g, 52.14 g and 49.29 g, respectively, it was lower than the mean daily BW gain of supplemented treatments in the current study except control. The authors also reported that the
control treatment (rice straw alone) showed mean daily BW gain of 20 g, which was very high compared to the current finding which is 27g/day. Goats fed on browsing alone lost weight throughout the experimental period due to low intakes of Dry matter and Crude protein which agree with Simret (2005). The current study revealed that feeding of animal without any supplementation during dry season cannot meet the maintenance requirements of goats. This might be due to low CP, high cell wall content of the natural pasture and slow digestion rate. Generally, dry period supplementation can be considered as a strategic way to maximize profit in dry period at which economic loss is a common phenomenon due to body weight reduction and death of particular goats associated with feed shortage.

Table 2. Initial weight, final weight and average daily gain of Borana bucks supplemented with varied levels of Vechilla tortil pod (n=36)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Initial Live Weight (kg)</th>
<th>Final live Weight (kg)</th>
<th>ADG (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>17.25</td>
<td>23.46&lt;sup&gt;a&lt;/sup&gt;</td>
<td>103.51&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>T2</td>
<td>16.00</td>
<td>21.62&lt;sup&gt;b&lt;/sup&gt;</td>
<td>93.63&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>T3</td>
<td>16.3</td>
<td>21.47&lt;sup&gt;b&lt;/sup&gt;</td>
<td>85.38&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>T4</td>
<td>17.67</td>
<td>21.45&lt;sup&gt;b&lt;/sup&gt;</td>
<td>63.06&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>T5</td>
<td>17.08</td>
<td>21.99&lt;sup&gt;b&lt;/sup&gt;</td>
<td>81.72&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>T6</td>
<td>17.16</td>
<td>15.49&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-27.94&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>SD</td>
<td>0.11</td>
<td>0.45</td>
<td>7.54</td>
</tr>
</tbody>
</table>

<sup>a</sup>T = Treatment diet, ADG = average daily weight gain of days

4.3 Dry matter intake

Dry matter and nutrient intake of Borana bucks fed rhodes grass hay supplemented with the locally available feed and concentrate mixture is presented in table 4. Bucks in T3 and T5 had shown similar (P>0.05) intake of basal hay and significantly higher (P<0.05) than bucks in T4 and T2 but lower than T1. The relatively higher intake of basal hay in T1, T3 and T5 as compared to the other treatment groups might be associated to the other treatment based on voluntary feed intakes of animals. However, the basal hay intake reported by Jalel (2013) and Mekonnen et al. (2016) for the same sheep breed was within the range of 591.9-698 gm and 465-615 gm respectively, which is higher than values obtained in the current study. This difference could be possibly resulted due to provision of supplements based on their body weight to all treatment groups and species of experimental animals.

Table 3: Dry matter intake of Borana bucks fed rhodes grass hay and supplemented with Vechilla tortil pods and conventional mixture.

<table>
<thead>
<tr>
<th>Intake (g/day)</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hay intake (g/day)</td>
<td></td>
</tr>
<tr>
<td>VTP (g/day)</td>
<td></td>
</tr>
<tr>
<td>Concentrate mixture (g/day)</td>
<td></td>
</tr>
<tr>
<td>Total DM Intake (g/day)</td>
<td></td>
</tr>
<tr>
<td>DM intake (% BW basis)</td>
<td></td>
</tr>
<tr>
<td>DM intake (g/kgW&lt;sup&gt;0.75&lt;/sup&gt;)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intake (g/day)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
<th>SL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hay intake (g/day)</td>
<td>393.91&lt;sup&gt;a&lt;/sup&gt;</td>
<td>256.03&lt;sup&gt;d&lt;/sup&gt;</td>
<td>358.57&lt;sup&gt;b&lt;/sup&gt;</td>
<td>329.9&lt;sup&gt;c&lt;/sup&gt;</td>
<td>347.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-</td>
<td>**</td>
</tr>
<tr>
<td>VTP (g/day)</td>
<td>-</td>
<td>250&lt;sup&gt;a&lt;/sup&gt;</td>
<td>150&lt;sup&gt;d&lt;/sup&gt;</td>
<td>250.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>250&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>**</td>
</tr>
<tr>
<td>Concentrate mixture (g/day)</td>
<td>411.20&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>275&lt;sup&gt;b&lt;/sup&gt;</td>
<td>200&lt;sup&gt;b&lt;/sup&gt;</td>
<td>250&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-</td>
<td>***</td>
</tr>
<tr>
<td>Total DM Intake (g/day)</td>
<td>893.91&lt;sup&gt;a&lt;/sup&gt;</td>
<td>806.03&lt;sup&gt;c&lt;/sup&gt;</td>
<td>783.57&lt;sup&gt;d&lt;/sup&gt;</td>
<td>779.94&lt;sup&gt;d&lt;/sup&gt;</td>
<td>847&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-</td>
<td>**</td>
</tr>
<tr>
<td>DM intake (% BW basis)</td>
<td>3.85&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.8&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.65&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.45&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>**</td>
</tr>
<tr>
<td>DM intake (g/kgW&lt;sup&gt;0.75&lt;/sup&gt;)</td>
<td>83.86&lt;sup&gt;a&lt;/sup&gt;</td>
<td>80.39&lt;sup&gt;b&lt;/sup&gt;</td>
<td>78.56&lt;sup&gt;c&lt;/sup&gt;</td>
<td>78.25&lt;sup&gt;c&lt;/sup&gt;</td>
<td>83.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>**</td>
</tr>
</tbody>
</table>

