

Relative yields and nutritive value of whole crop rice harvested on four successive dates for forage in Korea

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Introduction About four million tons of forages are fed to ruminants in Korea, but half of them rely on rice straw as roughage and 0.6 million tons of forage was imported. The lack of forage results in increased imports of concentrate feeds and increased production cost. Now, Korea has about 1.1 million ha of rice fields, but as a consequence of world trade negotiation, Korea will open the rice market from next year. It is expected that due to aging farmers and lower rice price, about 0.2 million ha of paddy field will not be cultivated for grain rice. Therefore, we suggest that whole-crop rice cultivation for feeding beef and dairy cattle. The purpose of this study was to investigate relative yield and nutritive value of whole-crop rice grown in paddy fields in Korea.

Material and methods Two varieties of whole-crop rice (Suwon 468 and Dongjin) were harvested at four different growth stages (heading, milk, dough and ripe stage). Dry matter (DM) content of rice was determined by forced air drying at 65°C for 72h. The dried samples were ground and kept for the analysis. Crude protein (CP) was determined by Kjeldahl (AOAC, 1995), acid detergent fiber (ADF) and neutral detergent fiber (NDF) were measured by the method of Goering & Van Soest (1970), and *in vitro* dry matter digestibility (IVDMD) was determined by the method of Moore (1970).

Results Crude protein content decreased with progressed maturity at harvest. As harvest stage delayed, TDN concentration of whole-crop rice increased. The contents of ADF and NDF decreased with harvest maturity. This was in line with the results of Brundage *et al.* (1979), that the highest ADF and NDF content in oats were found at flowering stage. The highest DM yield was at the ripe stage and the early-maturity rice cultivar (Suwon 468) gave higher yields than the late cultivar (Dongjin). The DM yield of all varieties was low. This was associated with a late sowing date. Total digestible nutrient (TDN) yield followed a similar trend to DM yield.

Table 1 The content of crude protein (CP), ADF, NDF, TDN and IVDMD and yield of forage rice harvested at four different growth stages

Varieties	Harvest stage	CP (%)	ADF (%)	NDF (%)	TDN (%)	IVDMD (%)	DM (%)	Yield (kg/ha)	
								DM	TDN
Dongjin	Heading	10.6	33.6	68.7	62.2	45.6	22.2	5,761	3,584
	Milk	7.6	32.9	65.8	62.9	51.5	31.0	7,811	4,914
	Dough	6.2	31.9	63.9	63.7	48.8	33.2	9,644	6,141
	Ripe	5.8	30.3	63.2	65.0	59.3	42.0	10,687	6,947
Suwon 468	Heading	13.5	33.5	67.9	62.5	55.9	20.0	6,038	3,772
	Milk	10.2	32.9	64.6	62.9	53.8	32.2	7,513	4,728
	Dough	8.6	30.7	63.1	64.6	57.5	41.2	9,798	6,332
	Ripe	8.6	31.1	63.2	64.3	53.7	43.2	12,137	7,807

Conclusions The experiments presented here show that whole-crop rice may provide a reasonably high quality feed for ruminants. It may cover the shortage of forage for ruminants in Korea and substitute for imported forage.

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