PIGEONPEA AS FORAGE FOR GOATS
Roseminda R. Sair, Corazon Diana A. Pastor, Benito B. Balneg and Rodel Bañez

ABSTRACT

A study comparing the growth performance of goats fed with napier grass with and without pigeonpea supplementation was conducted at Brgy. San Pedro, Batac City, Ilocos Norte. The performance of ten upgraded goats was evaluated using the body weight gain, feed consumption, crude protein intake, and feed conversion efficiency. In addition, financial benefit of using pigeonpea as forage supplement was also determined.

The pigeonpea variety used was ICPL 7035 with dry matter yield of 175g/plant for nine months. The results showed that pigeonpea supplementation improved body weight gain by 1.07 kg, enhanced total feed consumption by 9.46 kg and decreased the amount of feed to produce a kg gain in weight by 3.98 kg. However, the improvements were statistically insignificant.

Based on the results, pigeonpea is a good forage supplement because it significantly (P > 0.01) increased the daily crude protein intake of goats by 29 g and gave a financial benefit of Php 97.00 per goat.

INTRODUCTION

Goat is a good source of meat and milk. The caprito is prepared as kilawen while caldereta for chevon which were served as specialty food for every occasion. Goat also subsists in a variety of roughages, requires low initial investment and has shorter gestation period. Most of the goat population (98.3 percent of 3.69 million heads as of January 1, 2014) was being raised by the backyard raisers (http://www.bas.gov.ph).

The traditional ways of raising goats are by grazing and tethering in vacant lots and along the road. These practices resulted to low productivity due to inadequate feed and nutrients intake. Planting and utilization of leguminous forages like pigeonpea will not only provides supplemental feed but also the protein needed for growth and development. In other countries, pigeonpea is well known as an excellent forage feed for livestock. The leaves, tender shoots, flowers and pod seeds contain high levels of protein and minerals which make the animals grow rapidly. Thus, feeding trial was conducted to compare the growth performance of goats fed ration with and without pigeonpea supplementation. Specifically, it aimed to compare the feed consumption, crude protein intake, gain in weight and feed conversion efficiency of goats fed ration with and without pigeonpea supplementation and to determine the financial benefit of pigeonpea supplementation in raising goats.
REVIEW OF LITERATURE

Goat Production

Goats and sheep are more compatible to farming system of smallhold farmers because it requires low initial investment and less amount of feeds, highly fertile, good source of meat and milk and supplemental source of income. Data from http://www.bas.gov.ph shows that as January 1, 2014, 98.3 percent of 3.69 million heads goat population was in the hands of backyard raisers and only 1.7 percent was on the commercial scale. In addition, Ilocos region is included in the the top five goat producing regions together with Western Visayas, Central Visayas, Davao Region, and Central Luzon (http://www.bas.gov.ph).

The breeds of goats that are adapted to the Philippine conditions are Philippine native, upgrades, Anglo-Nubian, Boer, and Toggenburg (The 2003 Goat Farming Committee). The Philippine native goat are small, stocky, with red, white or black color or combinations and with mature weight of 20 kg. Upgrade goats have a mature weight of 30 kg. Anglo-Nubian goats have pendulous ears with a mature weight of 75 kg, black, gray, cream, white shade of tan reddish-brown facial stripes. Boer has prominent horn with a mature weight of 80 kg, reddish-brown head and neck with white body and legs. Toggenburg has short and erect pointed forward ears with light fawn to dark chocolate with distinct white markings; two white stripes down the muzzle; fairly white from knees downward and hind legs, and with 60 kg mature weight.

