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The Grazing of Pampangan Buffaloes at Non Tidal Swamp in South Sumatra of Indonesia

Ali A.I.M[a*], S Sandi[a], Muhakka[a], Riswandi[a], D Budianta[b]

[a]Department of Animal Science, [b]Department of Soil Science, Faculty of Agriculture and Researchers at Research Centre for Sub-optimal Lands (PUR-PLSO), University of Sriwijaya, South Sumatra 30662, Indonesia.

Abstract

The grazing of Pampangan buffaloes at non tidal (lebak) swamp in South Sumtra of Indonesia is one of effort to enhance farmer income in South Sumatra. This research is aimed to investigate the characteristics of Lebak swamp used as a grazing land of Pampangan Buffaloes included soil physical and chemical properties, water quality, land use in Lebak swamp, and high of flooding; to find out botanical compotition and vegetation consumed by Buffaloes, nutrition value of forage and productivity of Pampangan Buffaloes. It was concluded that water quality and soil fertility found are low level with highest flooding occurred in March 2012, and lowest flooding taken placed in June and July; existence of rice and vegetables cultivation are showns in low flooding season, as well as for palm oil plantation encourages emergence the interest conflict between buffalo farming and crop cultivate activities; amounting to 23 species of vegetation are identified, 14 specieses are consumed by Buffaloes with the chemical composition varies among species; high content of fiber fraction, low crude protein content will be resulting low productivity of Pampangan Buffaloes.
Keywords: GRAZING, PAMPANGAN BUFFALO, LEBAK SWAMP, FIBER FRACTION, PROTEIN

1. Introduction

Non Tidal swamp (it is called lebak, Indonesian) that is widely distributed in Indonesia is one of alternative areas to overcome food needs due to rising number of population and increasing conversion of land function. Lebak swamp in Indonesia is estimated about 13.3 million ha which is distributed in Sumatra, Kalimantan, and Papua. In Sumatra, the widest lebak swamp is located in South Sumatra covering about 2.98 million ha which has been used for rice field is approximately 368.690 ha [24]. Pampangan Buffalo is one of Swamp Buffalo widely distributed in Indonesia, especially in South Sumatra. Farmers of Pampangan Buffalo have been utilizing lebak swamp since long time ago to produce meat and milk. However, the population of pampangan buffalo in some sub-districts in South Sumatra tended to decline, due to the supply of feed insufficient and inbreeding. Practically the Pampangan Buffalo farming is not as their main activities to get income but as the secondary activities. Their main income are derived from rubber, oil Palm plantation and paddy rice of lebak. Although it is managed in tradisional system, but the Pampangan buffalo farming can

* Corresponding author. Tel.: +6281377510031
E-mail address: indranutrisi@yahoo.co.id, asepali76@gmail.com

provide their additional income [19]. The similar farming is also done by farmers lived in Amazon Valley [6, 4, 17]. This study is aimed to; 1) investigate characteristics of Lebak swamp which is used as a grazing land of Pampangan Buffalo included soil physical and chemical properties, water quality, land use in Lebak swamp, and height of flooding; 2) to find out botanical compotition and vegetation consumed, nutrition value of forage in grazing land, and productivity of Pampangan Buffaloes.

2. Methods

2.1. Characteristics of Lebak

Soil sampling were based on a unit of land to study the physical and chemical properties of the soil [8]. Measurement of water quality was done in January (highest flooding) and in August (lowest flooding). The water pH measurement was done every month in the field by using pH Meter Hanna HI-98107. Area of Lebak swamp is investigated by GPS (Garmin's Oregon 400t gps) and plotting to map for each outermost point by using the ArcView 3.2 (ESRI, Redlands, California). Measurement the height of flooding was done every 2 weeks dated on January until August, 2012.

2.2. Dominance and Vegetation Consumed

All type of vegetation grown in land grazing are identified using Biotrop [3] and USDA [22]. Measurement of dominance of vegetation on grazing land is carried out by line intersection method. Observation of vegetation consumed by Buffaloes was played on 08.00-11.00 a.m. and 02.00-05.00 p.m. [12, 18]. Sampling of forage for the chemical composition were scheduled on May 19, 2012. Sample of forage was dried in oven at 70^0 C degrees for 24 hours and then analyzed in Laboratory. Measurement of fiber fraction content is done by using the Goering and Van Soest method, which included Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), cellulose, hemicellulose, and lignin. Furthermore, the data obtained were analyzed using ANOVA and Duncan test to compare mean value between forage species.

