

eCHO™ Basal Medium and Feed for CHO cells:

Lonza

Easy, economical, chemically defined animal origin-free, simple one part formulation medium for the production of monoclonal antibodies

Pharma & Biotech

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Abstract

Chinese hamster ovary (CHO) cells are a major industrial cell culture platform for biomanufacturing of monoclonal antibodies, complex glycoproteins and other recombinant proteins of medical use. In this work, we demonstrate the performance of Lonza's easy, economical, chemically defined, animal origin-free, simple one part eCHO™ Basal Medium and one part eCHO™ Feed for CHO cells to produce recombinant proteins. Both eCHO™ Basal Medium and eCHO™ Feed were tested, compared with different vendors' products, and investigated for their influence on growth, titer and product quality. We further demonstrate the benchmarking and scalability of mAb production using bioreactors compared with shake flasks and find consistency across multiple cell clones. Our medium was able to generate high viability, high titers, and low lactate, a unique feature combination we offer to our customers.

Introduction

Biotherapeutics have constituted a large and growing percentage of the total pharmaceutical market, mAbs representing the most lucrative product. Most significantly, nearly 50% of these biotherapeutics are produced using CHO cells. There has been considerable success in developing high producing CHO cell cultures using different approaches such as media development, significant improvement in expression vector design, and bioreactor design and control. As media design and development is one, the expression bottleneck requires fine tuning of nutrients required for cell growth and protein production. Our group focused on developing the media for CHO cells to produce recombinant proteins and our medium was able to generate high viability, high titers, and low lactate, a unique feature combination we offer to our customers.

Benefits and features

- Easy, economical, chemically-defined, animal-origin-free medium
- One part basal and one part feed formulation
- High viability with high titers and low lactate
- Consistent performance
- Compatible with multiple cell clones
- Scalability
- GMP grade

