โครงการวิจัยย่อยที่ 7:

Influences of preservative methods on voluntary intake, digestibility of the dry matter and organic matter and on ruminal degradation parameters of the dry matter of Ruzi grass *(Brachiaria ruziziensis)* and Streblus leaves *(Streblus asper Lour)* in Goats under the Humid Tropic Climate in Southern Part of Thailand

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Ong-arge Insung[1]

Abstract

The research was conducted in two consecutive trials to evaluate the influence of plant species and preservative methods on voluntary intake of the dry matter and the organic matter of Ruzi grass (*Brachiaria ruziziensis)* and Streblus leaves (*Streblus asper* Lour) in goats under the humid tropic climate in southern part of Thailand. In the first trial, four male goats of average 33.75 ± 4.11 kg of life body weight were used. Two plant species, Ruzi grass and Streblus leaves were used as feed for the experimental animals. Both plants were preserved with two different methods, dried out by sunlight and ensiled with 5% sugarcane molasses. The animals were allocated to receive 4 different feed types alternately in 4 periods according to a 2x2 factorial experiment in 4x4 Latin square design. Each period extended for 14 days with 9 days for the preliminary period and 5 days for the collecting period. The animals were fed *ad libitum*. Both the offered and the refusal feed were recorded daily. Feed samples and the animal's dung were collected daily during the collecting period, using for analysis and calculation for the dry matter and the organic matter content. It was found that the voluntary intake, expressed both as the dry matter intake and the organic matter intake, was higher for Streblus leaves than Ruzi grass ($P<0.01$). The voluntary intake for the dried plant was higher than that of the ensiled plant ($P<0.05$). However, the voluntary intake of the organic matter and digestibility of both of the dry matter and the organic matter was not affected by the preservative methods and plant species ($P>0.05$). The digestibility of the organic matter in the dry matter (DOMD: D-Value), however, was affected by plant species ($P<0.01$). The second trial dealed with the ruminal degradability of feed samples obtaining from the first trial. Feed samples were used to evaluate the ruminal

[1]**Department of Animal Science, Nakhonsithammarat Campus, Rajamangala Institute of Technology Thungsong district, Nakhonsithammarat, 80110, THAILAND**

degradation parameters, using the nylon bag technique. Four cows fitted with permanent ruminal fistula were used. Feed samples were incubated in the rumen of the cows at 2, 4, 8, 16, 24, 48, 72, and 96 hours according to the Randomized complete block design. The degradability of the dry matter at every incubated hours was used for calculation of the ruminal degradation parameters using the Neway excel program. It was found that the ‘a’, ‘b’, ‘c’, ‘ed1’, ‘ed2’, ‘ed3’ and the potential degradability of the feed samples was significantly different across treatments ($P<0.01$). The research results imply that each plant species is suitable for each preservative method. Therefore, in determining the specific preservative methods for plant species, accordance between plant species and the preservative methods should be taken into consideration.

Key words: Preservative method; Voluntary intake; Dry matter digestibility; Organic matter digestibility; Ruzi grass; Streblus leaves.

[1]**Department of Animal Science, Nakhonsithammarat Campus, Rajamangala Institute of Technology Thungsong district, Nakhonsithammarat, 80110, THAILAND**

Introduction

The main objective in preservation of any crops is to keep it at the optimum stage of growth for using during the seasons when the crop is unavailable (Mc Donald *et al.*, 1991). In general, there are two methods for preserving animal feed, haymaking and silagemaking. Haymaking has long been the traditional technique in preserving forage. In the tropical region, haymaking seems to be the most suitable technique for preserving forage crops because of the longer day length and the higher light intensity in this region. Haymaking in some areas of the tropical and sub-tropical regions was, however, limited due to either longer rain-fall period or higher relative humidity. Generally; haymaking has some advantages over other preservative methods such as no need of sophisticated technology, low moisture content easier to handle and higher vitamin D-content. On the other hand, there are some disadvantages of haymaking such as more leaf shattering, mouldy and spoilage by thermophilic bacteria, over heated and may cause of fire. These disadvantages may affect hay quality on lower feed intake, increase nutrient loss, decrease feeding value and hazard to humen health (lung and allergies). Therefore farmers in some countries, especially, in Europe, prefer to preserve their crops instead as silage. In western Europe, silage making is significantly increased in the last 30 years (Mc Donald *et al.*, 1991).