2.3. Buffalo Productivity

Determination of buffalo productivity was calculated by direct measurement on body weight and milk production with interviewing the farmers on site. Research locations are distributed on village of Rambutan, Suka Pindah, and Parit, in Rambutan subdistrict, District of Banyuasin of South Sumatra. Buffalo sampling was determined by *purposive sampling* method at the most population of buffaloes. The farmer criteria used in sampling is already raised buffaloes for 3 years and they have more than 10 buffaloes. The measurement of body weight calculated in April, June and August, 2012 on 23 males and 36 females buffaloes by using electric cattle scales CAS brand. Measurement of milk production is collected by when the milking was done by farmer.

3. Result and Discussions

3.1. Characteristics of Lebak

Research was conducted on February until September 2012 located in Lebak swamp on $3^o05'$ 27.2" – $3^o11'$ 24.9" South Latitude and 104 $^o55'$ 23.9" – 104 $^o58'$ 57.9" East Longitude. Status of soil fertility is indicated by low in pH with acidic condition, nitrogen in medium, and content of CEC, P Bray, Na, Ca, Mg is ranging from very low to low criteria [8]. Result of measurement of pH in the field indicated that the water pH ranged from 3,3 to 3,7, 3,4 to 3,9 and 4,7 to 5,6 in Shallow, Midle and deep lebak respectively. This will be resulting in high solubility of mineral Fe and Zn but low mineral of Ca, P, and Mg contents.

Pampangan buffaloes were carried out extensively, where buffaloes were released in the morning and herded coming back in the afternoon. The extensive effort have complied with the land typology of lebak which have high flooding condition and low nutrient of forage. With this farming system, condition of Lebak Swamp as a grazing land highly determined the buffaloes productivities. Result of the outermost points mapping and tracking in the field using GPS showed that the area of lebak swamp used for grazing land is about 567,35 ha. As shown in other location of lebak swamp in South Sumatra, the Lebak swamp in the research area is also utilized by people to cultivate rice and vegetable which is planted once a year during low flooding. Land mapping for the rice and vegetables cultivation amounting to 304,62 ha of grazing land are

also used by people for rice and vegetables specially in the shallow and middle part. Practically, preparation of rice planting (land clearing and floating seeding) is carried at beginning of June, while harvesting was scheduled on August to September which different with Djamhari [9].

Lebak swamp used for grazing land is also used for palm plantation. Fencing is done by farmers on the land of rice and vegetables areas with palm and rubber crops thus the buffaloes do not enter to the land. This led to extensive grazing is getting narrowed, mainly at the time of rice and vegetables planting on June to September. The similar condition was also occured in other locations [4, 19, 22]. Therefore, efforts are required to protect the sustainability of buffalo farming in accordance with lebak swamp agroecosystem. One of them is through the establishment of the lebak swamp as a grazing land, like in South Kalimantan [20], either through regional regulation, governor or regent regulation as legal protection to preserve the grazing land for buffalo farming. As shown in other lebak swamp, grazing land of lebak swamp is located beside of Batang Hari river which are affected by the high and low river water [14]. The low height of flooding will not only affect the growth and development of forage in grazing land, but also affect cropping pattern for farmers in the swamp land. The highest flooding occured in March 2012, while the lowest flooding (point 0 meters) occured in June to become lebak of Pematang (Shallow) and Tengahan (Midlle) and in July to become deepest Lebak. The highest flooding can reach 50 cm in Lebak of Pematang (Shallow), 101 cm in Lebak of Tengahan (Midle), and 167 cm in Lebak of Dalam (Deep), while the maximum depth of ground water taken placed in Lebak of Pematang, Tengahan, and Dalam occured in September, which are 37.70, 77,70, and 87, 70 cm, respectively. The similar pattern of declining the Lebak but the different value of hight flooding is reported by Waluyo *et al*. [23].