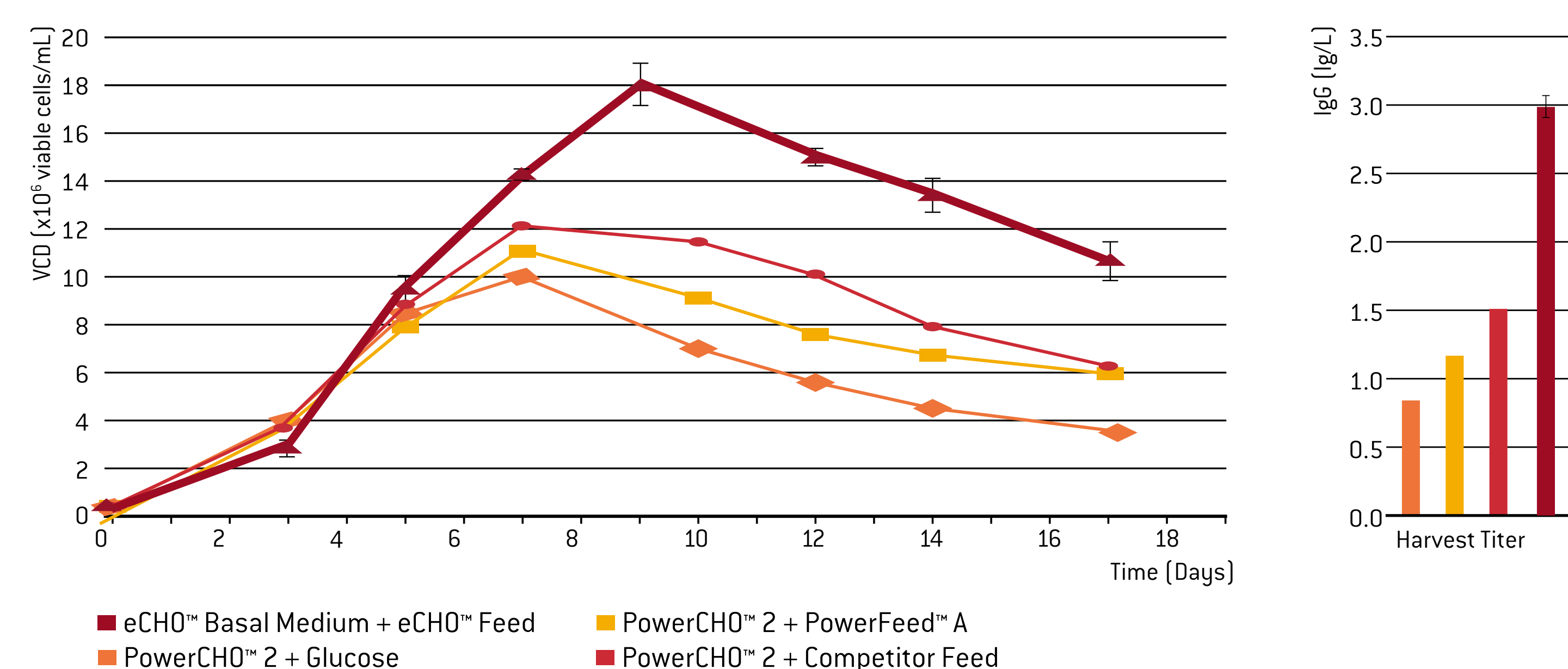


Figure 1: Left panel: Offline monitoring of viable cell density [VCD] of fed-batch CHO cell cultures. Briefly, cells were cultured in automated ambr15 system with different media supplemented with different feeds as required. Cell densities were monitored using Vi-Cell (Beckman Coulter, USA) showing VCD (Y-axis) and process time (X-axis). With new Lonza CHO media, the cell densities reached ~1.5 to 2-fold increase on Day 9 compared with other basal and feed media. Right panel: showing the mAb production.

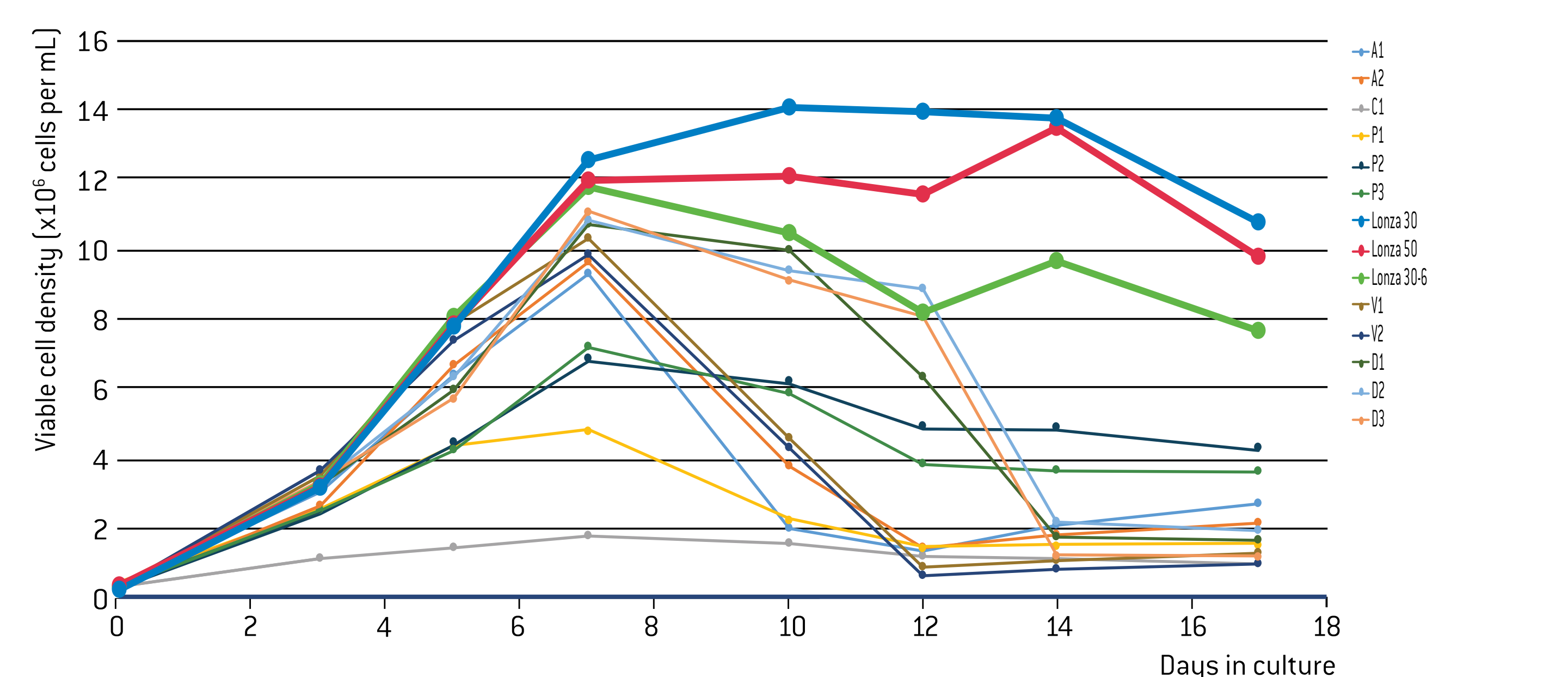


Figure 2: Proliferation of CHO K1 cell cultures using various media and feed combinations. All three Lonza media contain basal medium and feed. Briefly, Lonza 30 represents 10% feed supplemented to the cultures on day 3, 5, and 7. Lonza 50 represents 10% feed supplemented to the cultures on day 3, 5, 7, 9, and 11. Lonza 30-6 represents 6% feed supplemented to the cultures on day 3, 5, 7, 9 and 11. All other competitors medium denoted as A1-2, C1, D1-3, P1-3, and V1-2 respectively. Viable cell densities were measured using Vi-Cell counter (Beckman Coulter, USA).

