



Chemically defined supplements designed with performance in mind

Resurge CD Pak

As the cell culture industry looks for new ways to reduce variability and continue to increase protein production, Thermo Fisher Scientific has designed and formulated a diverse set of fully chemically defined, animal origin-free (AOF), and protein-free cell culture supplements.

Resurge chemically defined supplements

Chemically defined. Animal origin-free. Protein-free.

Gibco™ Resurge™ CD Pak supplements are a diverse set of fully chemically defined, AOF, and protein-free cell culture supplements that help promote cell growth and boost protein production. This set of supplements, formulated without glucose, L-glutamine, and sodium bicarbonate, can be used in batch and fed-batch processes to enhance production in mammalian cells while maintaining product quality.

Resurge CD1 supplement

Gibco™ Resurge™ CD1 supplement is fortified with vitamins to improve recombinant protein production.

Performance of Resurge CD1 supplement in batch and fed-batch mode

Representative shaker flask and bioreactor studies are shown below for the Resurge CD1 supplement. Figure 1 shows batch and fed-batch data using shaker flasks, while Figure 2 shows bioreactor data.

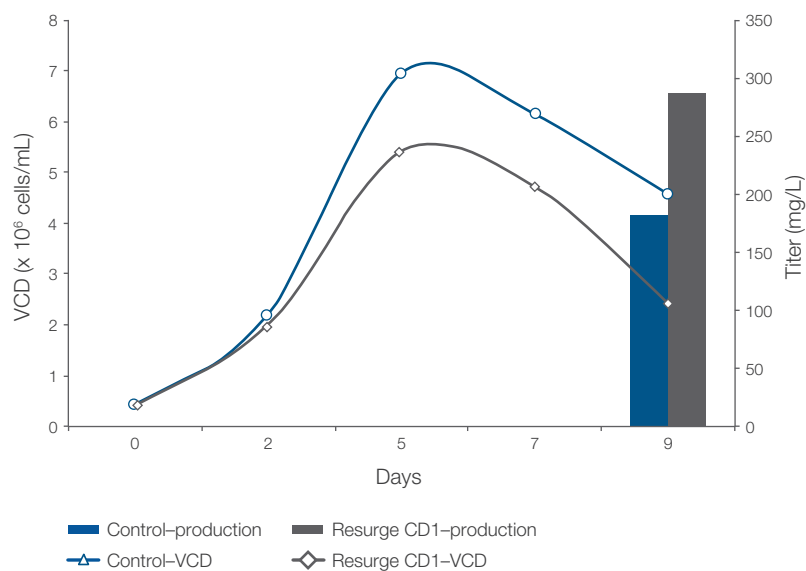


Figure 1. Growth and production of CHO cell line 1 supplemented with Resurge CD1 in batch and fed-batch modes in 125 mL shaker flasks. Fed-batch cultures were supplemented from early- to mid-phase. VCD: viable cell density.

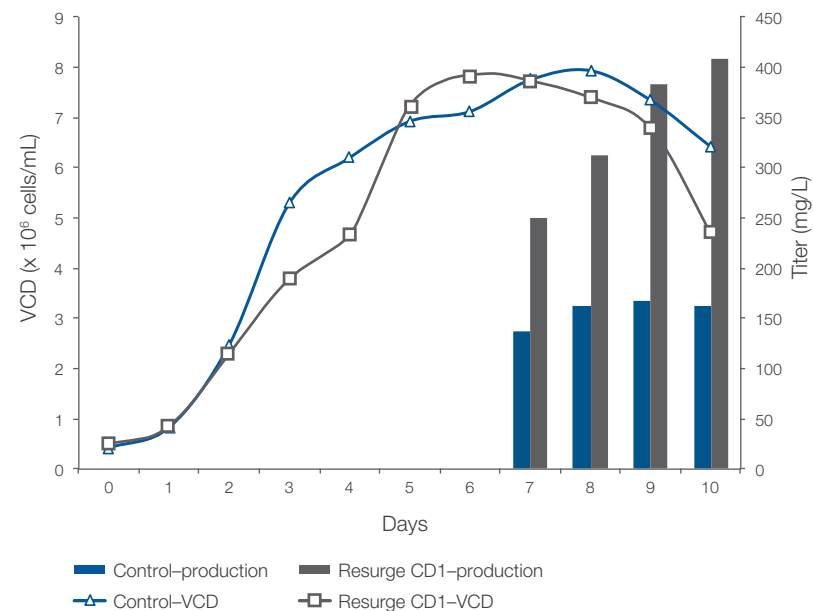


Figure 2. Growth and production of CHO cell line 1 supplemented with Resurge CD1 in a 2 L stirred-tank bioreactor. The study was performed in fed-batch mode with the addition of Resurge CD1 supplement on days 3 and 5. The control represents an optimized basal bioreactor process.