The 2003 Goat Farming Committee cited that based on the data from the Small Ruminant Center-Central Luzon State University, the upgraded goats raised in complete confinement have a birth weight of 3.16 kg, 10.33kg weaning weight, 18 kg weight at eight months, 1.5 kidding rate per year, 8 months kidding interval, 1.5 kid size, and 5% and 3% pre and post weaning mortality respectively. The daily dry matter (DM), total digestible nutrient (TDN), crude protein (CP), calcium (Ca) and phosphorus (P) requirements of goats weighing 10 to 20 kg ranges from 0.32-0.62 kg, 0.16-0.46 kg, 25-70 g, 0.9-2.4 g and 0.7-2.1 g (PHILSAN, 2010).

The annual average farm gate price of live goat increased by 4.74 percent or from Php 101.91 per kilogram in 2012 to P106.74 per kilogram in 2013. The highest average farm gate price in 2013 at P110.78 per kilogram was registered in the month of December. It was 5.27 percent higher than the price in the same period in 2012. On the other hand, the lowest farm gate price was noted during the month of February at Php 104.67 per kilogram but was 3.94 percent higher than the 2012 level (http://www.bas.gov.ph).

Pigeonpea Production

*Description.* Pigeonpea is taxonomically known as *Cajanus cajan* L. It is chiefly grown in India where it is probably originated (Olalekan and Bosede, 2010). It is a perennial legume shrub that lives around one to five years. It is grown annually, reaching a height of about 1-4 meters. It is woody near the base. The leaves are comprised of three leaflets. They are pubescent and green on the upper side and silvery grayish-green having long hairs on the lower side. The leaflets can be either elliptic or lanceolate in shape. They are normally 2.5 cm to 10 cm long and almost 3.5 cm wide. The flower blossoms are yellow in color having red or reddish-brown lines. Sometimes the flowers may have a red lining on the outer edge. They are
The flowers have a diameter ranging between 1.2 cm and 1.7 cm. The seeds vary greatly in their color. They may be white, cream-yellow, brown or almost black soil (http://www.onlyfoods.net/pigeon-peas.html). The pods are flat, acuminate, pubescent, 5–9 cm long, 12–13 mm wide, containing 2–9 oval to round seeds varying in colour from light beige to dark brown, 16,000–18,000 seeds/kg (http://www.tropicalforages.info/key/Forages/Media/Html/Cajanus_cajan.htm). The seeds can be squarish, globose or ellipsoid. Pigeon pea has taproots which are tetrarch, thin and grows deep under the ground, reaching to a depth of six feet. The deep roots help in improving infiltration of water into the soil (http://www.onlyfoods.net/pigeon-peas.html).

**Cultivation.** Pigeonpea plants are propagated by planting the seeds in the ground at a distance of 3 to 4 inches. The ideal planting months are June and July. Pigeonpeas grow well on all types of soils ranging from fine textured to coarse and infertile soils but needs free-drainage (http://www.onlyfoods.net/pigeon-peas.html). It grows well even on semiarid lands because of their deep roots. It prefers 5.0-7.0 soil pH. It is a very drought tolerant plant able to grow with a dry season exceeding 6 months, and rainfall of <300 mm, but grows best with an annual rainfall of 600–1,000 mm. It requires a day lengths of 12.5 h for flowering and seed production. Short varieties of pigeon peas flowered at 60 days after planting while the taller woody species flowered at 180–250 days after planting (http://www.tropicalforages.info/index.htm). Although it is a nitrogen fixing plant, 20-25 kg N per ha is recommended. It grows well in phosphorus rich soil. The applications of 17-26 kg P per ha increased the seed yield by 300-600 kg/ha (http://www.tropicalforages.info/index.htm).

**Uses.** Pigeonpeas are a nutritious, high-protein pulse crop. Its seeds are utilized as dried, canned and fresh vegetables. It is also used as medicinal plant for curing blood disorders, anemia, diarrhea, dysentery, jaundice, fevers, colic, leprosy, convulsions, flu diabetes, hepatitis, yellow fever, strokes, urinary infections and menstrual disorders (http://www.onlyfoods.net/pigeon-peas.html). It is a nitrogen fixing plant producing approximately 40 kg nitrogen per hectare (http://www.arc.agric.za/arc-iic/Pages/Pigeon-Pea.aspx). However when used as green manure, it produces about 2.5 tons/acre of dry matter and generates 50 lbs nitrogen per ton of dry matter (http://www.onlyfoods.net/pigeon-peas.html).

