



**The effect of heat-treatment of bovine colostrum on passive immune transfer, health and growth characteristics of Holstein calves**

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Nowadays, one of the most important method for decreasing the microbial load of colostrum is heat-treatment. Recent study showed use of low temperature with high duration (60°C for 60 min) not only leads to destroy main pathogens of colostrum, but also have not any highly significant effect on total IgG concentration of colostrum.

In this study we intend to use heat-treatment of colostrum at 60°C for 90 min for the first time in large scale. The aim of current study was to investigate: (1) assessment of consumption of bovine colostrum heat-treated at 60°C for 90 min on IgG absorption, serum total protein, AEA of IgG, growth rate, health and mortality of Holstein calves in suckling period, (2) look at the effect of heat-treatment at 60°C for 90 min on physio-chemical composition of colostrum, and (3) validation of digital Brix refractometer for immunoglobulin and total protein evaluation in serum and colostrum samples. For this purpose first-milking colostrum of fresh cattle 2 hours after parturition was collected and thoroughly mixed. Totally 40 colostrum batches each including 150 litres was prepared. Half of each batch (75 L) heat-treated at 60°C for 90 min and other half (75 L) left untreated and both frozen at -20°C. It should be mentioned that before and after heat-treatment 15 cc colostrum from each batches collected. 1200 neonatal calves enrolled in this study were divided in two groups: Heat-treated colostrum (601 calves) and unheated colostrum (599 calves) randomly. Blood samples were collected before colostrum feeding and at 48 hour after that for IgG, refractometry and total protein measurements. All calves monitored till weaning time from with regard to their growth rate, performance, health and mortality rate

Results of this study showed that consumption of heat-treated colostrum led to significant elevation of serum IgG, total protein and apparent efficiency of absorption (AEA) ( $P < 0.05$ ) in comparison to the unheated colostrum feeding calves. In addition, calves fed by heat-treated





colostrum had a significant increase in growth rate, health and performance ( $P<0.05$ ) and rate of morbidity, duration of disease recovery, antibiotic usage and mortality rate were significantly lower ( $P<0.05$ ) in comparison to calves fed with unheated colostrum. Results also determined that colostrum heat-treatment at  $60^{\circ}\text{C}$  for 90 min significantly increased viscosity, acidity, density, protein concentration, fat, lactose and solid matter ( $P<0.05$ ), and a significant decrease in total plate count (TPC) and somatic cell count (SCC) of colostrum ( $P<0.05$ ), but had not any significant effect on IgG concentration, calcium, urea, and fat to protein ratio of colostrum ( $P>0.05$ ). Validation of refractometer proved for colostrum evaluation at cut-point of 22% ( $\text{kappa}=0.87$ ) and for serum at cut-point of 7/7% ( $\text{kappa}=0.82$ ) have the highest accuracy and agreement compared with ELISA results.

Overall, The findings of present study suggest that heat-treatment of bovine colostrum at  $60^{\circ}\text{C}$  for 90 min is an effective method with minimum negative impact on colostrum composition, IgG concentration and passive transfer of immunity index in calves.

**Keywords:** Colostrum, Digital Brix refractometer, colostrum heat-treatment, Growth, Health.