



Bovine Serum Meeting: Challenges and opportunities in the research and development and manufacture of vaccines and other biological products

**September 29-30, 2026
Virtual Meeting**

Alternatives to Bovine serum as a growth medium for the manufacture of biological medicinal products – Where are we? - Bálint Kupcsulik

Bovine serum remains a widely used supplement in biological production systems, despite the growing availability of serum-free and chemically defined alternatives. Its replacement is challenging because serum provides multiple functions simultaneously, including nutrients, growth and differentiation signals, transport proteins, protection from cellular stress, and attachment factors. Consequently, successful serum reduction cannot rely on a universal substitute but must be tailored to the specific cell substrate, product, and manufacturing process.

This presentation reviews practical strategies for serum reduction and removal, including gradual adaptation, Design of Experiments-based media optimization, spent-media analysis, intracellular metabolomics, secretome analysis, and multi-omics modelling. Combining these approaches can enable the development of robust serum-free processes, although the required time, technical expertise, validation effort, and cost can be substantial.

Serum-free production is already well established for recombinant-protein platforms and several cell-based processes, while viral-vaccine substrates, primary cells, and some advanced therapies still require application-specific development and comparability work. Overall, further serum reduction is technically feasible, but its implementation depends strongly on biological complexity, process requirements, and economic viability.

