SHORT COMMUNICATION

IN SITU DRY MATTER DEGRADABILITY AT 30- AND 45-DAY CUTTING INTERVALS OF FIVE *Pennisetum* SPECIES IN DAIRY CATTLE

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ABSTRACT

Dry matter (DM) rumen degradability of Bana, Florida, Local Napier, Pakchong and Purple at 30- and 45-day cutting interval (CI) was determined using *in sacco* technique. Dry matter degradation curves at 30- and 45d CI follow the standard nonlinear degradation curve wherein the majority of the fractions disappear from the bag within 24h incubation. More than 50% of 30d grasses were degraded in 24h except for Bana. Degradation of 45d grasses was the same at 72h. Results show nutrient availability as indicated by high degradation in 30d grasses. Shorter CI for feeding calves and milking cows is recommended.

Key words: cattle, dairy research, *Pennisetum* species, rumen degradability

Sustainability is defined as meeting the demands of consumers with the availability of given resources (Vavra, 1996). In response to the developing ruminant industry, the number of cattle in the Philippines is estimated at 2.55 million heads (July 2018) in comparison to 2.54 million heads of the previous year (PSA, 2018). It was also projected that a 60% increase in demand for animal protein would surface due to the need of developing countries (Guyader *et al.*, 2016).

A key factor in any ruminant production system is to give importance to forage crops which are essential in meeting the nutritive needs of animals. The sustainability of animal production, particularly ruminant production, can be addressed through the development and utilization of applicable technologies and facilitating huge forage-based feed resources (Food and Fertilizer Technology Center, 2010).

One of the frequently fed forage to ruminants due to its high yielding characteristic and adaptability is Napier grass. *Pennisetum purpureum* is commonly found in tropical countries (FAO, 2015) and can either be grazed on, cut and carried, dried or ensiled. Several *Pennisetum* species used in feeding cattle in the Philippines include Bana (*P. purpureum* x *P. americanum*), Florida (*P. purpureum* x *P. glaucum*), Local Napier, Pakchong (*P. purpureum* x *P. glaucum*) and Purple (*P. polystachion*) grass. Differences among grass species may influence intake and animal performance thus, to test the feeding potential of the several *Pennisetum* species available, a highly successful and established method would be the

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in sacco incubation technique. This method, which measures the disappearance of the incubated sample, provides an estimate of the extent and rate of degradation of the sample. The advantages of this method include lessening the bias of microbial synthesis in relation to methods that takes this into account and considering the kinetics present in the rumen (Mehrez and Ørskov, 1977).

Rumen degradation studies on available feed materials are relevant in providing a basis for the formulation of the ration to be given to the animals – at optimum amount and in case of forages, optimum maturity without forgoing animal nutrition in expense. Further, degradation results on these species would be beneficial in addressing shortage on forage sources that in turn would contribute to the sustainability of the ruminant industry hence, the objective of this study is to determine the DM degradability pattern of Bana, Florida, Local Napier, Pakchong and Purple at 30- and 45- day cutting interval (CI) using the *in sacco* incubation technique.

Stem cuttings of five *Pennisetum* species were transplanted at 1x0.5m spacing into 4x5m plots laid out in a 4x2 factorial split-plot design with three replicates. The soil in the area is Adtuyon clay loam which is slightly acidic (pH 6.6) containing 3.63% organic matter and 0.25% total nitrogen. Available P, K, Ca and Mg were 43.70ppm, 0.40 me/100g soil, 6.60% and 2.23%, respectively. The experimental plots were set at Brgy. Dalwangan, Malaybalay, Bukidnon with a Type III climate. No fertilizer was applied during the experiment and replanting was done to replace dead plants. *Pennisetum* species were cut 180 d after planting for standardization prior to harvest at CI of 30- and 45-days.