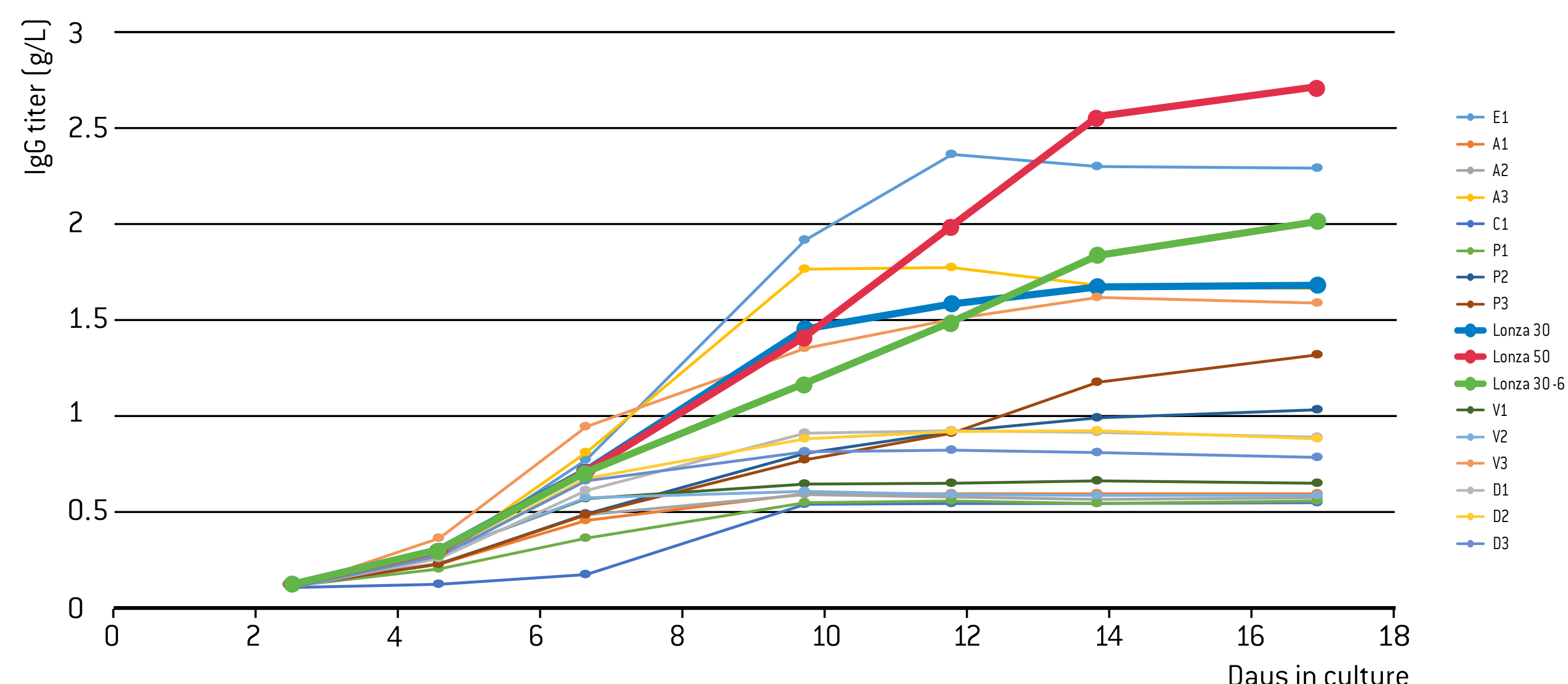


Figure 3: Time course analysis of mAb production using various media and feed combinations. All three Lonza media contain basal medium and feed. Briefly, Lonza 30 represents 10% feed supplemented to the cultures on day 3, 5, 7, 9, and 11. Lonza 50 represents 10% feed supplemented to the cultures on day 3, 5, 7, 9, and 11. Lonza 30-6 represents 6% feed supplemented to the cultures on day 3, 5, 7, 9 and 11. All other competitors medium denoted as A1-3, C1, D1-3, E1, P1-3 and V1-3 respectively. IgG titers were measured using Cedex analyzer (Roche, USA).

