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no data reported in the USDA Census (2012) on cowpea hay production; however from 0 g seed-

Cowpea residues of two varieties of Mississippi silver and pink eye purple hulls were harvested and dried before used for study. The residues from two varieties were mixed, chopped and moistened with 40% volume of water and 5% molasses solution. This mix was packed and ensiled for 30 days prior to use as silage treatment. Cowpea residues were sprayed with 40% volume water solution plus 5% molasses daily and were used as hay treatment. Both treatments were dressed with 100 grams of soybean meal to meet all the requirements for growth of young Angora goats. Eight Angora goats with average body weight of 21.6 kg (47.5 lbs) were randomly divided into two groups of four animals each and were assigned to one of the two treatment groups or hay group. Animals were fed these respective diets for 10 days followed by 5 days of total collection digestion trial. Feed offered, refusals and fecal output was monitored throughout the experiment. Table 3 represents the chemical composition of the cowpea residues hay and silage. Cowpea residues silage had higher protein content and lower fiber (neutral detergent fiber (NDF), hemicellulose and lignin). Silage is partially fermented forage and cowpea residues improved in nutritive quality by process of fermentation that was enhanced by molasses moisture. Fermentation has partially digested fiber and resulted in lower NDF in the final product.

Table 3. Chemical composition of the experimental diets

Intake and Digestion

Body weight, dry matter intake and apparent digestibility of the diets fed to goats in this study are presented in Table 4. Animals used were Angora goats. According to NRC 2007, the estimated dry matter intake of a 20 kg (44 lbs.) goat gaining 20 grams of body weight per day and producing 4 grams of mohair is 680 grams (1.5 lbs.) of dry matter, 450 grams (1 lb.) of total digestible nutrients and 65 grams of protein. According to Table 4, animals on silage diet consumed 605 grams (1.34 lb) of dry matter, slightly below the requirements. Considering dry matter digestibility of 54.2%, total digestible nutrients (328 grams) fall below the required amount of 450 grams per day. According to Table 3 and 4, silage contained 6.61% protein and provided approximately 40 grams (605 x 0.0661) of protein per animal per day and did not meet the requirements of the animals; however, all animals were supplemented with 50 grams of soybean meal (contains almost 50% CP on dry matter basis) to be supplied (40 + 50 = 90 grams) the 65 grams of required protein. Cowpea residue top sprayed with water and molasses solution had lower intake when compared to silage. Cowpea residues when fed as hay had also lower digestibility of dry matter and fiber for optimum goat production; however, when ensiled for 30 days with water (40%), and 5% molasses solution the quality was improved. Ensiling improved dry matter intake, dry matter and fiber digestibility of cowpea residues.

Table 4. Dry matter intake and apparent digestibility of experimental diets fed to goats

Items	Cowpea Residue	
	Silage ¹	Seed-harvested vines ²
Body Weight, kg	21.6	21.6 ^a
Dry Matter Intake, g	605	394 ^b
Digestibility (%)		
Dry Matter	54.2 ^a	37.5 ^b
Crude Protein (CP)	67.4 ^a	71.4 ^a
Neutral Detergent Fiber (NDF)	53.0 ^a	49.7 ^a
Acid Detergent Fiber (ADF)	49.7 ^a	34.1 ^b
Cellulose	52.6	42.7 ^b

Hemicellulose

68.8

79.2^a

DM = dry matter, CP = crude protein, ADF = Acid detergent fiber, NDF = Neutral detergent fiber.

Source: NRC, 2007.

Conclusion

Cowpea seed-harvested vines are foddered in the field after removal of peas. Although cowpea planted as hay is highly forage, its residues after harvest of peas have low protein content and dry matter digestibility when fed to goats. However, when these residues are moistened with water molasses and ensiled for 30 days, the product has slightly higher protein content, higher dry matter intake and digestibility because of improved fiber digestibility in the silage. Microbial fermentation in the silage increases fiber digestibility and therefore improves intake. Seed-harvested cowpea vines when harvested and dried are low quality forage and shouldn't be considered to sustain high producing animals. Cowpea vines should be used as a part of the forage portion of the diet when fed to goats.

References

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Publication No. 07-09