Pigeonpea plants are also utilized as fodder for large and small ruminants. The pods, seeds and leaves are excellent fodder for cattle in the form of hay and silage. If cut for hay when the pods are well developed, it should be cut successively higher. Grazing may damage the plants (http://www.fao.org/ag/aga/agap/frg/afris/default.htm). However according to http://www.tropicalforages.info/index.htm, pigeonpea has lasted up to 5 years under good grazing management. Foliage regeneration is moderate when the pigeon pea plants are younger but becomes poorer as the plants become woody nearer the end of their life. It cannot tolerate frequent, severe cutting, or heavy defoliation as with continuous grazing, although regrowth occurs even when coppiced as low as 15 cm. Similarly according http://www.onlyfoods.net/pigeon-peas.html it is intolerant to continuous grazing and should first be allowed to grow properly and reach maturity before grazing be done.

As a forage shrub, pigeon pea can be interplanted with grasses. Tall late flowering varieties are commonly grown as a food grain crop intercropped with sorghum or millet in the semi-arid tropics. It has grown well with *Chloris gayana* and been planted into pangola grass (*Digitaria eriantha*) pastures. When used in
intercropping systems, the deep root system competes less with associated crops than some other legumes (http://www.tropicalforages.info/index.htm). It is used as a wind breaker/shade crop for young coffee plants and forest seedlings. It also acts as a cover crop or support crop for vanilla. Water and nutrients from deep within the soil can be caught by its deep taproot and brought to the surface. It can be planted along contour barriers for erosion control (www.echonet.org).

The woody parts of the plants can be used as firewood (www.echonet.org). The stems and branches are used for preparing baskets (http://www.onlyfoods.net/pigeon-peas.html).

Cruz et al. (2012) evaluated the agronomic characteristics and yield of four varieties of pigeonpea namely: ICPL 87119, ICPL 13092, ICPL 7035 and ICPL 20092. They found out that ICPL 7035 had the highest survival rate of 49% and produced the highest herbage yield of 32.9 tons or a dry matter yield of 8.38 tons/ha.

**Feeding Value of Pigeonpea**

Pigeonpea leaves contain 10-15% crude protein (http://www.tropicalforages.info/index.htm). On dry matter basis, *Leucaena*, *Gliricidia* and pigeonpea contain high levels of protein (22-23%) and phosphorus (0.12-0.20%) and 20-30% crude fiber which make it a suitable feed not only for ruminants (cattle, buffaloes, sheep and goats) but also to non-ruminants (pig, rabbits and poultry) and make them grow rapidly (http://www.fao.org/docrep/006/T1975E/T1975E03.htm). Study in India showed that older leaves have higher nutritional value to sheep than young foliage. In addition, palatability increases with age of the plant and no toxicity has been reported (http://www.tropicalforages.info/index.htm). The fodder yield obtained in semi-arid conditions in Africa is 2t/ha. However, the DM yields of 25-40 t/ha can be obtained under optimal conditions with the applications of 100 kg N/ha (http://www.tropicalforages.info/index.htm).

Cruz et al. (2012) reported that napier grass and pigeonpea contain 20.15% and 24.75% dry matter; 6.70% and 24.35% crude protein; 66.45% and 61.48% nitrogen-free extract; 42.64% and 32.98% hemicellulose, 23.81% and 28.5% ADF; 10.21% and 8.70% acid detergent fiber; 10.21% and 8.70% acid detergent soluble; and 6.70% and 55% ash respectively.

