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Assessment of animal palatability for domestic developed Italian ryegrass *Lolium multiflorum* Lam. in South Korea

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Introduction

About 5.6 million tons of forage were consumed in ruminant animals in Korea. But, most of them were supplied in rice straw (2 million ton) and more than one million ton of forage was imported from oversea. As a matter of fact, the self-sufficiency rate of high quality forage was 44 % (2.5 million ton). The research institute had started breeding programs of forage varieties (orchardgrass, Tall fescue and Italian ryegrass). Their remarkable breeding program resulted in release of a synthetic species Italian ryegrass (*Lolium multiflorum* Lam.) which was more cold-tolerant, much higher yielding than introduced varieties and more adapted in paddy field. Most varieties had focused in evaluation of chemical analysis and productivities of dry matter, however assessment of palatability for ruminant was not conducted. For this reason, this report examines the assessment of animal palatability for domestic developed Italian ryegrass in Korea.

Materials and Methods

All eight varieties were tested for productivity, feed value and silage quality before palatability test. A domestic developed rye (*Secale cereale* L.) variety, "Gogu", three Italian ryegrass (*Lolium multiflorum* Lam.), "Kowinearly", "Kospeed", "Kogreen", two barley (*Hordeum vulgare* L.), "Yuyeon", "Yeongyang", one oat (*Avena sativa* L.), "Samhwan" and imported Italian ryegrass, "TAM 90" were evaluated palatability for growing dairy cattle.

Forages were harvested at different calendar dates (rye was harvested at 30 April, Italian ryegrass was 13 May and barley and oat was 27 May). The forages were conserved as round bale silage for two months and then assessed the palatability for four cattle per each treatment. Two palatability test were conducted. First, a rye and three Italian ryegrass were tested and then an Italian ryegrass, two barley and an oat were evaluated. Forage were fed twice daily on basis of voluntary intake.

Acid detergent (ADF) and neutral detergent fiber (NDF) was analyzed according Goering and Van Soest (1970). Crude protein was quantified by standard procedure (AOAC, 1995). Total digestible nutrient (TDN) was calculated as follow: $88.9 - (ADF\% \times 0.79)$ (Holland and Kezar, 1990). All data were analyzed using the general linear model (GLM) procedure of SAS (2002). A 10g of sample of each silage was macerated with 100ml of distilled water, filtered through a filter paper (#No. 6). The pH was measured with a pH meter (HI 9024; Hanna Instrument Inc. UK). Volatile fatty acids were analyzed using gas chromatography (Model 3400; Varian Co., USA). Lactic acid was analyzed by using HPLC (HP-1100; Hewlett-Packard Co., USA).

Results and Discussion

The feed values of newly developed eight varieties are shown in Table 1. Total digestible nutrient (TDN) was high in Italian ryegrass and oat and the lowest in rye. Average crude protein content was 7.45% and shown higher in the order of Italian ryegrass > oat > barley > rye. Especially, Italian ryegrass "Kogreen" classed as early maturing variety showed the highest CP (9.38%) and TDN (62.0%) content. The acidity (pH) of rye and barley silage slightly increased compared with Italian ryegrass. Lactic acid content of oat and Italian ryegrass increased as compared with barley and rye. Butyric acid content of "Kogreen", "Kospeed" and "Samhwan" were low compared with barley and rye variety. But, butyric acid content of Italian ryegrass "TAM 90" was the highest. According to Flieg's score, the qualities of forage crop silages conserved in this experiment were very high. All silages were ranked 1st grade of silage quality.

In the palatability evaluation of a rye and three Italian ryegrass, "Kogreen" showed the highest DM intake among varieties and "Gogu" was the lowest. Due to the experiment result, high palatability results from good smell and soft texture of feed. Thus, "Kogreen" has low content of fiber fraction (ADF and NDF) and high content of lactic acid. In 2nd palatability test (one Italian ryegrass, two barley and one oat), oat and Italian ryegrass were higher than that of barley varieties.

Thought, the feed value of barley was not low compared with Italian ryegrass and oat, the palatability was low. I think that the reason for low palatability of barley was caused by late harvesting stage (yellow ripen stage).

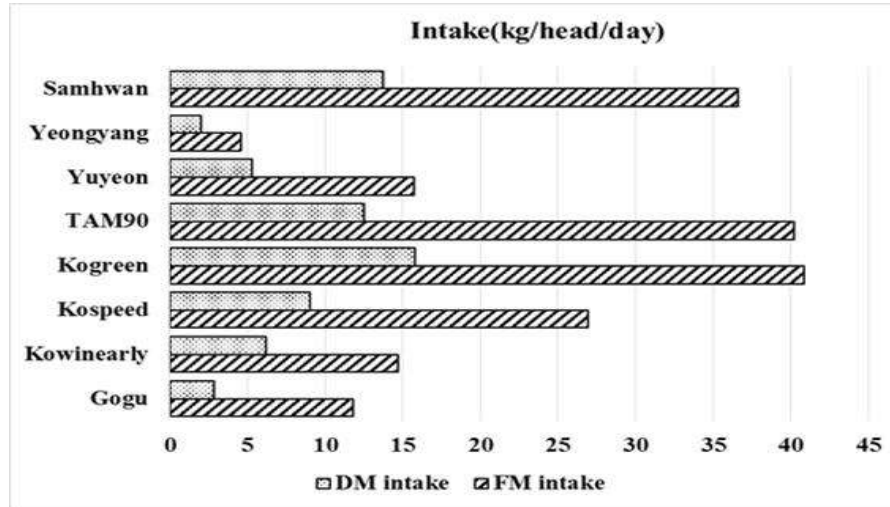


Fig 1: the intake of forage by growing daily cattle

Table 1: Chemical composition and silage quality of conserved domestic developed forages.

Varieties	CP (%)	ADF (%)	NDF (%)	TDN (%)	pH	Organic acid(% in DM)			Flieg's score	Quality grade
						Acetic	Butyric	Lactic		
Gogu	4.51	39.89	64.17	57.4	4.90	0.39	0.80	2.24	82	1
Kowinearly	9.01	37.20	61.55	59.5	4.76	0.48	0.40	1.72	87	1
Kospeed	6.65	35.22	57.76	61.1	4.79	0.61	0.13	1.44	100	1
Kogreen	9.38	34.05	56.64	62.0	4.76	0.87	0.06	3.13	100	1
TAM90	7.94	39.30	62.01	57.9	4.56	0.86	0.87	3.31	87	1
Yuyeon	6.80	38.04	59.74	58.8	4.78	0.45	0.64	2.99	84	1
Yeongyang	7.10	39.91	57.82	57.4	4.88	0.6	0.49	1.23	87	1
Samhwan	8.19	35.86	59.48	60.6	4.48	0.64	0.14	3.57	100	1
Average	7.45	37.43	59.90	59.3	4.74	0.61	0.44	2.45	91	1

Conclusion

The result of this study indicated that the palatability of Italian ryegrass, “Kogreen” showed higher than that of rye and barley and also higher among Italian ryegrass. It has low content of fiber fraction (ADF and NDF) and high content of lactic acid. So, it will be recommendable as proper Italian ryegrass variety in South Korea, and Oat (“Samhwan”) also has high productivity and palatability among forage crop and it is recommended to forage crops in Korea.

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