There are many species of grass and tree leaves that can be used for goat's feed in the tropical region. Among of such species of grass, Ruzi grass seems to be the most popular than that of others. The information from the Department of Livestock Development (DLD) of Thailand showed that the DLD provided the farmers more Ruzi grass seed than any other grasses seed (http://WWW.dld.go.th). This might mean that Ruzi grass is the most popular exogenous grass species in Thailand. The reason might ground on the fact that it has moderate high production potential and can be planted in low quality soil type. Moreover, some other information on Ruzi grass had been elucidated. However, the information on it intake and digestibility of the

preserved Ruzi grass in goats under the tropical climate is very limited.

Streblus is a medium sized-erected tree of 10-20 m in height, and can be found mostly in lowland areas. It has the single leaf type, alternate, oval shape with 2-4 cm in width and 4-8 cm in length. It is also used for landscape gardening because of the belief that, if is a lucky plant. This plant species is a leafy plant that can be used for ruminants' feed. The previous research result showed that goats prefer fresh Streblus leave to Rambuton, Jackfruit and Rose apple leaves (Insung, 2000). However, the information on the impact of the preservative methods of its leaves on voluntary intake and digestibility is very limited. Therefore, it is reasonable to evaluate the impact of the preservative method of Ruzi grass and Streblus leaves on voluntary intake and digestibility.

Objectives

1. To investigate the influence of two preservative methods, hay and silage, on intake and digestibility in goats.
2. To assess the influence of two plant species, Streblus leaves and Ruzi grass, on its acceptability and digestibility in goats.
3. To determine the ruminal degradation parameters of preserved feed obtained from two species of plants in cows.

Materials and Methods

The research consists of two consecutive experiments. The first experiment dealed with the evaluation of feed intake and digestibility of the dry matter and the organic matter of Ruzi grass and Streblus leaves preserved by two different methods, haymaking and silage making. Four male anglonubian - Thai indigenous crossbred goats of an average 33.75 ± 4.11-kg life body weight were allocated to receive 4 different feed types, dry Ruzi grass, dry Streblus leaves, Ensiled Ruzi grass and ensiled

Streblus leaves in 4 periods alternately according to a 2x2 factorial experiment in a 4x4 Latin square design. Each period was extended for 14 days with 9 days for the preliminary period and 5 days for collecting period. The animals were fed *ad libitum*. Offered and Refusal feeds were measured daily using for calculation of net feed intake. Feed samples and animal's dung were collected dailies during the collecting period using for analysis and calculation for the dry matter and the organic matter content. The second experiment coped with the ruminal digestion parameters. Feed samples obtained from the first trial were used. The nylon bag technique, introduced by Orskov and McDonald (1979) was used to evaluate the rumen degradation parameters of the feed samples. Data were calculated and the Neway excel, an application program, written by Chen (1997) was used to generate the degradation parameters. The data obtained was analyzed using the analysis of variance (ANOVA) procedure (SAS, 1988).

Results and discussions

The goats fed on Streblus leaves had higher (575.60 vs 414.21) feed intake than those animals fed on Ruzi grass ($P<0.05$). The animals fed on dried feed had higher (519.87 vs 469.94) intake than that of ensiled feed both in the dry matter ($P<0.01$) and the organic matter ($P>0.05$). However, the digestibility of the dry matter and the organic matter of both plant species and of any preservative methods were not significantly different ($P>0.05$). This might ground on the fact that Streblus leaves may contain more anti-nutritional factors such as condensed tannin than Ruzi grass. It is known that the digestibility of feed will be decreased when tannin appear (Leng, 1997). Although the voluntary intake of the dry matter and the organic matter and it's digestibility do not have the same tendency, the correlation coefficient and the coefficient of

determination (r^2) between intake and it's digestibility was very high (r_{xy} = 0.968, r^2 = 0.936 and r_{xy} = 0.967, r^2 = 0.935).

