

## Wednesday 13 August 2025

### Session 2.2a – Adaptive Immunity

Grand Klimt Hall 2 & 3

#### 122 - *Bos taurus* and *Bos indicus* cattle exhibit compelling different immune responses towards vector-borne viruses



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Cattle are the mammalian species with most global biomass associated with a huge impact on earth. *Bos taurus* and *Bos indicus* cattle are likely to show different immune responses and susceptibilities towards specific diseases including vector-borne diseases (VBDs), because of different evolutionary trajectories and geographic origins of domestication. In line with 3R, we employed an *ex vivo* platform based on blood isolated cells to test this hypothesis, using the vector-borne viruses Bluetongue virus (BTV) and Schmallenberg virus (SBV). For *Bos taurus*, we found that the response towards SBV was rather moderate compared to BTV; this clearly indicates a fine-tuning of the immune response depending on pathogen. The most striking finding was the differential response towards BTV: *Bos taurus* exhibited an enhanced activation of classical monocytes, dendritic cells, CD8<sup>+</sup> and gd T cells, whereas *Bos indicus* relied mostly on non-classical monocytes and CD4<sup>+</sup> T cells. Those differences were confirmed by higher amounts of secreted cytokines/chemokines by cells derived from *Bos taurus* animals. Most interestingly, we found that the recent BTV outbreak in Switzerland hardly affected the *Bos indicus* cattle, but the *Bos taurus* breed. Moreover, comparison of the transcriptomic profiles examined into details the response to BTV: *Bos taurus* had significant enrichment of antiviral, humoral and natural killer responses, whereas *Bos indicus* animals lacked clear antiviral responses. Finally, we confirmed the impact of fever-like temperature on blood cell capacity to respond to vector-borne viruses, regardless of host genetic background. Overall, we validated the hypothesis that cattle with different genetic background exhibit compelling different immune responses towards vector-borne viruses, possibly contributing to the difference of disease susceptibility. The potential of our experimental platform to decipher differential immune responses of cattle breeds can be envisaged for vaccine development. This is of relevance giving the climate change and foreseeing invasion of tropical vectors.

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