

Effect of potato pulp silage on urea nitrogen content in serum and fecal nitrogen excretion by lactating cows grazed on artificial temperate pasture

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Introduction High urea nitrogen contents of serum and milk are often shown in lactating cows grazed on artificial temperate pasture because of high degradable protein intake from the pasture. The high urea nitrogen contents cause declines of protein and energy utilization efficiencies by the cows. Urea nitrogen contents of serum and milk in grazing cows fed potato pulp silage were lower than the cows fed rolled corn as energy supplements (Hanada *et al.*, 2005). The decreases of the urea nitrogen contents were probably due to decrease of non-protein nitrogen absorption from lower intestine since ammonium nitrogen concentration in the rumen was not affected by the supplements. The objective of this trial was to investigate the effect of potato pulp silage on urea nitrogen contents in milk and serum and fecal nitrogen output of grazing cows.

Materials and methods This experiment was conducted using temperate pasture consisted of orchardgrass, Kentucky blue grass and white clover in north part of Japan. The pasture was continuously stocked by twelve Holstein cows from May to October. After one month of adaptation period, the cows were divided into two groups and received supplement including rolled corn (RC) or potato pulp silage (PS). The supplements were offered before and after morning and evening milking to satisfy 35% of digestible energy requirements of the cows. Chromium dioxide was dosed twice a day to estimate fecal dry matter output. Milk yield was recorded every day and feed, milk, serum, rumen juice and fecal samples were collected in June, July, September and October.

Results and discussion Crude protein contents of the pasture ranged from 19.2% to 23.1%. Dry matter intake from supplement was higher in PS than in RC, but crude protein intake did not differ between the treatments, because crude protein content in the potato pulp silage (3.5%) was lower than that of the rolled corn (6.8%). Milk yield ranged from 17 to 23 kg/day in RC and from 21 to 25 kg/day in PS, but there was no significant difference between the treatments. Serum and milk urea nitrogen in PS were lower than that in RC through the experimental period ($P < 0.01$). Also, fecal pH was low in cows fed potato pulp silage compared with the cows fed the rolled corn ($P < 0.05$). Fecal nitrogen excretion tended to be more in PS compared with RC. These results suggest that large intestinal fermentation of the cows is enhanced by feeding the potato pulp silage. It has been reported that large intestinal carbohydrate fermentation in dairy cows converts some nitrogen excretion from urine to feces (Gressley and Armentano, 2005).

Table 1 Urea nitrogen contents of serum and milk, fecal pH and nitrogen excretion in grazing cows fed rolled corn (RC) or potato pulp silage (PS) based diets.

Month	Serum urea nitrogen, mg/100ml			Milk urea nitrogen, mg/100ml			Fecal pH			Fecal nitrogen excretion, g/day		
	RC	PS	P-value	RC	PS	P-value	RC	PS	P-value	RC	PS	P-value
Jun.	16.5	10.0	<0.001	15.6	10.9	<0.001	6.38	5.98	0.001	127	134	0.495
Jul.	18.9	11.9	<0.001	17.9	13.8	<0.001	6.28	6.05	0.031	118	132	0.002
Sep.	20.9	14.8	0.001	17.9	14.6	<0.001	6.31	5.94	0.001	143	156	0.199
Oct.	13.9	8.8	0.002	15.6	11.4	0.002	6.96	6.32	0.007	136	151	0.091

Conclusion High urea nitrogen contents of serum and milk, which are one of the nutritional concerns in lactating cows grazed on artificial temperate pasture, could be decreased by feeding the potato pulp silage, because the potato pulp silage enhances large intestinal fermentation and decrease nitrogen absorption from large intestine of grazing cows.

References

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