Initial results indicate that 20 to 25 percent is the optimum level of inclusion of tropical legumes in grass hay-based diets (http://www.reeis.usda.gov/web/crisprojectpages/0212773-improving-ruminant-performance-by-feeding-tropical-legumes-with-condensed-tannins.html). Karachi, M. and M. Zengo (1997) reported that in two dry and two wet seasons forage of pigeonpea, *Leucaena* and *sesbania* were fed to growing goats as supplements to natural grazing over a two year period. The supplemented goats gained live-weights faster (P < 0.05) than the control animals. Intakes of pigeon pea (63.1 to 91.4 g/head/day) and *Leucaena* (52.6 to 93.8 g/head/day) were consistently higher (P < 0.05) than that of *Sesbania* (49.7 to 83.4 g/head/day) and this was reflected in liveweight gains in both wet and dry season. Liveweight gains ranged from 25.5 to 43.2, 16.7 to 37.5, 14.4 to 28.3 and 6.7 to 21.6 g/head/day for goats supplemented with pigeon pea, *Leucaena*, *Sesbania* and the control animals respectively. Preliminary cost-benefit analysis of the results indicate that such interventions are
likely to be economically attractive and the responses provide a basis for improvement of goat production in the Tabora agro-pastoral systems.

In Brazil, cattle on pigeon pea pasture gained 0.7–1.25 kg/day at carrying capacity of 1–3.75 cattle/ha with liveweight gains of 200–500 kg/ha/yr (http://www.tropicalforages.info/index.htm).

Based on feeding trial conducted by Cruz et al. (2012), higher gain in weight and lower feed cost were obtained from goats fed with 25% pigeonpea than those fed with 25% ipil-ipil leaves. Whereas, goats fed with 50% pigeonpea had slightly higher gain in weight but it is relatively small to compensate for the added cost of feeding.

**Conceptual Framework**

Based on the above literatures pigeonpea is a potential forage supplement for animals. The leaves contain high amount of crude protein (24.35%) which is the most limiting nutrient in the ration of small ruminants like goats and sheep. It is also drought resistant.

The paradigm of the study is presented in figure 1. The independent variables are ration with and without pigeonpea supplementation specifically 100% napier grass (control) and 75% napier grass and 25% pigeon pea. The performance of the animals and financial benefit was the dependent variables. The performance of the animals was measured in terms of body weight gain, feed consumption and feed conversion efficiency. These parameters might be affected by the palatability of the ration and the amount of nutrients present in plant material. The cost of supplementation might be affected by the price of feeds given to the animals.

**Intervening Variable**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Palatability</th>
<th>Crude protein content</th>
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<tr>
<td>Treatment Ration</td>
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<tr>
<td>100% Napier Grass</td>
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<tr>
<td>75% Napier Grass + 25% Pigeonpea</td>
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<table>
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<tr>
<td>Feed Consumption</td>
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<td>Feed Efficiency</td>
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<tr>
<td>Financial Benefit</td>
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Price of feed materials
Figure 1. The paradigm of the study

Hypotheses of the Study

In this study, the following hypotheses were tested:

a. That pigeonpea supplementation significantly enhance the feed consumption and crude protein intake of goats.
b. That pigeonpea supplementation significantly improve the growth rate and feed conversion efficiency of goats.
c. That supplementation of pigeonpea is financially beneficial in raising goats.

METHODOLOGY

Locale of the study

The study was conducted at the farm of Mr. Florendo Pitpit in San Pedro, Batac City (Plate 1). He is raising more than 50 goats composed of native, Anglo Nubian, Boer and upgrades. The goats are confined in an elevated housing and fed with napier grass and other farm by-products available in the farm (Plate 2). Sometimes when weeds are abundant, he allowed the goats to graze the surrounding area.

Plate 1. The research cooperator, Mr Florendo Pitpit at the center
Plate 2. The elevated goat housing used by the cooperator

**Planting of Feed Resources**

*Napier grass*. The napier grass cuttings were planted in an upland area previously planted with corn. No land preparation was done. The cuttings were planted at a distance of 0.70 m x 0.30 m (Plate 3).

