CLINICAL OBSERVATIONS IN CALVES FED COLOSTRUM SUPPLEMENTED WITH CLINOPTILOLITE

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Summary

Neonatal calf diarrhea is the most common disease that affects newborn calves leading to high mortality and high economical losses. Adding clinoptilolite (natural zeolites) in colostrum reduces the incidence of diarrhea syndrome.
In this work was investigate the effect of short-term supplimentation of clinoptilolite (*Min-a-Zel S*) suspension added in colostrum on calves health status and performance until weaning.

Key words: calf, clinoptilolite, neonatal diarrhea, colostrum

Zeolites are crystalline, hydrated aluminosilicate of alkali and alkaline earth cations which possess three-dimendional crystal structures. They have the ability to lose and gain water reversibly, to adsorb molecules of appropriate cross-sectional diameter and to exchange their constituient cations without major change in their structure (8, 9).

This unique properties allows zeolites to be used in a wide range of industrial (water and wastewater treatment, adsorption of radioactive elements, as catalysts in the petrochimical industry, absorbantes for oil), agricultural (soil treatement, odor control), aquaculture (amonia filtration in fish hatcheries, biofilter media), horticulture (used in greenhouses, floriculture) and medical applications (in anticancer therapy, antidiarrheic drug for humans) (8, 10, 19, 20).

In animal nutrition natural and synthetic zeolites are used, mainly to improve production. Researches had demonstrated that their use additionally has favorable effects on the prevention and/or treatment of certain farm animal diseases. Clinoptilolite has high adsorption indexes *in vitro*, more than 80%, for aflatoxins B_1 and G_2 agents that produce mycotoxicoses (9). On high producing dairy cows, zeolite A is used for the prevention of milk fever (16, 17), of ketosis (6); also zeolites are used for the prevention of heavy metal toxicity in animals, in elimination of gas polluants in confinemet facilites (9), against zearalelone toxicosis in pigs and lambs (2, 13).

In newborn calves, clinoptilolite is used to increase immunoglobulin absorption. Due to the ruminants specific type of placenta, the calves are born agammaglobulinemic. The transfer of passive immunity is achieved through

colostrum in the first 24-36 hours after parturition, because intestinal epithelium remains permeable for gamma globulins in this interval (15).

Short-term consequence of failure of passive transfer (FPT) in calves is high morbidity and mortality and on long-term affects performance and productivity. Robinson et al. (11) reported 6,78% mortality in the first 6 months, in heifers who had <12 mg/ml IgG at 24/48 h postpartum in comparison with only 3.33% mortality for those who had >12 mg/ml IgG at 24/48 h postpartum. Virtala et al. (1996) reported low performance, less with 0,048 kg/day in heifers with FPT (11, 18).

Improving the transfer of IgG and also reduceing morbidity in calf neonatal period can be obtained by adding clinoptilolite, natural zeolite in colostrum. Cernescu (1), Gvozdic et al. (5) and Fratric (3, 4) reported good results. According to those researchers clinoptilolite added in colostrum increased the net absorption with 40% of IgG in calves serum, reducing the number of calves with health problems (1, 3, 4, 5).

Materials and methods

The study was carried out on 26 newborn Romanian Black and White calves from the University Research Farm, between July 2008 and January 2009. Calves were divided in three groups, one representing control group (n=10) and the others experimental groups (E1, n=10; E2, n=6). All calves were bottle fed two times daily, with their mothers' colostrum 1.5L, at 12 hours interval.

Calves from experimental group I received colostrum with 5g/L clinoptilolite, starting immediately after parturition, at 12 and 24 hours. In the second experimental group, calves received 20g/L clinoptilolite in the same interval as the first experimental group.

Values of growth performance are expressed as means ± SX. Statistical analysis was performed by Mann-Whitney U Test.

Results and discussions

In this work we investigate the effect of clinoptilolite (*Min-a-Zel S,* PATENTKOMERC, Serbia) suspension added in colostrum on calves health status and growth performance till weaning.

The number of calves from experimental groups had less diarrhea symptoms that calves from control group, the results are presented in Fig. 1.

Clinioptilolite added in colostrum appeares to reduce the incidence of diarrhea, this could be a result of: alteration of metabolic acidosis through effects on osmotic pressure in the intestinal lumen; or through retention of the enterotoxigenic *Escherichia coli* thus limiting its attachement to the intestinal cell-membrane receptors (Ramu et al. quoted by 12).