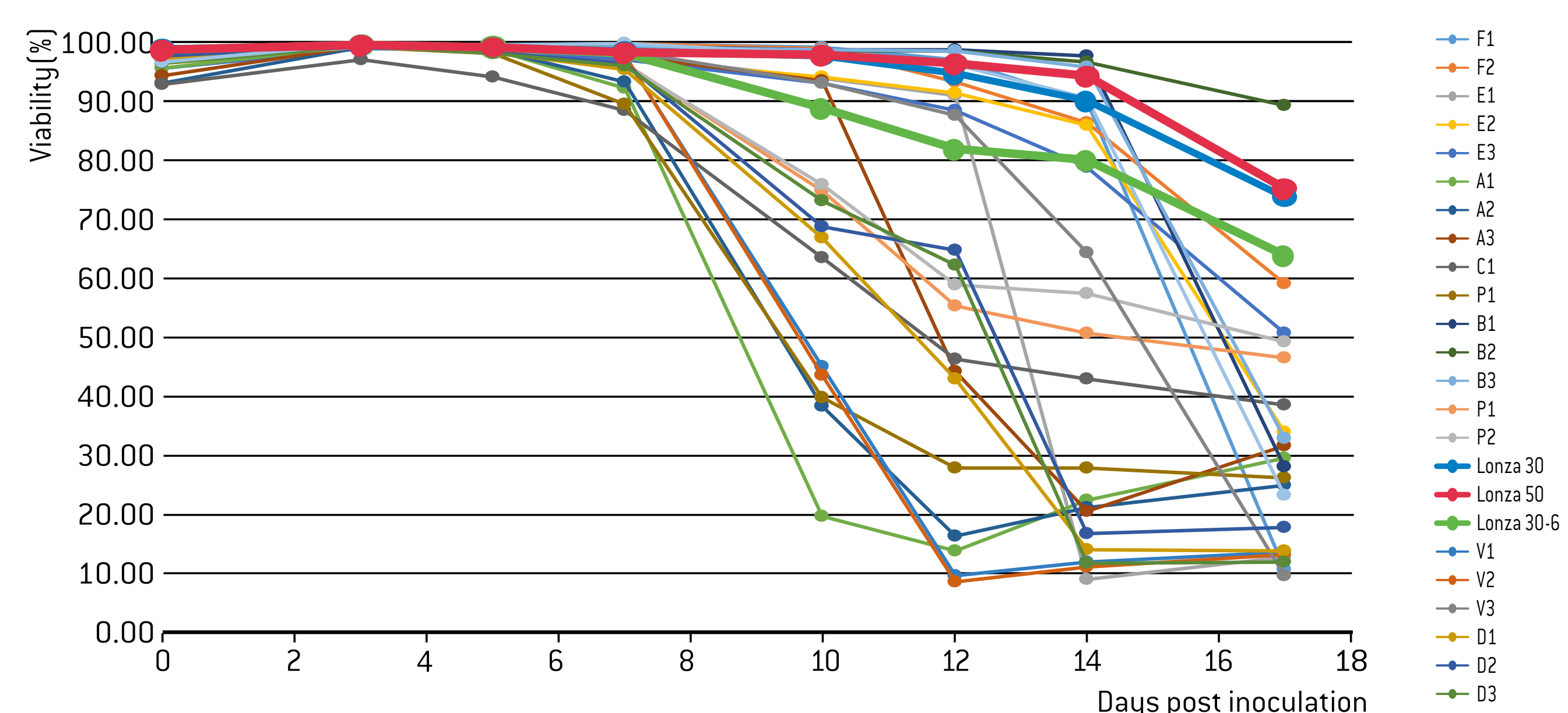


Figure 4: Offline monitoring of cell viability in shake flasks (working volume 30 ml) using Lonza media vs competitor media. The data points indicated were the average values of cell viability. Briefly, Lonza 30 represents 10% feed supplemented to the cultures on day 3, 5, and 7. Lonza 50 represents 10% feed supplemented to the cultures on day 3, 5, 7, 9, and 11. Lonza 30-6 represents 6% feed supplemented to the cultures on day 3, 5, 7, 9 and 11. All other competitors media and feed combinations were denoted as A1-3, B1-3, C1, D1-3, E1-2, F1-2, G1, P1-2 and V1-3 respectively.