Plate 3. The napier grass planted near the goats house

*Pigeonpea*. The area was plowed and harrowed to loosen the soil into small particles and furrows were prepared at a distance 0.60 m. The pigeonpea seeds were planted on the top portion in between the two furrows with one seed per hill at a distance of 0.50 m per hill by direct seeding at a depth of 5 cm (Plate 4). The plants were allowed to establish for three months.
Plate 4. The pigeonpea seedlings at 8 days after planting

Preparation of Experimental Pens for feeding trial

The existing house was divided into small pens using bamboo and hog wire (Plate 5). The partition was also placed on the feeding trough for goats supplemented with pigeonpea to measure the intake of the animals (Plate 6).

Plate 5. Preparation of feeding stall

Plate 6. The feeding trough for goat supplemented with pigeonpea

Research Design and Treatments

The experimental animals were grouped based on their breed, sex and age. The animals used were approximately 4-5 months old. They were randomly
distributed to two experimental diets using randomized complete block design. The treatments used were 100% napier grass and 75% napier + 25% pigeonpea. The selected animals were dewormed prior the conduct of preliminary trial.

**Feeding Management**

A seven-day preliminary feeding trial was done to accustom the animals to their experimental ration. The treatment rations were gradually introduced to the goats. Clean and fresh drinking water was provided at all times. The expected daily dry matter intake of forages was computed as 3% of the body weight. Twelve percent allowance was added to the computed amount of fresh forages.

The forages were harvested daily from the established pastures and then chopped into 5 cm long before feeding to the animals. The napier grass and pigeonpea were offered separately to the animals twice a day. Feed refusal were collected and weighed daily to determine the exact amount of feed consumed by the animals. The feed and refusal samples were air-dried for 7 -10 days in order to determine dry matter intake of the animals.

The goats were also given 100g/hd/day of concentrates containing rice bran (52%), copra meal (46%), limestone (1%) and salt (1%). The concentrates was offered to the goats before offering the forages.

**Data Gathering Procedure**

The initial and final weight of the animals was taken at the start and end of 120-day feeding trial respectively (Plate 7) using the table balance. The total gain in weight was computed as the difference between the final and initial weight. The average daily gain in weight was computed as total gain divided by the number of feeding days.

The daily feed intake was computed by getting the difference between the daily feed offered and daily refusal. Total feed consumption was the summation of the daily feed intake and converted to dry matter basis using the dry matter of napier grass, pigeonpea and concentrates. Feed efficiency was computed by getting the quotient of total feed consumption and the total gain in weight.

The financial benefit of pigeonpea supplementation was determined using partial budget analysis.
Data Analysis

The data gathered were summarized in table form and analysed using the analysis of variance for randomized complete block design using Excel.

RESULTS AND DISCUSSION

Pigeonpea Production

The pigeonpea variety used in the trial was ICPL 7035. This was the variety which performed best in the study conducted by CLSU. The seeds were planted at distance of 60 cm x 50 cm at a depth of 5 cm with a germination rate of 95%. The plants were allowed to establish for three months (Plate 8). A pigeonpea plant had a total dry matter yield of 175 g during the feeding trial without fertilization and irrigation. The total rainfall recorded from May to December 2013 was 2198.30 mm (PAGASA, MMSU). The computed dry matter yield was 5.8 tons per hectare for a period of 9 months which was higher than the yield obtained in semi-arid conditions in Africa of 2t/ha (http://www.tropicalforages.info/index.htm). It was also observed that cutting should be done above the growth points. Cutting below the growth points lead to death of the plant or a very poor regrowth. After the feeding trial, the plants were not cut and then it flowered and produced pods even with only 11.2 mm rainfall from January to March 2014 (PAGASA at MMSU). The study showed that ICPL 7035 which is a vegetable pigeonpea variety could be a dual purpose, feeds during wet months and for seed production during dry months (Plate 9).
Growth Performance of Goat Supplemented with Pigeonpea

