SPEECH INFORMATION (For Conference Program Book)	
Topic	Applying OMICs in Microbial Research within Animal Health: Opportunities and Challenges
Abstract	Advances in high-throughput OMICs technologies have reshaped microbial research in animal science, providing unprecedented resolution into host–microbe interactions, microbial ecology, and functional pathways linked to livestock health and productivity. Our work integrates metagenomics, metatranscriptomics, metabolomics, proteomics, and microbial extracellular vesicle (EV) profiling to investigate microbial functions in dairy cattle, pigs, and companion animals, with emphasis on next-generation probiotics originating from kefir ecosystems and rumen fluid. Through multi-omics analyses, we uncover mechanisms that drive immune modulation, metabolic regulation, gut–organ communication, and host resilience under production stress. In dairy and swine production systems, OMICs-based approaches have enabled comprehensive characterization of the gut microbiome, resistome, and surrounding environmental microbiomes on farms implementing probiotic supplementation or sustainable feed strategies. These datasets allow us to evaluate antimicrobial resistance (AMR) dynamics, identify functional microbial shifts, and assess One Health implications across animal, environmental, and feed matrices. Despite these advances, several challenges persist. Farm environments are inherently complex and multifactorial, making it difficult to connect microbial genotypes with phenotypic outcomes. Standardized analytical pipelines remain limited, and the translation of multi-omics signatures into practical industry solutions is still emerging. Even so, the integration of OMICs with animal nutrition, microbiome engineering, and circular-economy feed innovations offers substantial opportunities to reduce antibiotic reliance, enhance animal welfare, and support sustainable agricultural systems.