3.2. Dominance and vegetation consumed

Based on the diversity and dominance of vegetation grown in swamp, grazing land is categorized into two areas, namely excessive grazing intensity (Over Grazing) and with low grazing intensity (Under Grazing). This condition is caused by the absence of grazing management on site studies, where land with excessive grazing is the most affordable by livestock that is relatively closer to the cage. Grazing with low intensity is hard to reach, which is located in rice and vegetables cultivation and palm oil plantations which at certain times are given to border, and also the location is placed far from the cage. Swamp vegetation which is found at the site of research is amounting to 23 species. Type of grasses (*Poaceae*) are *Brachiaria muticum, Echinochloa stagnina, Hymenachne acutigluma, Ischaemum rugosum, Leersia hexandra, Oryza rupifogon* and *Saccharum spontaneum;* type of legumes (*Mimoceae*)) are *Mimosa gigantica, Sesbania exasperata, Neptunia oleracea, Aeschynomene sensitiva;* type of Cyperace *are Scirpus grossus L, Scleria pterora Presl, Eleocharis dulcis;* type of *convulaceae* are *Ipomea aquatica Forks, Ludwigia hyssopifolia, Kylinga brevifolia, Polygonum barbatum L, Heliptropium indicum, Eichornia crassipes S, Hydrilla, Pandanus sp, Melaleuca leucadendron Ludwigia peruvinial dan Ludwigia peploides*. Rohaeni [15] found in South Kalimantan amounting to 24 species, while Camarao & Rodrigues Filho [5] is only obtained to 7 species. Vegetation that dominated on land with excessive grazing is *oryza rupifogon* and *Eleocharis dulcis* with a composition of botany of 46,9 % and 46,1 %. Other vegetation found in this location is *Hydrilla* (3%), *Ludwigia peruvinial* (1,1%), *Mimosa gigantica* (0,9%), *Ludwigia peploides* (0,82%), *Neptunia oleracea* (0,76%), *Ipomea aquatica Forks* (0,32%), and *Nymphaea amozanum* (0,1%). The height availability of *Oryza rupifogon* is also expressed by Rohaeni [15], while Camarao & Rodrigues Filho [5] suggested that the swamp grazing land is dominated by *Paspalum fasciculatum* (37%). The high composition of *Oryza rupifogon* and *Eleocharis dulcis* in high grazing intensity area showed that both species are highly resistant to the condition. This is possible with the characteristic of *Oryza rupifogon* which float according with high and low of flooding. Result of observation of the grazing buffaloes showed that species of *Brachiaria muticum*, *Leersia hexandra*, *H. acutigluma*, *Ischaemum rugosum*, *Oryza rupifogon*, *Mimosa gigantica*, *Sesbania exasperata*, *Neptunia oleracea*, *Aeschynomene sensitiva*, *Scirpus grossus L, Scleria pterora Presl,*, *Eleocharis dulcis*, *Ludwigia peploides*, and *Nymphaca amazonum* were consumed by Buffaloes.

The chemical composition of forage is different among species (P<0.01). Crude protein content of the forage in these studies ranged from 60,40 (*Scleria pterora presl*) up to 280,28 g.kg^{-1} (*Neptunia oleracea*). Rohaeni *et al.* [15] suggested that the crude protein content ranged from 62.5 (*Paspalum sp*) up to 107,8 g. kg^{-1} (*Hymenachne amplexicaulis*), whereas Camarao *et al.* [4] suggested that the crude protein content of swamp forages ranged from 63 (*Paspalum fasciculatum*) up to 235 g kg^{-1} (*Echinochloa polystachya*). Crude protein content of grass on this research is not all lower than protein content of legumes such as forage in dry land [10, 1]. Neutral Detergent Fiber content ranged from 610,50 (*Nymphaca amazonum*) up to 987,23 g. kg^{-1} (*Eleocharis dulcis*). NDF content on legumes is lower (P<0.01) in comparison to NDF content on other type of forage, except in *Leersia hexandra* and *Nymphaca amazonum*. Evitayani *et al*. [10] suggested that the NDF content of legumes is lower than NDF of grass. NDF content of swamp grass found on this research is ranging from 821,51 (*Leersia hexandra*) up to 921,99 g. kg^{-1} (*Brachiaria pycanthemum*). Fariani & Evitayani [11] obtained that NDF content of swamp grass ranged from 680,2 (*Ischaemum rugosum*) up to 710 g. kg^{-1}, Meanwhile Camarao *et al*. [4] suggested that NDF content of swamp grass was 346 (*Echinochloa polystachya*) up to 750 g kg^{-1} (*Leersia hexandra*).

