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Effect of dietary supplementation with malt extracts on milk production

G. Biagi[1], I. Fusaro[2], P. Pezzi[2], A. Formigoni[1]

[1] Dipartimento di Morfofisiologia Veterinaria e Produzioni Animali. Università di Bologna, Italy
[2] Dipartimento di Scienze degli Alimenti. Università di Teramo, Italy

Corresponding author: Giacomo Biagi. Dipartimento di Morfofisiologia Veterinaria e Produzioni Animali. Facoltà di Medicina Veterinaria, Università di Bologna. Via Tolara di Sopra 50, 40064 Ozzano dell'Emilia (BO), Italy - Tel. +39 051 2097379 - Fax: +39 051 2097373 - Email: gbiagi@vet.unibo.it

ABSTRACT: The transition period of a cow is characterized by marked changes in metabolism as the cow prepares for parturition and lactogenesis. Aim of the present study was the evaluation of the effect of feeding dairy cows with malt extracts on milk production. Ten days before calving, 22 multiparous Holstein dairy cows were divided in two groups and received for four months the same base diet added with an experimental concentrate (1.5kg/cow/day) containing either corn starch and malt extracts (ME) or only corn starch (CS) as the main energy source. Dry matter intake was not influenced by treatment and averaged 21.7kg of DM/cow/day. The use of malt extracts determined a numerical increase of milk yield (+0.7kg/cow/day, i.e. +2.5%) but this difference did not reach the significance level. Milk quality parameters were not influenced by treatment. Further studies will be needed to assess if feeding diets rich in very high fermentable carbohydrates to transition dairy cows can be a valuable strategy.

Key words: Dairy cow, Transition period, Malt extracts, Milk production.

INTRODUCTION – The transition period of a cow is generally defined as 3wk before calving to 3 wk after calving. This period is characterized by marked changes in metabolism as the cow prepares for parturition and lactogenesis. Metabolic disorders are common during this time. Proper nutrition and management during the transition period can have major benefits on health and lactational performance. Researchers (Curtis *et al.*, 1985) have suggested that increasing the energy intake during the transition period may have positive effects on health, lactation and reproductive performance of high producing lactating cows. One way to increase the energy supplied to the cow is to increase ruminal carbohydrate availability through the use of different grain processing (Owens *et al*, 1997). Feeding diets with high ruminal carbohydrate availability during the prepartum period helps acclimating the microbial population to postpartum diets, promoting ruminal papillae development, increasing absorptive capacity of the rumen epithelium, and reducing lipolysis by increasing glucogenic precursors (Grummer, 1995). However, no studies have compared the feeding value of ruminal highly available carbohydrates during the transition period. Aim of the present study was the evaluation of the effect of feeding dairy cows with malt extracts on milk production.

MATERIAL AND METHODS – The Ethical Committee of the University of Bologna reviewed and approved the experimental protocol. Ten days before calving, 22 multiparous Holstein dairy cows were divided in two groups (homogenous for milk yield, milk quality, age, BCS, and lactation number) and received for four months the same base diet (mixed hay 5kg, alfalfa hay 6kg, concentrates 9.5kg) added with an experimental concentrate (1.5kg/cow/day; Table 1) containing either starch and malt extracts (ME) or only starch (CS). Diets were formulated to provide the same amount of energy and protein. Concentrates were administered by an automatic self feeding system. Milk production and feed consumption were recorded weekly. At 30, 60, 90, and 120 days after trial start, milk samples from each cow were collected and analyzed (AOAC, 2000). Plasma samples were collected from each animal 10 days before and 7, 15, and 45 days after calving. Milk production and quality data were analyzed by repeated measures ANOVA using the SPSS MANOVA procedure. Plasma data were analyzed with the t test for each single time-point.

Table 1. Composition of the experimental concentrates (%).

