

Applications of bovine colostrum and milk in infant nutrition

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Background

Early postnatal ingestion of mothers' colostrum is crucial to secure survival and low morbidity in neonatal animals. Colostrum is a biological fluid tailor-made by the mammary gland to ease the transition from pre- to postnatal life, and possesses a long range of biologically active compounds that support immunity, hemostasis, neuronal development ect. in the neonate. Colostrum and milk are derivatives of maternal plasma and *de novo* synthesis of milk compounds in the mammary gland, and is delivered to the neonatal animals upon stimulation. Relative to species like lambs, goats, calves and pigs, human infants are less dependent on early postnatal ingestion of colostrum, as they have already received some level of passive immunization *in utero*. Despite this discrepancy between human infants and other mammal species, there is still a marked benefit of breast feeding with regard to morbidity, metabolism and cognition, relative to nutrition with artificial milk replacers.

In cases where mothers' milk is not available, alternatives like donor milk or artificial milk replacers are second choice. From this notion we hypothesized that colostrum collected from cows, would be a better nutritional alternative for human infants than artificial milk replacers, even though it is derived from another species. This was initially tested in a long series of experiments with neonatal caesarean-derived pigs. To maximize experimental sensitivity toward the dietary interventions, the pigs were delivered preterm and housed individually in incubators, allowing very controlled experimental conditions.

Results

Colostrum and/or milk was derived during lactation from human, porcine and bovine species, and fed to preterm caesarean-derived pigs. The influence of timing of the first feeds, enteral feeding volume, storage and pretreatment of the milk, have been studied in this pig-model using endpoints mainly related to immunity, gut health and neurodevelopment. Collectively, bovine colostrum or unpasteurized bovine milk, showed many beneficial effects with regard to gut mucosal function, inflammatory markers and resistance toward infections and sepsis.

Conclusion

Although bovine colostrum does not provide species-specific immunity, there appears to be other non-species specific effects that confer benefits to neonatal pigs. Having consolidated this finding multiple times in pig experiments, two large intervention studies with bovine colostrum to preterm human infants are now ongoing within the Neomune research program. Preliminary findings are expected by the end of 2019.