Three hundred (300) g of composite samples per grass were prepared by drying, grinding and placing 3.50 g of each sample into 10x15cm digestion bags made from "Gina" cloth sewn with a double line technique using a polyester thread. Each bag was incubated in the rumen of three (3) cannulated dairy cows fed at 70:30 ratio of Napier grass and dairy concentrate (17% CP) for 7 days in a 3x3 Latin Square Design. Samples were incubated in duplicates for 3, 6, 12, 24, 48 and 72 h. After the 3 d incubation period, bags were withdrawn and washed with running water to stop further fermentation. Washed bags were air-dried overnight and oven-dried to constant weight at 70°C for three days. Inconsistencies in the loss in weight during the washing with running water after the incubation was corrected by soaking control samples in water then washing and drying them normally. Rumen DM degradability of the grasses was estimated (Ørskov and McDonald, 1979).

The DM degradation curves of the five 30 d *Pennisetum* grass species are presented in Figure 1. All grasses follow a standard nonlinear degradation curve wherein the majority of the degradable fraction disappears from the bag within the first 24 hours.

Except for Bana, total DM degraded after 72 hours were higher than 50% with the highest degradation in Pakchong (70.33%), followed by Purple (67.33%), and then by Florida (60.61%) and Local Napier (58.17%). Bana only had a total DM degradation of 45.95% after 72 hours. Although Bana's total DM degradation is in the acceptable degradation range which is 40-50% according to Preston (1986), its low degradation percentage as compared to the rest of the grasses could be associated to high amount of fiber due to its physiological characteristic of having succulent and broad leaves (Nyambati *et al.*, 2010).

Similarly, Figure 2 also shows a standard nonlinear degradation curve for the five 45 d *Pennisetum* grass species. All of the 45 d grasses have the same degradable fractions. Total DM degraded after 72 hours were highest in Local Napier with 47.09%, followed by Pakchong (45.67%) then Purple (45.17%), Florida (42.57%) and the least, Bana (36.83%).
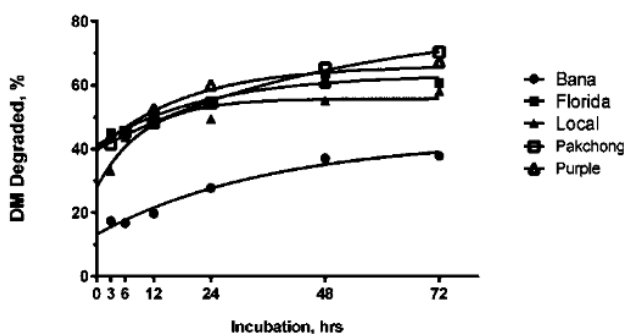
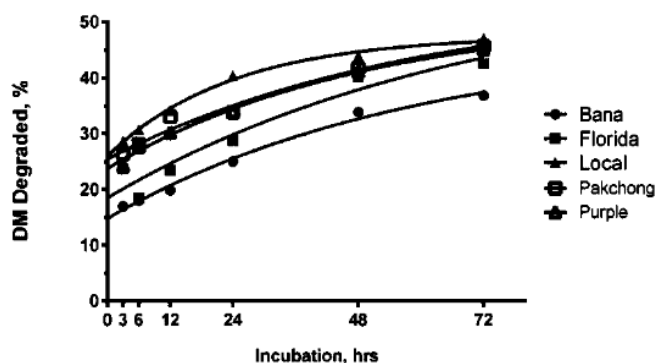Figure 1. Dry matter degradation of five *Pennisetum* species harvested at 30 d.

Figure 2. Dry matter degradation of five *Pennisetum* species harvested at 45 d.

These values were lower compared to the DM degradation of the 30 d *Pennisetum* grass species.

The obtained results show promise of nutrient availability in the five *Pennisetum* species as indicated by the high degradability values in 30 d grasses. DM degradability of grasses declines with maturity; hence the researchers recommend shorter CI for utilization of these specific grasses especially Bana, with low degradability at longer CI when feeding calves and the milking herd.

Further assessment of the species in terms of nutritive value must still be conducted. Succeeding researches are also advised to conduct the *in sacco* method wherein the cannulated animals are fed with the test grasses for the cows to be adapted so that the ruminal microbes can adjust accordingly prior to the experiment.

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