<sup>a,b,c,d</sup> Means within a row with different superscripts differ significantly (P < 0.01), ** = (P < 0.01), *** = (P < 0.001), DM= Dry Matter, BW= body weight, SL: significance level, VTP= Vechilla tortil pod

There were significant (P<0.001) differences in supplemental DM intake among the treatments. Concentrate supplement was consumed more by bucks in T1. This due to ration formulation to compare the value of concentrate alone with concentrate mixture with Vechilla pod tortil. Bucks in T1 supplemented with concentrate diets consumed more total DM (P<0.05) as compared to those bucks in T3, T5 and T4. However, the total DM intake of bucks in T1 had significant difference (P>0.05) from
bucks in T3 and T4 supplemented with concentrate. This might be attributed to the relatively higher basal hay intake of bucks in T1 and T3 than T5 and T4 and T2 respectively. Bucks fed concentrate mixture diets in T1 had lower value of ADF and Ash intake as compared to the rest treatment groups fed with the Vechilla. The likely reason for this difference could relate to the lower content of ADF and Ash in WB and NSC compared to the content of the Vechilla.

4.4 Partial Budget Analysis
The partial budget analysis for the feeding trial is given in Table 4. The current study realized that the economic return of the feeding trial mainly depends on feed cost, purchasing, selling price of the experimental goats and other variable cost. The control treatment had the lowest net return (7.11ETB) compared to supplemented animals which was in the range of 87-168ETB. The highest net return was obtained in T1 (168 ETB) and followed by T2 (133 ETB). The highest change in total variable cost (ΔTVC) was recorded in T4 (81 ETB). T1 supplementation resulted in good daily BW weight gain (103.13 g/d), ΔNR (160.68) and highest MRR (2.08), and also it had highest net return (168ETB) compared to the other supplemented treatments. T2 supplementation in a proportion of T2 had more satisfactory daily weight gain (93.63 g/d), optimum NR (140 ETB), ΔNR (133.6) and optimum MRR (1.81) compared to the other supplemented treatments. Among the supplemented treatment, all treatment except the control all indicate satisfactory result.

Table 3: Economic analyses of Borana bucks supplemented with Vechilla tortils pod with concentrate mixture Rhodes grass as basal diet.

<table>
<thead>
<tr>
<th>Items</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing Price (Buck/ETHB)</td>
<td>422</td>
<td>400</td>
<td>409</td>
<td>441</td>
<td>427</td>
<td>429</td>
</tr>
<tr>
<td>Total feed cost (buck/ETHB)</td>
<td>77.35</td>
<td>76.35</td>
<td>72</td>
<td>81.25</td>
<td>77.35</td>
<td>-</td>
</tr>
<tr>
<td>Total non-feed cost (ETHB)</td>
<td>13</td>
<td>10.38</td>
<td>15.5</td>
<td>13.13</td>
<td>14.14</td>
<td>13.14</td>
</tr>
<tr>
<td>Total variable cost (buck/ETHB)</td>
<td>90.56</td>
<td>86.73</td>
<td>87.50</td>
<td>94.38</td>
<td>91.39</td>
<td>13.14</td>
</tr>
<tr>
<td>Gross income (buck/ETHB)</td>
<td>680.35</td>
<td>627.00</td>
<td>622.65</td>
<td>622.05</td>
<td>637.75</td>
<td>449.25</td>
</tr>
<tr>
<td>Total return</td>
<td>258.35</td>
<td>227.00</td>
<td>213.65</td>
<td>181.05</td>
<td>210.75</td>
<td>20.25</td>
</tr>
<tr>
<td>NR (ETHB/head)</td>
<td>168</td>
<td>140</td>
<td>126</td>
<td>87</td>
<td>119</td>
<td>7.11</td>
</tr>
<tr>
<td>ΔNR (EB/head)</td>
<td>161</td>
<td>133</td>
<td>119</td>
<td>79</td>
<td>112</td>
<td>-</td>
</tr>
<tr>
<td>ΔTVC</td>
<td>77.42</td>
<td>73.59</td>
<td>74.36</td>
<td>81.24</td>
<td>78.25</td>
<td>-</td>
</tr>
<tr>
<td>MRR (%)</td>
<td>2.08</td>
<td>1.81</td>
<td>1.60</td>
<td>0.98</td>
<td>1.43</td>
<td>-</td>
</tr>
</tbody>
</table>