Item	CS	ME
Wheat flour middlings	22.0	21.0
Corn gluten feed	22.0	21.0
Corn ground	22.0	18.0
Faba bean	16.5	16.5
Malt extracts	—	7.0
Barley	5.0	4.0
Sorghum	5.0	4.0
Sunflower seed meal	1.5	1.0
Soybean meal	1.5	3.0
Linseed meal	1.5	1.5
Dicalcium phosphate	1.5	1.5
Yeasts	1.0	1.0
Magnesium oxide	0.5	0.5
Chemical composition (% DM)		
Crude protein	18.23	17.99
Ether extract	3.83	3.62
Crude fibre	6.80	7.10
Ash	6.74	6.14
NDF	23.21	21.21
ADF	10.01	8.61
ADL	1.53	1.42
Starch	38.81	38.24
NPN	3.38	4.42
Soluble protein	8.50	8.56
NDIP	0.77	1.00
ADIP	0.33	0.48

Table 2. Average milk daily production and milk quality in dairy cows receiving an experimental concentrate containing malt extracts (ME) or not (CS).

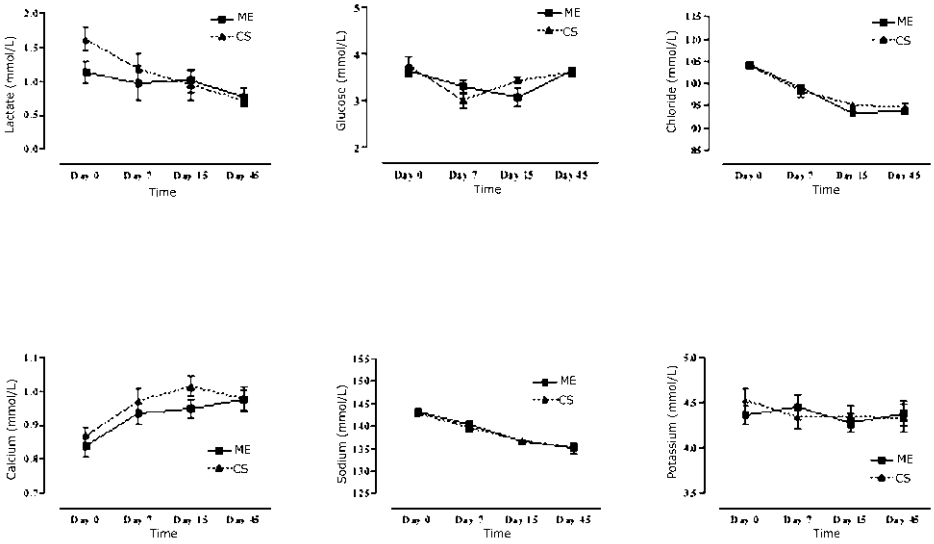
				Pooled	Anova P value		
Item		CS	ME	SEM	Diet	Time	Diet x time
Observations	n	11	11				
Milk production	kg/cow/day	35.9	36.8	1.70	0.77	< 0.001	0.09
Protein	%	2.99	3.01	0.07	0.92	0.31	0.22
Fat	%	3.39	3.28	0.18	0.58	< 0.001	0.42
Lactose	%	4.90	4.89	0.10	0.66	0.36	0.69
SCS*		1.97	2.21	0.07	0.97	0.59	0.63

** Somatic cells score was calculated using the method proposed by Ali and Shook (1980).*

RESULTS AND CONCLUSIONS – Milk production and quality results are briefly summarized in Table 2. Dry matter intake was not influenced by treatment and averaged 21.7 kg of DM/cow/day. Throughout the study, the use of malt extracts determined a numerical increase of milk yield (+0.7 kg/cow/day, i.e. +2.5%) but this difference

did not reach the significance level. Milk quality parameters were not influenced by treatment. Milk fat content was affected by time and significantly decreased from 3.6% at Day 30 to 3.0% at trial end (Day 120).
Plasma concentrations of lactate, glucose, chloride, ionized calcium, and sodium were significantly influenced by time (P<0.05) but not by treatment (Figure 1).

Figure 1. Plasma concentrations of lactate, glucose, chloride, ionized calcium, sodium, and potassium (mmol/L; means±SEM) 10 days before (Day 0) and 7, 15, and 45 days after calving in dairy cows receiving an experimental concentrate containing either malt extracts (ME) or not (CS).



In this study, malt extracts failed to exert a statistically significant beneficial effect on milk production and quality. Further studies will be needed to assess if feeding diets rich in very high fermentable carbohydrates to transition dairy cows can be a valuable strategy.

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