In Vitro Digestibility of Lampoyangan Grass (*Panicum sarmentosum Roxb*) in Form of Hay and Silage

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Abtract

The study aim was to determine in vitro digestibility of silage and hay of Lampoyangan grass (Panicum sarmentosum Roxb) which were fermented and dried in defference of length.This wild grass live in Tondo Panicum sarmentosum Roxb Grasses made in silage and hay forms were obtained from the wild grasses that lived in Tondo Village, District of Eastern Palu, Palu Municipal. In this study the grass was made as silage and hay forms as a treatment followed 2 x 3 factorial pattern of Completely Randomized Design the length of fermentation for silage was 30, 45 and 60 days and the length of drying for hay was 2, 4 and 6 days. Observed variables were in vitro dry matter (DMD) and organic matter (OMD) digestibilities of Lampoyangan grass both silage and hay treatments. The finding results showed that the length of fermentation in silage treatment did not affect DMD and OMD of the grass, but significantly affected DMD and OMD of Lampoyangan grass in hay treatment (P<0,05). Four days of drying was the best time to get the effective time for making hay of Lampoyangan grass. Actually the DM and OM digestibilities of Lampoyangan grass silage treatment were higher than of hay treatment.

Keywords: digestibility, fermentation, hay, Lampoyangan grass, silage.

Introduction

Lampoyangan grass (*Panicum sarmentosum Roxb*) is one type of promising grass that grows and spreads naturally on dry land in Tondo Village (Amar, 2003; (Amar *et al*., 2005). This grass grows better than other grasses, either planted as a crop monoculture or mixed with *Panicum maximum*, or planted with Desmanthus (Tarsono *et al*., 2009). Lampoyangan grass will become the best grass in the future and considering as superior grass in the dry land areas due to its high capability for shade tolerance and drought resistance.

Production of *Panicum sarmentosum Roxb* grass are often surplus than, 145 kg/ha (Tarsono *et al*., 2009) and the content of crude protein and crude fiber were 12.80% and 33.82%. Respectively for the grass before flowering (Tarsono and Amar, 2007). Those advantages are usefull anticipating of the shortage of forage production in the transition period of rainy to dry season. Overproduction during the best growth can be utilized, that is in preserved forms of silage or hay. Factors that may affect the quality of silage and hay are: plant age, origin or type of forage, storage temperature, level of withering and maturity or cutting length (Regan, 1997 and Driehuis *et al*., 2001). The best time to cut the plants for making silage or hay is in the vegetative phase, before the formation of flowers (Reksohadiprodjo, 1995, and Regan, 1997). The plant growth phase at the time of making silage and hay affects the digestibility of dry matter and organic matter (Harrison *et al*., 1994). Saloko (2006) reported that *Panicum sarmentosum Roxb* grass that got the addition of preservatives in the level 22.5% of dry matters and fermented for 30 days resulted in the succeed silage percentage of 94.58%, while 4–day drying time was the best of *in vitro* digestibilities in cassava leaves (*Manihot esculenta Crantz*) as reported by Zubaidah (2005). To examine whether a given feed material is good enough to support microbial growth and enzymatic processes in animal body, the way that is so long to be considered as the most convenient, accurate and relatively quick is through *in vitro* assays. The assays are carried out outside the animal body by using simulations that are similar to processes that occur in the body. Digestibility studies on *Panicum sarmentosum Roxb* grass that involve the fermentation length in silage process and the drying length on in hay prosses are still in the lack of interest. Therefore, the aim of this research was to obtain an overview and recommendations about *in vitro* digestibilities of silage and hay of *Panicum sarmentosum* Roxb grass with differences of fermentation and drying length.

Materials and Methods

Materials

The material of this study was *Panicum sarmentosum Roxb* grass obtained from wild grasses that lived in Tondo village, District of Eastern Palu, Palu Municipal.

The study was designed with a Completely Randomized Design of factorial pattern consisting of two factors (2x3). namely silage and hay with three levels of silage treatments, namely the length of fermentation 30, 45 and 60 days respectivelly and the hay treatments were the length of drying 2, 4 and 6 days, respectively. The treatments that showed a significant effects were followed by Duncan test.

Methods

Panicum sarmentosum Roxb grass that had been chopped (± 20 cm from ground level), was taken to the laboratory and then withered to about 65% water

content. The grasses were cut into pieces about 1-2 cm. a pieces were then treated in accordance with the length of fermentation for silage and the length of drying for hay. The use of preservatives that have been determined, that was 22, 5% of the dry matters (Saloko, 2006). Samples were taken at random and then divided into two groups, that was 50% to be made for silage with the length of fermentation 30, 45 and 60 days and 50% to be made for hay with the length of drying 2, 4 and 6 days. In making silage cans were filled and compacted with a press so that there were no air cavities in between, then given with the pieces of *Panicum sarmentosum Roxb* grass. Cans were sealed and given with a tape (insulation) in order to be airtight. While, in making hay three repetitions were made for each treatment so that there were 9 cans (silos), so it was with making hay, the grass divided according to the number of treatments and then drying was performed by using a drying rack in the sun. After the silage and hay have been made in accordance with each of treatments then they were continued by drying in oven 55^{o}C. After drying, the sample was milled using a Wiley mill with a sieve of 3 mm diameter hole, then followed by in vitro digestibility test, follow the procedures Tilley and Terry (1963) in (Harris, 1970).