The initial weight of upgraded goats used in the feeding trial ranges from 13.7 to 13.9 kg. Analysis of variance revealed that the goats had comparable weights at the start of the feeding trial. At the end of the 120-day feeding period, the performance of the experimental goats fed with napier grass alone and 75% napier grass + 25% pigeonpea are presented in Table 1. The data shows that goats supplemented with pigeonpea were heavier by 1.27 kg. However, analysis of variance revealed no significant difference. The total gain in weight and average daily gain weight of goats fed with napier alone were 2.7 kg and 22.5 g respectively. On the other hand, goats supplemented with pigeonpea had a total gain of 3.77 kg or 31.4 g average daily gain in weight. No significant difference was observed on the total and daily gain in weight. The average daily gain in weight of goats supplemented with pigeonpea was within the ranged of liveweight gain of 25.5 to 43.2 g/hd/day obtained by Karachi and Zengo (1997) for goats supplemented with pigeonpea compared to goats without supplementation with 6.7 to 21.6 g/hd/day for two seasons. The total voluntary dry matter intake of goats fed with pigeonpea supplementation (46.83 kg) was 9.46 kg higher than those fed with napier alone (37.37 kg). The data shows that supplementation of pigeonpea enhanced the voluntary dry matter intake although the difference was insignificant. The goats supplemented with pigeonpea consumed 57.33 kg of feeds for the entire duration of
feeding trial while those without supplementation consumed only 47.87 kg. However, no significant difference was observed although data showed that supplementation enhanced the feed consumption of goat. Similarly, no significant difference was observed on feed efficiency although un-supplemented goat required 4 kg more feeds to produce a kg gain in weight. In terms of crude protein intake, goats supplemented with pigeonpea had highly significant crude protein intake than those without supplementation. The results show that addition pigeonpea increased the crude protein intake by 29 g daily.

Table 1. Performance of goats fed napier grass with and without pigeonpea supplementation

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>NAPIER</th>
<th>NAPIER + PIGEONPEA</th>
<th>LEVEL OF SIGNIFICANCE</th>
<th>COEFFICIENT OF VARIATION (%)</th>
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<tr>
<td>Initial Weight, kg</td>
<td>13.70</td>
<td>13.90</td>
<td>Ns</td>
<td>2.36</td>
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<tr>
<td>Final Weight, kg</td>
<td>16.40</td>
<td>17.67</td>
<td>Ns</td>
<td>5.13</td>
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<td>Total Gain in Weight, kg</td>
<td>2.70</td>
<td>3.77</td>
<td>Ns</td>
<td>16.49</td>
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<tr>
<td>Average Daily Gain in Weight, g</td>
<td>22.50</td>
<td>31.40</td>
<td>Ns</td>
<td>18.82</td>
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<tr>
<td>Total Voluntary Dry Matter Intake, kg</td>
<td>37.37</td>
<td>46.83</td>
<td>Ns</td>
<td>8.65</td>
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<tr>
<td>Total Feed Consumption, kg</td>
<td>47.87</td>
<td>57.33</td>
<td>Ns</td>
<td>7.65</td>
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<tr>
<td>Feed Efficiency, kg feed/kg gain</td>
<td>19.73</td>
<td>15.78</td>
<td>Ns</td>
<td>10.63</td>
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<tr>
<td>Crude protein intake, g</td>
<td>37.86</td>
<td>66.67</td>
<td>**</td>
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</table>

