Study on Serumic Levels of Zn on Intern Holstein Cows and Their Calves During Colostrum Nutrition

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ABSTRACT

Zinc is an essential trace element that has an important role in livestock metabolism. The aim of this study was the evaluation of zinc serumic levels in cows and their calves due to colostrum consumption after birth. In this study 40 intern cows and their calves were collected. Samples were taken from cows 24h and at calving time; and from calves at 0, 24, 48 and 72h of calving. Serumic levels of zinc in cows were 151.9±4.12 µg/dl and 129.6±2.33 µg/dl respectively. Serum levels of Zn in calves at birth was 137.7±1.42 µg/dl that has significant (P<0.05) Increase in contrast with mothers. Zn levels at 24, 48 and 72h after birth were 144.8±4.51, 155.4±3.61 and 156.6±4.11 µg/dl respectively. The results show that serumic levels of Zn in cows at parturition time were lower than the calves and in calves due to colostrum nutrition increase more and more.

Key words: Zn, Holstein cows, Calves, Colostrum.

Introduction

Micro elements have a number of structural catalytic and regulatory function in the organism and also play a major role in the immune system [12]. The calf metabolism is affected by nutrition and thus also by pregnant cow metabolism and the early post natal period mainly by means of colostrum intake [10] Colostrum is a vital source of nutrients and Passive Immunity for neonatal calves. Survival of newborn calves is dependent on sufficient colostrum’s intake soon afterbirth [6]. It also provides newborn calves not only with basic nutrition but also with Immunoglobulins, a high volume of vitamins (mostly soluble in fat), minerals and also a series of unspecified antibacterial factors (Interfron, lactoperoxidase, lactoferrin) and cells that strengthen in various ways the defense function of the newborns [1,2]. In mice deprived of colostrum intake some clinical signs appear which removed with oral administration of inorganic zinc. Therefore it was concluded that colostrum has a much higher content of zinc than late milk and that deprivation of colostrums lead to manifestation of Zn deficiency in suckling mice [8]. This trial was undertaken to determine serumic Zn levels of newborn calves at 0, 24, 48 and 72 hrs. After birth and their mother 24h before and at parturition time, and evaluation the effects of colostrum intake on blood serumic levels of Zn in calves.

Material and Methods

This study was done on 40 Healthy female Holstain cows at a range of 2-3 years old and their calves (20 male and 20 female) from an industrial farm. All of the cows classified as high production and were on the last day of pregnancy. All the selected cattle’s and their calves’ reared under the same management and environmental conditions.
The common food available for the mothers consisted mainly of forage (alfa alfa) and plate food (based on S.B.M, barley, corn and supplements). All newborn calves were left with their mothers and housed in their special sites; in these sites they were fed 3 days withcolostrum and milk. All newborn calves and their mothers were subjected to clinical investigations; No metabolic or reproductive disorders occurred for cows around parturition. Also there was no evidence of health disorders among calves in all groups. Blood was drawn from the jugular vain of all mother cows 24h before and at parturition time and from their calves at calving time and 24, 48 and 72h after birth. It is necessary to say that when a reproductive or metabolic disorder happens to a cow or calf, that case was rejected from study (sampling continued until 20 male and 20 female calves’ blood samples were collected). After sampling blood was allowed to coagulate and the harvested serum was stored at freezing condition until processing. Blood serum Zn was determined spectrophotometricaly by using already manufactured colourometric test kits (Giesse diagnostic co. Italy). With Alcyon 300 auto analyzer. Collected data’s in various times and sex in calves and various times in mothers against their calves analysed by T-test, with the SPSS program windows (version 14). Significant levels were set at p < 0.05.

**Table 1:** Mean serumic levels of Zn in cows and calves according to different time (µg/dl).

<table>
<thead>
<tr>
<th>Zinc serumic levels</th>
<th>Cow 24h before parturition</th>
<th>Cow at Parturition time</th>
<th>Calf at birth time</th>
<th>Calf 24h after birth</th>
<th>Calf 48h after birth</th>
<th>Calf 72h after birth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>151.9±14.12 a</td>
<td>129.6±2.33 b</td>
<td>137.7±1.42 a</td>
<td>144.8±4.51 a</td>
<td>155.4±3.61 a</td>
<td>156.6±4.11 a</td>
</tr>
</tbody>
</table>

Dissimilar letters in each line show significant difference between times (p<0.05).

**Table 2:** Mean serumic levels of zinc in calves according to sex in different times (µg/dl).

<table>
<thead>
<tr>
<th>Zinc serumic levels</th>
<th>Calf at birth time</th>
<th>Calf 24h after birth</th>
<th>Calf 48h after birth</th>
<th>Calf 72h after birth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>138.8±3.52 a</td>
<td>132.25±3.8 a</td>
<td>144.00±4.22 b</td>
<td>148.00±3.1 b</td>
</tr>
<tr>
<td></td>
<td>142.75±2.02 a</td>
<td>151.5±101 b</td>
<td>160.00±4.75 b</td>
<td>162.33±4.10 b</td>
</tr>
</tbody>
</table>

Dissimilar letters in each line show significant difference between times (p<0.05).

*sign in each column shows significant difference between sex in different times

The results from the study suggested that colostral nutrition as soon as after birth play an important role to provide zinc for calves and in this way guaranteed their health and postnatal period growth.

Results:

Mean serum trace element (Zn) for all calves and their mothers according to different times are shown in table 1. The units are µg/dl and p <0.05. According to this table mean serum zinc levels in mothers at parturition time shows significant decrease in contrast with other times (p<0.05). Table 2 shows mean serumic levels of zinc in calves according to time and sex. This table shows that there is a significant increase at 48 and 72h after birth in contrast with 24h after and at birth time in males; and in females we have a significant increase in zinc levels in all times in contrast with birth time; Also except the calving time significant increase are seen in female calves in contrast with males (p<0.05).

Discussion:

In this study serumic Zn levels of mothers at parturition time have the lowest amount and show significant decrease in contrast with calves in other time and calves at birth have higher amounts. There is no clear reason for this shortage at parturition time but Radostits et al. [11] in veterinary medicine with indicating this fact reports that exactly before the parturition plasma zinc levels decrease in cows but after that, increase to normal range. This shortage in distocia is more severe than the normal parturition. It's imagining that in beef haifers some times distocia is due to Zn deficiency [11] which is possibly because Zn transfers to mammary gland and colostrum's [3]. Colostrum is rich in Zn [5,9] and because of calf high capacity to mineral absorption specially in first days [11,7] therefor with colostral consuming serum Zn level will increase. According to this fact; serum Zn elevation in calves at 24, 48 and 72h after birth can be described. Serumic zinc levels in female calves were higher than males and except the birth time in other times, there were significant increase in females rather than males. These differences may happen because of post-calving period nutrition in female calves. These results agree with the reports of mohamad [7], which report that serum Zn levels of newborn calves increase significantly in the first 3 weeks of life than the first day. Furthermore; this agrees with pavlata et al. [9] which reports that blood zinc concentration of newborn calves is significantly higher than their mothers, which means that the calf organs can accumulate Zn during intra uterine development.

Copper in sheep colostrum is greatly elevated compared with Cu in bovine colostrum [6]. Bovine colostrums contain elevated concentration of Zn [4]. Nishimura [8] reports that in mice deprived of colostrum intake, some clinical signs appear which removed with oral administration of inorganic Zn. Results from this study suggested that colostral nutrition as soon as after birth play an important role to provide zinc for calves and in this way guaranteed their health and postnatal period growth.
References