Session S.05
Abstr. No 3854
Present. No 35

Effect of dietary attapulgite clay on performance and blood parameters of lactating Holstein cows

V.A. Bampidis[1*], V. Christodoulou[2], N. Theophillou[3]

[1]Department of Animal Production, School of Agricultural Technology, Alexander Technological Educational Institute, 57400 Thessaloniki, Greece; [2]Animal Research Institute, National Agricultural Research Foundation (N.AG.RE.F.), 58100 Giannitsa, Greece; [3]Geohellas S.A., P. Faliro, 17564 Athens, Greece.
* Corresponding author. Tel.: +30 231 0791313; fax: +30 231 0791325. E-mail address: bampidis@ap.teithe.gr (V.A. Bampidis).

INTRODUCTION

Attapulgite clay (AC) is formed by attapulgite and saponite, which are complex hydrated magnesium aluminum silicates. There is no information on the effect of dietary attapulgite clay for ruminants. Thus, the objective of this study was to evaluate attapulgite supplementation in diets of lactating Holstein cows relative to performance and chemical composition of milk and hematological values and serum biochemical constituents.

MATERIALS & METHODS

Sixteen lactating Holstein cows were used in an experiment to determine effects of dietary AC supplementation on productivity and milk composition, and blood parameters. In the experiment, which started on week 12 postpartum, cows were allocated, after equal distribution relative to milk yield and lactation number (i.e., 2 or 3), into 2 treatments being AC0 and AC10 of 8 cows each. For a period of 12 weeks (i.e., weeks 12-24 postpartum), cows were fed one of two isonitrogenous (crude protein 178 g/kg, dry matter – DM basis) and isoenergetic (net energy for lactation 7.85 MJ/kg, DM basis) concentrates (12.3 kg DM/cow/day), alfalfa hay (5.4 kg DM/cow/day), corn silage (3.3 kg DM/cow/day) and wheat straw (1.8 kg DM/cow/day, DM basis). The AC was added to the concentrate mixture at inclusion levels (as mixed basis) of 0 and 10 kg/t for treatments AC0 and AC10, respectively. Feed intake was measured daily for each cow. Cows had free access to water and were machine milked twice daily. Health status and behavior of all cows was monitored on daily basis. Milk yield was recorded weekly during 13 morning and afternoon milkings, and milk samples were collected from each cow, after cleaning and disinfecting the teats. Milk samples were analyzed for fat, protein, lactose and solid-not-fat (SNF) with IR spectroscopy (Milkoscan 4000, TESCO, Denmark) according to methods of AOAC (1). Ash was calculated as SNF minus protein and lactose. Milk samples were also analyzed for somatic cell counts (SCC; Fossomatic 4000 cell counter, TESCO, Denmark), and for colony forming units (CFU; Bactoscan 8000, TESCO, Denmark). Blood samples were obtained from all 16 cows at the start (week 12 postpartum) and during (weeks 16 and 20 postpartum) the study for hematological value analysis (2) and serum biochemical constituent analysis (3). Average performance and milk composition of cows were analyzed as repeated measures using analysis of variance procedures (4) with linear effect of treatment, time, and treatment by time interactions included in the model. Blood parameters of cows were statistically analyzed by one-way analysis of variance (4).

RESULTS

Cows remained healthy until the end of the experiment without altering their behavior. There were no feed refusals, and so feed consumption was the same between treatments. During the experiment, there were no differences between AC0 and AC10 treatments (P>0.05) in milk fat (31.7 g/kg), protein (33.6 g/kg), lactose (48.9 g/kg) or ash (6.7 g/kg) contents. Average milk yield, yields of components and SCC were not affected (P>0.05) with AC feeding (Table), except for protein yield that increased (P<0.001) and CFU that decreased (P<0.001). Moreover, no differences in blood parameters occurred (P>0.05) between treatments.

Figure. Lactation curves of cows as influenced by supplemental dietary attapulgite clay.

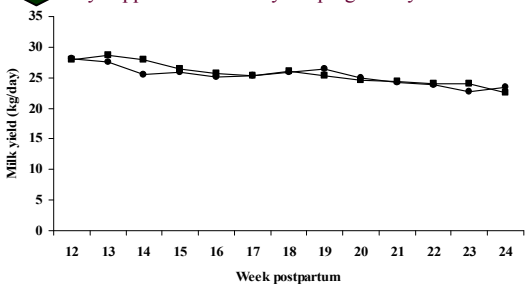

Table. Milk yield and composition of cows (week 12 to 24 postpartum).

Yield (kg/cow/day)	AC0[a]	AC10	SEM	Treatment effect[b]
Milk	25.0	25.4	0.234	0.420
Fat	0.80	0.79	0.017	0.686
Protein	0.82	0.86	0.005	<0.001
Lactose	1.23	1.24	0.012	0.497
Ash	0.17	0.17	0.002	0.308
SCC[c] (×1000/ml)	139.1	103.5	12.57	0.172
CFU[d] (×1000/ml)	59.3	41.2	2.48	<0.001

[a] AC0 (●) = treatment with no AC supplementation, AC10 (■) = treatment with 10 kg/t AC. [b] Numbers are probability values. Treatment × Time interactions for milk yield are illustrated in Figure. [c] Somatic cell counts. [d] Colony forming units.

CONCLUSION: Dietary attapulgite clay supplementation, at levels up to 10 kg/t, in isonitrogenous and iso (net energy) energetic diets for lactating cows increased protein yield and decreased colony forming units, while it did not affect other production traits.

ACKNOWLEDGEMENTS

The authors thank Geohellas S.A. (Athens, Greece) for providing the attapulgite clay, the staff of Animal Research Institute, N.AG.RE.F. (Giannitsa, Greece), especially Mr. P. Mitrentzis, for help provided during this study, as well as Greek Dairy Organization (Paralimni-Giannitsa, Greece) for milk sample analysis.

References:

1. Association of Official Analytical Chemists, 1990. Official Methods of Analysis of the AOAC. Helrich, K. (Ed), 15th ed. Arlington, Virginia, USA. **2.** Thrall, M.A., Glade Weiser, M., 2002. Hematology. In: Hendrix, C.M. (Ed.) Laboratory Procedures for Veterinary Technicians, 4th ed. Mosby Inc., Elsevier Science, St. Louis, MI, USA, pp. 29–74. **3.** Colville, J., 2002. Blood Chemistry. In: Hendrix, C.M. (Ed.) Laboratory Procedures for Veterinary Technicians, 4th ed. Mosby Inc., Elsevier Science, St. Louis, MI, USA, pp. 75–103. **4.** Steel, R.G.D., Torrie, J.H., 1980. Principles and Procedures of Statistics. A Biometrical Approach, 2nd ed. McGraw-Hill Book Co., New York, NY, USA.