Table 1. The chemical composition of forage species in grazing land (g kg^{-1} dry matter)

	Forage Species	Crude Protein	Crude Fat	Crude Fiber	N-free extract	NDF	ADF	Hemi cellulose	Cellulose	Lignin
1	*Brachiaria muticum*	81,22 ^{b}	16,46 ^{d}	264,64 ^{j}	584,53 ^{m}	921,99 ^{k}	843,09 ^{j}	78,90 ^{e}	544,75 ^{k}	295,36 ^{n}
2	*Leersia hexandra*	119,88 ^{c}	16,25 ^{c}	273,98 ^{l}	488,62 ^{f}	821,51 ^{d}	516,03 ^{c}	305,48 ^{k}	308,58 ^{c}	179,60 ^{d}
3	*H. acutigluma*	174,29 ^{e}	13,98 ^{b}	245,94 ^{h}	467,64 ^{e}	934,48 ^{l}	863,33 ^{l}	71,15 ^{c}	624,15 ^{m}	196,44 ^{h}
4	*Ischaemum rugosum*	81,87 ^{b}	19,16 ^{e}	349,77 ^{n}	449,41 ^{d}	917,32 ^{h}	601,78 ^{h}	315,53 ^{l}	413,08 ^{g}	178,36 ^{c}
5	*Oryza rupifogon*	155,93 ^{d}	21,36 ^{g}	224,11 ^{g}	438,94 ^{b}	920,60 ^{j}	868,04 ^{m}	52,56 ^{a}	633,53 ^{n}	182,73 ^{f}
6	*Mimosa gigantica*	187,18 ^{e}	25,14 ^{h}	207,27 ^{f}	528,90 ^{h}	909,33 ^{g}	811,81 ^{i}	97,52 ^{f}	481,54 ^{i}	293,01 ^{m}
7	*Sesbania exasperata*	228,14 ^{g}	29,46 ^{i}	147,73 ^{c}	540,54 ^{i}	766,63 ^{c}	592,18 ^{g}	174,46 ^{h}	402,14 ^{f}	181,85 ^{e}
8	*Neptunia oleracea*	280,28 ^{i}	20,28 ^{f}	172,55 ^{d}	448,67 ^{c}	681,14 ^{b}	553,74 ^{d}	127,41 ^{g}	314,28 ^{d}	223,99 ^{j}
9	*Aeschynomene sensitiva*	176,78 ^{e}	13,58 ^{a}	281,61 ^{m}	492,31 ^{g}	851,57 ^{e}	573,43 ^{f}	278,13 ^{j}	359,59 ^{e}	206,55 ^{i}
10	*Scirpus grossus L*	75,70 ^{ab}	32,37 ^{j}	184,96 ^{e}	571,68 ^{l}	918,92 ^{i}	843,29 ^{k}	75,63 ^{d}	539,98 ^{j}	267,60 ^{k}
11	*Scleria pterora Presl*	60,40 ^{a}	15,05 ^{b}	266,86 ^{k}	591,59 ^{n}	948,39 ^{m}	557,65 ^{e}	390,73 ^{m}	415,00 ^{h}	124,86 ^{a}
12	*Eleocharis dulcis*	178,92 ^{e}	16,36 ^{cd}	254,15 ^{i}	413,83 ^{a}	987,23 ^{n}	925,37 ^{n}	61,86 ^{b}	596,48 ^{l}	288,10 ^{l}
13	*Ludwigia peploides*	257,54 ^{h}	15,11 ^{b}	72,04 ^{a}	569,87 ^{k}	885,44 ^{f}	377,88 ^{b}	507,56 ^{n}	192,46 ^{a}	182,85 ^{g}
14	*Nymphaca amazonum*	205,57 ^{f}	21,31 ^{g}	117,93 ^{b}	560,52 ^{j}	610,50 ^{a}	373,37 ^{a}	237,13 ^{i}	201,43 ^{b}	171,60 ^{b}

Note : Means with different letter along the column are significantly different (P<0.05)

3.3. Buffalo Productivity

Daily weight gain of Pampangan Buffalos were lower compared to Murrah and Mediterian Buffalos [7 & 13], but higher than weight gain found by Triwulaningsing & Praharini [23] and Batosomma [2]. Average of milk production is indicated that milk production of Pampangan Bufallo is still low as 1,29 ± 0,44 liters per day [7, 13], but this result is not much different from the result obtained by Siregar *et al*. [18] in West Sumatra. Pampangan Buffalo productivity observed is low, due to low quality feed and poor management [7, 12, 21, 2].

Table 2. Performance of Pampangan buffalo productivity in location of research

Parameters	Result
1. Daily weight gain (kg.day^{-1})	
- Male	0,40 ± 0,13

- Female	0,38 ± 0,09
2. Milk production (liters. day^{-1})	1,29 ± 0,44
3 Calving age at the first time (year)	3 - 3,5
4. Calving interval (year)	1,5 - 2

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