

PSXII-4: Serum citrulline concentration of unweaned calves transported by road as a potential biomarker of gut functionality.

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Introduction



In the dairy calve fattening system, few days after colostrum intake, calves are usually transported to the rearing farms. It has been described that comingling conditions, long hours of transport and poor nutritional management can cause stress, fatigue and dehydration compromising health status increasing pulmonary infections and decreasing intestinal barrier functionality(1).

Gut health is a relatively new concept that includes complex interactions between structure and function of gastrointestinal barrier, immune system, diet and microbiota (2). Most techniques to assess *in vivo* intestinal barrier permeability require the administration orally of large (lactulose/mannitol) and/or indigestible (chromium) particles. These assays are difficult to run under commercial conditions with a large number of animals.

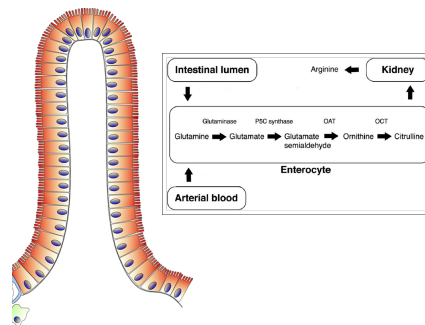
Citrulline is a non-essential aminoacid synthesized mainly by enterocytes whose levels can be detected in blood. In human loss of epithelial cell mass results in impaired intestinal permeability and decreased serum citrulline concentrations and therefore it has been proposed as a good non-invasive marker of intestinal integrity (3).

Objective

To analyse serum citrulline concentration (SCC) in calves submitted to short (ST) or long transport (LT), just at arrival (t0) and 14 days after arriving to rearing farm (t14).

Materials and Methods

- ✓ 1601 calves were included
- ✓ 2 treatments:
- 1. ST: short transport (<9h);
- 2. LT: long transport (>9h) with a rest stop
- ✓ Sampling times: at arrival (t0) and 14 days later (t14).



Citrulline synthesis in the small intestine.
Based on Kaore&Kaore (2014)
DOI: <http://dx.doi.org/10.1016/B978-0-12-404630-6.00053-1>

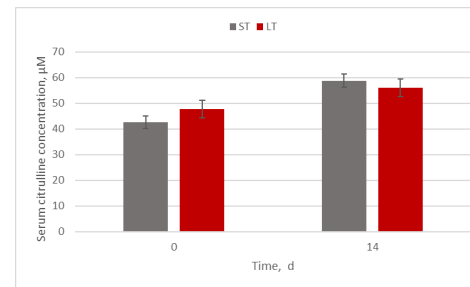
SCC was measured by ELISA (Immundiagnostik, Germany).

Briefly, after protein precipitation the supernatant was incubated with diacetyl monoxime (DAMO) at 95°C and absorbance was measured at 540 nm. A sample blank was run for each sample.

Inter and intra assay CV for SCC were 12.6 and 6.3 %, respectively.

Statistical analysis was performed in SAS using mixed model.

Results



Serum citrulline concentration was significantly lower in calves at t0 than t14 for short transport (ST) and long transport (LT) ($P < 0.001$). At t0, SCC of LT tended ($P=0.08$) to be greater than ST. No significant differences were observed in SCC at t14 between both groups.

Conclusions

Serum citrulline concentration increased 14 days after arrival indicating that previous management (mixing, transport) may affect gut integrity as citrulline may indicate rupture of enterocyte homeostasis.

Serum citrulline is a promising non-invasive biomarker of gut integrity in calves that can easily be measured in animals raised under commercial conditions and in large number of samples, however further studies are needed to validate it.

References:

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