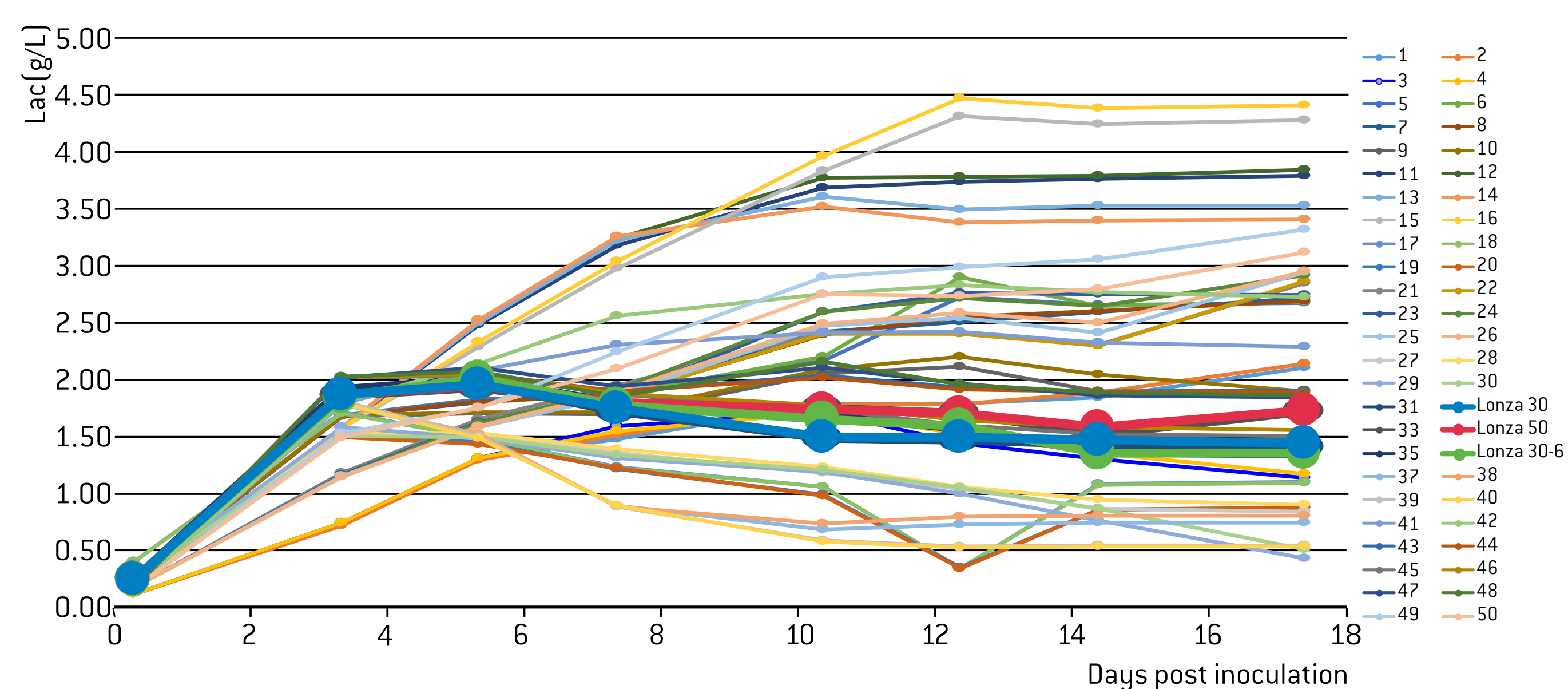


Figure 5: Lactate concentration profile in shake flasks using different combinations of basal and feed media using Lonza media vs competitor media. Briefly, Lonza 30 represents 10% feed supplemented to the cultures on day 3, 5, and 7. Lonza 50 represents 10% feed supplemented to the cultures on day 3, 5, 7, 9, and 11. Lonza 30-6 represents 6% feed supplemented to the cultures on day 3, 5, 7, 9 and 11. All other competitors media and feed combinations were denoted as 1-30 and 38-50 respectively.

Conclusion

In this work, we demonstrate the performance of Lonza's easy, economical, chemically defined animal origin-free, simple one part eCHO™ Basal Medium and one part eCHO™ Feed for CHO cells to produce recombinant proteins and meets critical quality attributes.

- High cell densities with viability: reaches ~18 million cells per ml with 95% viability
- High titers: 3 g/L
- Low cost and GMP quality
- Low lactate improves product quality (1.5 to 2 g/L)
- Offers consistent product quality and performance
- Scalability: Bioreactors vs shake flasks
- User friendly: One part formulation medium

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