Table 1 Voluntary intake and digestibility of dry matter and organic matter of Ruzi grass and Streblus leaves preserved by drying or ensilage in goats

tem	Plant species (A)		Preservative methods (B)		A*B	SEM
	Ruzi	Streblus	Dried	Ensiled		
Feed intake						
DM intake(g/d)	414.21^{D}	575.60^{C}	519.87^{A}	469.94^{B}	P<0.01	11.36
DM intake(%BW)	1.23^{D}	1.72^{C}	1.55^{A}	1.40^{B}	P<0.05	0.04
DM intake(g/$Kg^{0.75}$)	29.73^{D}	41.39^{C}	37.37^{A}	33.75^{B}	P<0.01	0.92
OM intake(g/d)	371.88^{D}	460.48^{C}	428.72	403.65	P<0.01	8.98
OM intake(%BW)	1.11^{D}	1.37^{C}	1.28	1.20	P<0.01	0.03
OM intake(g/$Kg^{0.75}$)	26.69^{D}	33.11^{C}	30.81	28.99	P<0.01	0.69
Digestibility						
DM (%)	67.81	68.40	68.87	67.33	P>0.05	1.52
OM (%)	71.41	71.67	70.84	72.23	P>0.05	1.28
DOMD: D-value (%)	64.15^{C}	57.37^{D}	58.92	62.60	P<0.05	1.07

A, B, and C, D Means in the same row of the same parameters not having the same superscript differ significantly (P<0.05) and highly significantly (P<0.01), respectively. DM intake = dry matter intake, DM intake (g /$Kg^{0.75}$) = dry matter intake as metabolic body weight: $BW^{0.75}$, DM = dry matter, OM = organic matter, DOMD = digestibility of the organic matter in the dry matter

Table 2. Rumen degradation parameters of dry matter of dried Ruzi grass (DR), ensiled Ruzi grass (ER), dried Streblus leaves (DS) and ensiled Streblus leaves (ES) incubated in the nylon bags in rumens of cows (%)

Item	Plant species with different preservative methods	SEM

	(DR)	(ER)	(DS)	(ES)	
a	17.60^{C}	48.70^{A}	13.08^{D}	19.58^{B}	0.55
b	60.98^{B}	40.80^{C}	65.68^{A}	58.60^{B}	1.14
c	0.06^{B}	0.08^{A}	0.09^{A}	0.06^{B}	0.004
ed1	61.35^{D}	81.08^{A}	66.13^{B}	63.48^{C}	0.37
ed2	48.98^{D}	73.58^{A}	54.65^{B}	51.80^{C}	0.52
ed3	42.27^{D}	68.95^{A}	47.45^{B}	45.15^{C}	0.57
PD	78.58^{B}	89.50^{A}	78.75^{B}	78.18^{B}	1.20
Lag Time (hr)	0.37^{BC}	0.22^{C}	0.88^{A}	0.68^{AB}	0.10

A, B, C, D Means in the same row not having at least a common superscript differ significantly (P<0.01). Degradation constants derived from the ørskov and McDonald (1979) equation P= a+b(1-e^{-ct}) where P is degradability at time 't'; 'a', the rapidly soluble fraction; 'b', the potential degradability of dry matter within time 't', be degraded; 'c', the degradation rate of the 'b' fraction, PD = Potential degradability (a+b). Effective degradation in the rumen at 0.02, 0.05 and 0.08 fraction/hr passage rate is represented by ed1, ed2 and ed3, respectively and is calculated by using the Excel application programs for processing feed degradability data written by Chen (1997). SEM = Standard error of mean., DR: dried Ruzi grass, ER: ensiled Ruzi grass, DS: dried Streblus leaves, ES: ensiled Streblus leaves.

The result on the ruminal degradation parameters of two plant species preserved with two different methods was clearly indicated that ensiled Ruzi grass has the highest the water-soluble fraction, the effective degradation at 0.02, 0.05 and 0.08 fraction/hours passage rate and the potential degradation of the dry matter (P<0.01). This might ground on the fact that it has higher water-soluble fraction.

Conclusions

Preserving plant by haymaking provided higher feed intake than by silage making. The voluntary intake of the DM and the OM of Streblus leaves was higher than Ruzi grass. The digestibility of the dry matter and the organic matter of Ruzi grass and Streblus leaves preserving by haymaking and silage making was not significantly different. Although the intake and the digestibility of the preserved feed do not have similar tendency, the correlation coefficient between the intake and the digestibility of feed was very high. This research result implied that each plant species is suitable for each preservative method.

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