Sadeghi and Shawrang (12) demonstred that adding 0.5g and 1g/kg body weight per day in colostrum and milk through 45 days reduced fecal score and its

severity. This results are caused by retarding effect of clinoptilolite on intestinal passage rate. Their water adsorption property leads to the appearance of drier and more compact feces (Mumpton and Fishman quoted by 12).

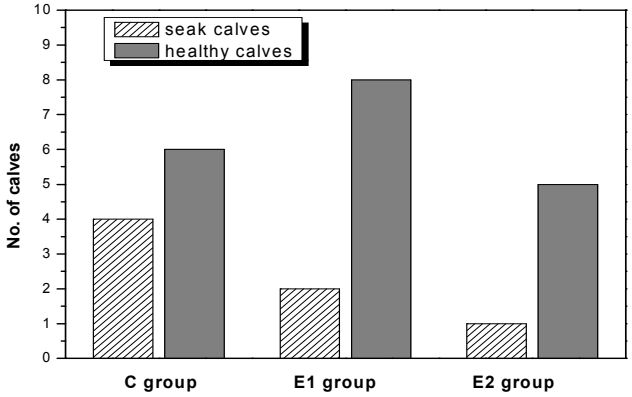

Fig. 1. Calf health status

Body mass was measured at parturition, at 45 and 90 days. Body mass in both groups at different time intervals and statistical signifiance of differences between them are presented in Table 2 and Fig. 2.

Table 2

Body mass between groups (mean ± SX)

Parameters	Control group (C)	Experimental group I (E1)	Experimental group II (E2)
n	10	10	6
Body mass at parturition (kg)	33.00 ± 1.92	35.60 ± 1.34	35.33 ± 1.41
Body mass at 45 days (kg)	47.11 ± 2.00	54.70* ± 1.67	52.83 ± 1.92
Body mass at 90 days (kg)	82.00 ± 3.19	87.90 ± 1.54	87.33 ± 5.46

* - significantly different

Body mass at birth (Table 2) of calves on group E1 and E2 were higher ($p<0.32$, respectivily $p<0.38$) than those on control group (33.00 kg, 35.60 kg and 35.33 kg).

At 45 days after parturition, body mass of calves from E1 and E2 treated with clinoptilolite was higher in comparison to control, but only in group E1 the

difference was significant (p<0.01)(E1/C= +16,11%), in group E2 the difference was not significant (p<0.06)(E2/C= +12.14%). This difference regarding performance at 45 days may be explained by the high number of calves from control group that had health problems and this affected the daily gain. Different clinoptilolite content (5g/L, 20g/L) didn't influence body mass at 45 days post partum (p<0.51)(E2/E1= -3.41%).

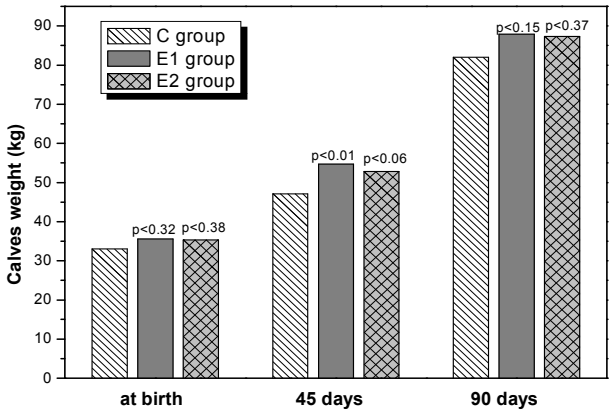

Fig. 2. Evolution of calves body mass

At 90 days the differences between experimental and control groups were not significantly higher (p<0.15, p<0.37)(E1/C= +7.19 %, E2/C= +6.5%). Different clinoptilolite content (5g/L, 20g/L) didn't influence the weight at 90 days post partum (p<0.58)(E2/E1= -0.64%).

This resultes are in accordance with those of Step et al. (14) who proved that body mass and average daily gain did not differ among treatment groups (0.5% and 2% clinoptilolite). Mohri et al. (7) reported no significant difference for performace in calves fed with clinoptilite 2% (in the first 48h post partum or for 14 days).

Conclusions

Adding clinoptilolite in colostrum in the first 24 hours post partum reduced the incidence of diarrhea syndrome and improved the body mass at 45 days post partum and at 90 days after parturition. The number of calves with diarrhea was lower in experimental groups compared to control group.

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