T1 = 250g Noug cake +250g Wheat bran, T2 = 150g of wheat bran +150g Noug cake +250g Vechilla tortils pod, T3 = 150g Vechilla tortils pod +275g Noug cake, T4 = 250g Vechilla tortils pod +200g Noug cake, T5 = 250g Vechilla tortilis pod + 250g Wheat bran and, T6 =control groups ETHB = Ethiopian Birr, ΔNR = Net return, ΔNRC = Net return over control and MRR = Marginal rate of return

The control treatment resulted in weight body loss, as a result had net return very low. Therefore, supplementation under semi-intensive based feeding system during dry season with local feed resources and agro-industrial by-products that have reasonable cost in optimum quantity per head/day in order to maximize net return.

5. Conclusion
The study comprised of days growth trial on intact Borana bucks with similar body weight were used for the study in randomized completely blocked design. Based on their initial all bucks were blocked in to six groups each containing six bucks. Experimental bucks were have free access to clean water, allowed ad-libitum intake of Rhodes grass hay. Supplemental feed offered was adjusted following regular weight measurement taken every ten (10) days interval.

The present study revealed that, basal hay intake was higher for bucks in T1,T5,T3,T4 and T2 respectively. The higher basal hay intake of bucks in T1 could be most probably an attempt to satisfy nutrient requirement by consuming more of less nutritious feeds. However, comparable total DM intake value was recorded (P>0.05) among bucks in T3 and T5, but had higher (P<0.05) value than bucks in
T2 and T4. On the other hand, total DM intake with respect to percent BW (%BW) and metabolic (g/kg\textsuperscript{0.75}) basis was significantly (P<0.05) affected by treatment diets.

Bucks fed diets in T1 had scored the higher FBW, BW change and ADG as compared to bucks in the remaining treatments. However, those bucks found in T2 and T3 had almost similar (P>0.05) value in their FBW, BW change and ADG considered, but was lower in these attributes than bucks allocated to consume diets in T4.

Based on biological performance result, bucks fed treatment indicated balanced response and were better than bucks fed unsupplemented. However, partial budget analysis result revealed that, bucks in T1 exhibited higher net return as compared to those bucks in unsupplement. Therefore, it can be concluded that supplementation of concentrate with local feed resources results their body weight results more profit and could be used as an alternative feed supplement for low quality roughage in feeding Borana bucks.

6. Recommendation

Based on above result pastoralists use any combination of feed experiment from treatment (T1-T5). According to its prority based on partial budget analysis T1,T2,T3 T5 and T4 were recommended for any users.

7. Acknowledgements

The team wishes to thank the Oromia Agricultural Research Institute (IQQO) and Yabello Pastoral and Dryland Agriculture Research Center for the financial support. The cooperation by Meat Technology Research Team during the data collection is highly appreciated.

8. Reference


Food and Agricultural Organization (FAO) and International Livestock Research Institute (ILRI), 2005. Farmers, their Animals and the Environment


Kathio,R.J.Umunna,N.N.Nsahlai,I.V.Tamminga S. and Van Bruchem J,Van.and Hanson,J.1998.Effect of feeding graded levels of leucaena leucocephala,leucaena pallid a ,sesbania sesanb and Chamaectomyus palmensis supplements to teff straw given to Ethiopia Highland sheep Animal Feed Science and Technology.72:355-366


Simret Betsha, 2005. Supplementation of graded levels of peanut cake and wheat bran mixture on nutrient utilization and carcass parameters of Somali goats. An MSc Thesis Presented to School of Graduate Studies of Alemaya University. pp. 30-32


Zambrut Journal, Link Access; https://zambrut.com
https://zambrut.com/effects-supplementation/

© Copyright International Journal of Zambrut | Zambrut, Inc.