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## Serum in mammalian cell culture: Weighing the challenges of bioprocessing, ethics and animal welfare (Review)

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### Abstract

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Serum; a clear portion of blood obtained after removing cells, platelets and clotting factors is a universal supplement commonly used in media for mammalian cell culture system. Serum contains amino acids, proteins, growth factors, hormones, vitamins, inorganic substances, nutrients and metabolites; which promote and sustain cell growth as well as provide buffering condition and protection to cells. Serum, from various animal sources such as bovine and porcine can be obtained commercially from manufacturers. Although serum has long been used successfully in mammalian cell culture system, recent trend is moving towards serum alternatives and serum-free media. This is due to many factors including the ethical and animal welfare issues in serum processing and production. Further, large scale production of bio-products using mammalian cell culture system prefers defined media which offers reproducibility and ease of downstream purification. Nevertheless, development of serum-free media is tedious and somewhat involve high cost with inherent problem of low growth rate as compared to serum supplemented media. This review is set to explore the many facets of serum and serum-free media in mammalian cell culture bioprocessing.

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