HIGH MOISTURE CORN SUPPLEMENTATION OF DIFFERENT DRY MATTER CONTENT TO COWS GRAZING TEMPERATE PASTURE

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ABSTRACT
The objective of this study was to evaluate grazing dairy cows performance supplemented with high moisture corn of different dry matter content. Cows grazed fresh forage oat day and night and received 5 kg DM high moisture corn daily. Treatments 1 and 2 were high moisture corn of 30% and 18% moisture content respectively. Twenty Holstein cows were used for milk production and composition studies and six rumen fistulated cows were used for rumen digestion studies. Milk production and composition and body weight gain were not affected by the dry matter content of the supplemented high moisture corn. Related to rumen digestion, there were no differences in rumen fluid pH, ammonia and total volatile fatty acids concentration. Acetic, propionic and butiric acids concentration were also similar in both treatments but the acetic:propionic ratio was lower in rumen fluid of cows supplemented with high moisture corn with 30% water. Corn dry matter soluble fraction and potential digestion at ruminal level were similar for both types of high moisture corn but rate of digestion was higher in cows fed high moisture corn with the higher moisture content.

KEYWORDS
Dairy cows, high moisture corn, grazing, ruminal digestion, milk composition

INTRODUCTION
Milk production in Argentina is based on perennial pastures and annual crop for grazing. Concentrate supplement is normally fed to high producing cows and on average it represents no more than 30% of the total diet. The main supplements used are commercial concentrates but cereal grains may constitute a cheaper alternative for cows grazing temperate pasture of high protein content. Milk production may be improved when high moistre corn (HMC) instead of dry corn is supplemented to dairy cows grazing high quality temperate pasture (Clark, 1975). Due to its higher starch degradability in rumen, HMC seems to adjust better than dry corn to the high degradable protein of temperate pasture (Hoover and Stokes, 1991). Starch degradability depends on moisture content of the supplemented grain and it may affect dairy perfomance of cows grazing pasture (Theurer, 1986). The recommended dry matter content of HMC is 70-74% but sometimes corn is harvested and storaged more mature with a lower moisture content. The objective of the trials was to evaluate the effects of HMC of different dry matter content on intake, rumen digestion and milk yield and composition in dairy cows grazing forage oats *(Avena sativa*).

MATERIALS AND METHODS
Twenty Holstein cows of early-middle lactation (80 days average) in a completly randomized design adjusted by covariance were used to study milk production and composition, and six Holstein cows with rumen canulae, were used in a cross-over design with two treatments and two 14 day periods in the digestion study. Trials were carried out at EEA INTA Balcarce during 30 days (June 5th to July 4th of 1995). Cows grazed fresh oat forage day and night and received concentrate supplement during milking. Treatments were: T0: 5 kg DM/cow HMC with 30% moisture; and T1: 5 kg DM/cow HMC with 18% moisture. Pasture dry matter intake was estimated measuring forage available before and after grazing (Meijs, 1981). Oat forage and HMC quality were analyzed for digestibility, crude protein and fiber content. Rumen fluid samples were taken on fistulated steers every four hours during one day in each period and analyzed for pH, NH3 and volatile fatty acid (VFA) concentration and composition. Dry matter degradation of HMC at ruminal level was estimated using the nylon bag technique and the model developed by Orskov and McDonald (1979). Individual milk production was measured daily and milk composition was measured from individual samples taken during five non consecutive days in the last two weeks of the trial. All cows were weighed two consecutive days at the beginning and at the end of the trial.

RESULTS AND DISCUSSION
Pasture availability was 3900 kg DM/ha, or 30 kg DM/cow/day. According to Meijs (1981) this availability would not be a limiting factor for intake. Quality of oat pasture, HMC 30% moisture and HMC 18% moisture were 177 g/kg, 98.8 g/kg and 99.4 g/kg; 287 g/kg, 136 g/kg and 114 g/kg; and 82.7% g/kg, 89.4 % and 91.0 % for CP, NDF and In Vitro Dry Matter Digestibility respectively. Estimated oat forage intake was 15 kg DM/cow/day therefore total dry matter intake was 20 kg/cow/day Milk production and composition were similar in both treatments and data are presented in Table 1. Cows in both treatments had similar body weight gain.

Daily average rumen fluid pH and ammonia concentration were not different between treatment (Table 2). Similar results were observed with ammonia and total VFA concentration. Acetate:propionate ratio was lower in cows supplemented with HMC with 30% moisture content. A higher rate of corn starch digestion at ruminal level with that HMC may be the cause of the lower acetate:propionate ratio.

Total DMI and milk production and composition were the same for both treatments. Even when pH, ammonia and total VFA concentration were not statiscally different between treatments, dry matter content of HMC seems to affect ruminal digestion because acetate:propionate ratio was lower in cows fed corn with the higher moisture content. Milk fat content was not affected by the difference in acetate:propionate ratio between both groups.

In conclusion we can say that under these trial conditions, the dry matter content of high moisture corn supplemented to dairy cows grazing high quality temperate pasture affected dry matter digestion rate and acetate:propionate ratio of rumen fluid but those changes were not enough to affect milk production and composition.

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Table 1
Milk production and composition

	Treatment		
	T0	**T1**	**SEM[z]**
Milk yield l/cow/day	20.61	19.95	1.23
Fat g/kg	35.8	35.4	0.24
Fat g/cow/day	737	706	0.10
Protein g/kg	32.9	32.6	0.09
Protein g/cow/day	678	650	0.02
Lactose g/kg	48.7	48.6	0.07
Total solids g/kg	124	123	0.28
Solids no fat g/kg	88.6	88.3	0.13

[z] Standard error of the mean (20 observations per mean).

Table 2

Rumen environment and corn dry matter dynamic digestion

	Treatment		
	T0	**T1**	**SEM[z]**
Rumen environment			
pH	5.62	5.56	0.179
NH3 mg/dl	7.48	8.55	4.97
VFA mmol/l	87.90	92.31	32.19
Acetic ac. mmol/l	54.28	58.11	18.86
Propionic ac mmol/l	22.04	21.59	9.29
Butiric ac mmol/l	11.57	12.60	4.65
Acetic:propionic	2.61[a]	2.86[b]	0.43
Dinamic digestion			
Soluble fracción %	10.4	4.9	4.77
Potential digestion %	75.43	80.02	7.68
Digestion rate %/hs	7.60[a]	4.13[b]	1.16

[z] Standard error of the mean (20 observations per mean).
[a b] Values on the same line with different superscrips are different, $P<0.05$