Observed Variables

The observed variables were *in vitro* dry matter (DMD), and organic matter digestibilities (OMD) based on methods that have been developed by Tilley and Terry (1963).

Results and Discussion

In vitro dry matter digestibility (DMD) and organic matters of *Panicum sarmentosum Roxb* in forms of silage and hay. The value of in vitro dry matter digestibilities (DMD and OMD) of *Panicum sarmentosum Roxb* made in form

Table 1. Dry matter digestibilities (DMD) and organic matter digestibilities (OMD) of *Panicum sarmentosum* Roxb grass in silage and hay form

Fermentation Length (days)	DMD (%)	OMD (%)
30	57.51 ± 1.57	56.13 ± 0.76
45	57.52 ± 1.57	56.14 ± 0.76
60	57.38 ± 2.07	56.55 ± 1.53
Drying Length (days)		
2	54.51 ± 1.57	54.15 ± 0.76
4	57.21 ± 1.57	56.13 ± 0.76
6	56.18 ± 2.07	56.12 ± 1.53

showed that the treatment length of ensilage and hay process has no significant effect on DMD and OMD (Table 1).

In vitro dry matter and organic matter digestibilities of *Panicum sarmentosum Roxb* grass in silage forms with different fermentation lengths showed nearly same levels of digestibilities, with the fermentation lengths 30, 45 and 60 days, respectively; for DMD was 57, 51% $\pm$ 1.57^{a}; 56.52 $\pm$ 0.76^{a}; 57.38 $\pm$ 1.57^{a}; and for OMD 56.13 $\pm$ 0.76^{a}; 56.14 $\pm$ 2.07^{a} and 56.55 $\pm$ 1.53^{a}. This indicates that the fermentation lengths did not affect crude fiber components either in fermentations for 30 days, 45 or 60 days. One of the factors that influence digestibility in both DMD and OMD is components of crude fiber, mainly cellulose, hemicellulose, and lignin (Van Soest, 1982). Cellulose, hemicellulose are parts of plants that are difficult to digest, while lignin is a part of plants that can not be digested at all (Anggorodi, 1984).

The four-day drying length is was significantly higher than the 2-day drying length, but there is was no significant difference with the 6-day drying length. This is due to the feed material that has a longer drying will be more difficult to be degraded by rumen microbes because the heating process can protect some proteins of *Panicum sarmentosum Roxb* grass. The same thing was stated by Abidin and Hendratmo (1983) in Zubaidah (2005) that the feed material that has undergone heating could protect some proteins against microbial fermentation in the rumen. *In vitro* dry matter and organic matter digestibilities of Panicum sarmentosum Roxb grass decrease with the length of drying, because the longer drying the harder components of crude fiber, among those are ADF, NDF, cellulose, hemicellulose, and lignin contents those are components of plant cell wall. The plant cell wall components are parts that are difficult to digest, even the lignin component can not be digested at all.

The length of the longer fermentations is was unable to improve both in vitro DMD and OMD. This is possible because the used grass to have the same relative age. One of the factors that influence both the level of DMD and OMD is the age of the plant, for which the older plant the higher crude fiber content, so that both *in vitro* DMD and OMD made in silage form with different fermentation lengths have the same percentage rate (Muck, 2009). Feed substance components that are easily digested such as protein decrease, while the components that are difficult to digest such as ADF, NDF, cellulose, and lignin increase with increasing plant age. Whiteman (1980) stated that increasing plant age, the proportion of parts that can be digested such as carbohydrates, proteins and other cell contents tended to decrease, whereas the proportion of which were difficult to digest such as lignin, cuticle, and silica increased. Similarly, Crowder and Chheda (1982) stated that the digestibility value differences of a forage in relation to changes of chemical composition, fibrous parts, lignin, and silica content which arose as a result of differences in species and genotype, growth rate, environmental conditions, place to grow, and management system.

Based on the values of *in vitro* organic matter digestibility (OMD), *Panicum sarmentosum Roxb* which will be utilized in fresh form or preserved in dry form (hay) should be cut at the age of 40 days, in order to obtain *in vitro* digestibility of organic matter is optimal. Just as in vitro dry matter digestibility (DMD), Panicum sarmentosum Roxb grass made in silage form with different fermentation lengths showed no significant effect on in vitro organic matter digestibility (OMD), but that were made in hay form showed significant effect ($P < 0.05$). Similarly, *in vitro* dry matter digestibility (DMD) of *Panicum sarmentosum Roxb* grass as well as *in vitro* organic matter digestibility (OMD) of *Panicum sarmentosum Roxb* grass, because the organic matter content was calculated based on the dry matters, then the existence of 4-day drying length drying influence on DMD, the same influence also occurred on OMD. Determination of plant dry matter when burned, then what remains is ash (inorganic material) (Anggorodi, 1984; Reksohadiprodjo, 1995; and Tillman *et al*., 1989).

Conclusion

1. *Panicum sarmentosum Roxb* made in silage form, the amount of fermentation time showed no significant effect on *in vitro* dry matter (DMD) and organic matter digestibilities (OMD).
2. *Panicum sarmentosum Roxb* grass made in hay form with different drying lengths showedsignificant effect. Four-day drying length is the best time to get the effective time for making hay of *Panicum sarmentosum Roxb* grass.
3. DM and OM digestibilities of *Panicum sarmentosum Roxb* grass made in silage form are higher than those in hay form, but they have no statistically significant differences.

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