Highthroughput Antibody and Cellular Immune Response Profiling Against Respiratory Pathogens in Calves following a Pre-Condtionning Protocol

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Objectives: Pre-conditionning of calves before entry in fattening units has been promoted as a good approach to reduce antibiotics treatment against bovine respiratory diseases (BRD). Enhancing immunity to respiratory pathogens by vaccination before the risk period may help reduce the prevalence of BRD. The purpose of our study is to evaluate antibody and cell-mediated response against the main repiratory agents in a case/control study in order to evaluate the effects of the pre-conditionning program on immunity to BRD.

Materials and methods: Two groups of calves (n=20) were allocated randomly to each treatment. Pre-conditionned (PREC) calves were weaned and grouped in loose housing approximately 50 days before entry in the fattening unit. They received a balanced diet and were vaccinated twice at 4 weeks interval with an inactivated vaccine against BRSV, BPI3 and *Mannheimia haemolytica.* During that time, control (CON) calves were kept with their dams on pasture without any change. After weaning, they were directly transported to the fattening unit where the vaccination program with the same vaccine was implemented. Blood samples were collected at recruitment in the protocol, and then at the date of entry, and 30 and 60 days after entry, to cover the period of highest BRD incidence in this breeding system. Antibody response against BRSV, BPI3 and *Mannheimia haemolytica* was assessed by ELISA (BioX diagnostics). Whole blood cell stimulation was prepared with the same pathogens, to assess cellular reponses, and with lipoplysaccharide (LPS) and concanavaline A to measure the levels of innate and adaptive responses, respectively. Cytokine production was measured using a custom bovine cytokines Milliplex assay (MERCK-Millipore).

Results: At the time of inclusion, no difference between the groups was noticed. The average daily gain (ADG), zinc and glutathion-peroxydase plasma concentration were higher in PREC compared to CON (+ 440g /d; + 3pmol / L; + 118U / g Hb) at the time of entry in the fattening unit. Further, specific antibodies for BPI3, BRSV, and *Mannheimia haemolytica* were higher in PREC compared to CON, as was IFNg production in response to *Mannheimia haemolytica*. Immune traits were correlated with several parameters like trace minerals or weight gain despite the low number of evaluated animals and the possibility of confusing factors.

Conclusions: High-throughput profiling of the immune response in young bulls around the entry in fattening units highlight the benefit and limits of pre-conditionning, and opens up promising prospects for the management of BRD in cattle, and improvement of farming conditions.