Financial Benefit of Pigeonpea Supplementation

The financial benefit of feeding goats with pigeonpea supplementation is presented in Table 2. Goat supplemented with pigeonpea was 1.07 kg heavier than those without supplementation. The incremental benefit of Php 114.21 was obtained which was computed based on the annual average goat's farm gate price price of Php 106.74/kg liveweight in 2013 (http://www.bas.gov.ph). The incremental cost of feeding pigeonpea was Php 16.55. This was computed based on the production cost obtained by Cruz et al. (2012) on the first study of the project, i.e. Php 1.35/kg napier grass and Php 1.73/kg pigeon pea. The result showed that goat supplemented with 25% pigeonpea had a net benefit of Php of 96.91. This finding corroborates with report of Karachi and Zengo (1997) the pigeonpea supplementation is economically attractive for the improvement of goat production.
Table 2. The financial benefit of raising goats with pigeonpea supplementation.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>100% Napier grass</th>
<th>75% Napier grass + 25% Pigeonpea</th>
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<tr>
<td>Total Gain Weight, kg</td>
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<td>3.77</td>
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<tr>
<td>Advantage in weight, kg</td>
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<td>1.07</td>
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<td>Incremental benefit, Php</td>
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<td>114.21</td>
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<tr>
<td>Voluntary Dry Matter Intake, kg</td>
<td>37.37</td>
<td>46.80</td>
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<tr>
<td>Cost of napier, Php</td>
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<td>Cost of pigeonpea, Php</td>
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<td>Incremental Cost, Php</td>
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<td>17.30</td>
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<td>Net Incremental benefit, Php</td>
<td></td>
<td>96.91</td>
</tr>
</tbody>
</table>

The price per kg liveweight of goat [http://www.bas.gov.ph] – Php 106.74
The cost of producing a kg of napier grass (Cruz et al, 2012) – Php 1.35
The cost of producing a kg of pigeonpea (Cruz et al, 2012) – Php 1.73

SUMMARY, CONCLUSION AND RECOMMENDATION

The feeding trial on goats supplemented with pigeonpea was conducted at the Brgy. San Pedro, Batac City, Ilocos Norte from May to December, 2013. Ten upgraded goats were randomly distributed to ration with and without pigeonpea supplementation using the Randomized Complete Block Design. The study aimed to compare the feed consumption, body weight gain and feed conversion efficiency of goats with and without pigeonpea supplementation and to determine the financial benefit of raising goats with pigeonpea supplementation.

Summary of Findings

The following are the results of the study:

1. A germination rate of 95% was obtained from the directly seeded pigeonpea variety ICPL 7035.
2. The dry matter yield of ICPL 7035 was 175 g/plant with total computed dry matter yield of 5.8 tons/ha for a period of nine months.
3. The average final weight of goats supplemented with pigeonpea was 1.27 kg heavier than those without pigeonpea supplementation although the difference was insignificant;
4. The goats supplemented with pigeonpea had a total gain in weight of 3.77 kg and an average daily gain of 31.4 g while those without supplementation had 2.7 kg and 22.5 g respectively;
5. The goats supplemented with pigeonpea leaf meal had voluntary dry matter intake of 46.83 kg and with a total feed consumption of 57.33 kg while 37.37 kg and 47.87 kg respectively for those without supplementation.
6. The feed conversion efficiency of goats fed with supplementation was only 15.78 kg feed per kg gain while 19.75 kg feed per kg gain for those without supplementation.
7. Pigeonpea supplementation significantly increased intake of crude protein by 29 g per day.
8. The financial benefit of pigeonpea supplementation was Php 96.91.
Conclusion

Based on the findings of the study, pigeonpea supplementation is financially beneficial in raising goats and provided a significant increased in crude protein intake. However, the supplementation had no significant effect on body weight gain, total feed consumption and amount of feed to produce a kilogram gain in weight. Nevertheless pigeonpea variety ICPL 7035 is a good forage supplement for goats.

Recommendation

Based on the above conclusions the following recommendations are forwarded:

1. The utilization of pigeonpea as forage supplement should be disseminated to farmers planting pigeonpea and also raising goats.
2. The ICPL 7035 variety of pigeon pea should be utilized as forage supplements during wet months and used as vegetable for the production of pods and seeds during dry months.

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