IN VITRO NEUTRAL DETERGENT FIBER DIGESTIBILITY OF 9 FORAGES IN THE HIGHLANDS AND THE LOWLANDS IN COSTA RICA

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The objective of this study was to determine the effects of the grazing age in the in vitro digestibility of the neutral detergent fiber of forages in the highlands and the lowlands dairy farms in Costa Rica. Nine forages was evaluated (*Lolium perenne, Kikuyuocloa clandestina, Cynodon nlemfuensis, Festuca sp. x Lolium sp., Brachiaria brizantha var. Mulato II, Brachiaria mutica, Hemarthria altissima*, *Panicum maximum var. Mombaza and Ischaemum ciliare*) during the entire year, considering the weather season (dry season, transition season and rainy season) and measuring the phenological age using the technique of counting living leaves. Five samples of every forage were taken considering three different grazing age, depending on each forage management and species. The samples obtained in the field, entered in the CINA laboratories, in order to conduct the respective analyzes: dry matter (DM), neutral detergent fiber (NDF), in vitro digestibility of dry matter at 48 hours (IVDMD) and in vitro digestibility of neutral detergent fiber (NDFD) at 48 hours according to the methodology of Van Soest and Robertson (1985). The data was analyzed using an unrestricted random model comparing the ages of grazing within the highland forages and within the lowland forages and using the Duncan-Waller test to compare means with InfoStat statistical software (Di Rienzo et al., 2011). The data analyzed show that the age of grazing has a direct impact on the use of the cell wall of forages and dry matter contents in both highland and lowland forages, and this impacts the energy content of these materials, which translates into direct effects on milk production. In addition it can be concluded that highland

forages showed higher values of NDFD, with respect to lowland forages, which partly explains their greater potential for milk production in the tropic.

Keywords: highland forage, lowland forage, NDF digestibility.

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Table 1. Phenological age, dry matter (DM), neutral detergent fiber (NDF), in vitro dry matter digestibility (IVDMD) and in vitro neutral detergent fiber digestibility (NDFD) of nine forages in highlands and lowlands dairy farms in Costa Rica.

Forage	Grazing age (days)	Living leaves number	DM (%)	NDF(%)	IVDMD (%)	NDFD (%)
			Highland forages			
Lolium perenne	24	1.5	13.73^{a}	42.96^{abc}	89.30^{dc}	75.60^{c}
	29	2.5	13.86^{a}	43.72^{abc}	88.72^{cde}	73.58^{bc}
	34	3.5	14.89^{a}	44.94^{bc}	88.27^{cde}	73.56^{bc}
Kikuyuocloa clandestina	25	3.5	13.04^{a}	54.26^{d}	83.92^{cde}	70.60^{abc}
	29	4.5	13.06^{a}	54.34^{d}	81.36^{bcd}	65.82^{abc}
	33	5.5	13.31^{a}	55.54^{de}	80.14^{abc}	64.50^{abc}
Festuca sp. x Lolium sp.	24	1.5	11.96^{a}	41.14^{a}	91.84^{e}	80.22^{c}
	27	2.5	12.42^{a}	42.08^{ab}	90.72^{e}	79.58^{c}
	33	3.5	13.56^{a}	45.54^{c}	90.64^{e}	77.80^{c}
Cynodon nlemfuensis	21	3.5	19.96^{b}	58.44^{ef}	74.10^{ab}	57.26^{ab}
	28	4.5	20.54^{bc}	58.98^{f}	73.08^{ab}	56.76^{ab}
	35	5.5	23.58^{c}	60.48^{f}	72.02^{a}	54.20^{a}
			Lowlands forages			
Brachiaria brizantha var. Mulato II	20	3.5	14.83^{a}	60.00^{a}	74.22^{a}	58.78^{a}
	22	4.5	15.21^{a}	62.56^{ab}	73.72^{a}	58.70^{a}
	24	5.5	15.62^{a}	66.32^{bc}	70.08^{a}	54.78^{a}
Brachiaria mutica	20	3.5	13.37^{a}	63.84^{bc}	72.24^{a}	56.58^{a}
	22	4.5	13.47^{a}	63.86^{bc}	70.92^{a}	55.74^{a}
	24	5.5	14.07^{a}	65.38^{bc}	70.42^{a}	54.46^{a}
Hemarthria altissima	20	2.5	24.00^{b}	73.14^{d}	62.82^{a}	50.50^{a}
	22	3.5	25.25^{b}	73.96^{d}	62.80^{a}	49.88^{a}
	24	4.5	25.58^{b}	74.78^{d}	61.06^{s}	46.92^{a}
Panicum maximum var. Mombaza	15	2	15.06^{a}	65.68^{bc}	72.10^{a}	56.64^{a}
	17	3	15.83^{a}	67.30^{c}	70.18^{a}	55.86^{a}
	19	4	16.19^{a}	67.70^{c}	70.02^{a}	55.34^{a}
Ischaemum ciliare	16	2	15.53^{a}	64.06^{bc}	73.42^{a}	58.70^{a}
	18	3	15.71^{a}	64.46^{bc}	72.92^{a}	57.90^{a}

	20	4	15.73[a]	65.30[bc]	71.22[a]	56.00[a]