Resurge CD2 supplement

Gibco™ Resurge™ CD2 supplement is easily incorporated in fed-batch process, and the formulation contains organic amines known to promote cell growth and metabolism.

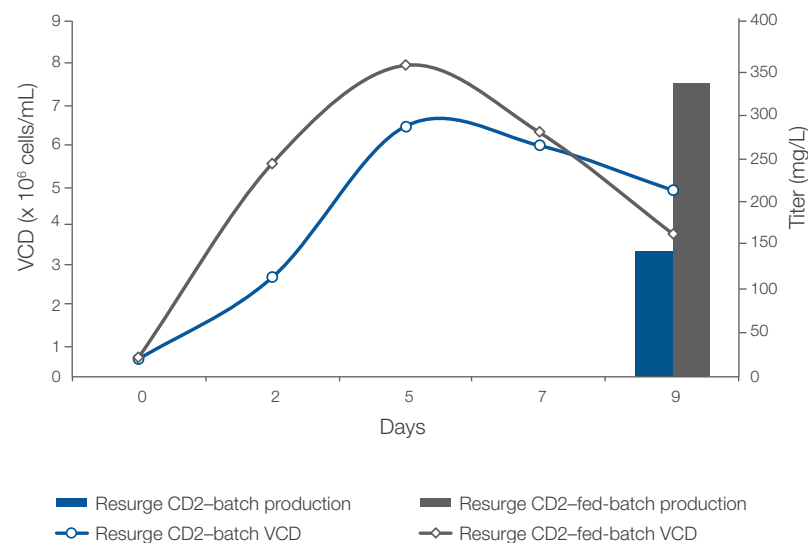


Figure 3. Growth and production of CHO cell line 1 supplemented with Resurge CD2 in batch and fed-batch modes in 125 mL shaker flasks. Fed-batch cultures were supplemented from early- to mid-phase.

Performance of Resurge CD2 supplement in batch and fed-batch modes

Representative shaker flask and bioreactor studies are shown below for the Resurge CD2 supplement. Figure 3 shows batch and fed-batch data using shaker flasks, while Figure 4 shows bioreactor data.

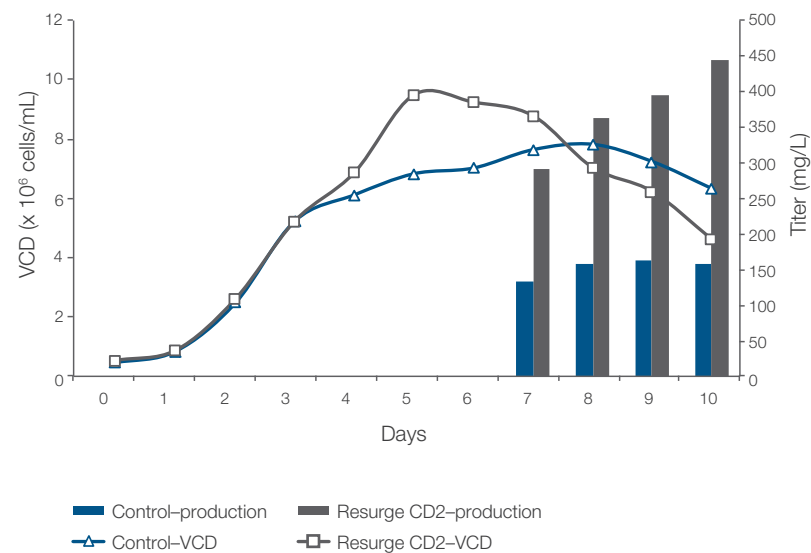


Figure 4. Growth and production of CHO cell line 1 supplemented with Resurge CD2 in a 2 L stirred-tank bioreactor. The study was performed in fed-batch mode with the addition of Resurge CD2 supplement on days 3 and 5. The control represents an optimized basal bioreactor process.

Resurge CD3 supplement

Gibco™ Resurge™ CD3 supplement is rich in amino acids and, due to the balanced nutritional nature of this supplement, it has also been used in bacterial applications.

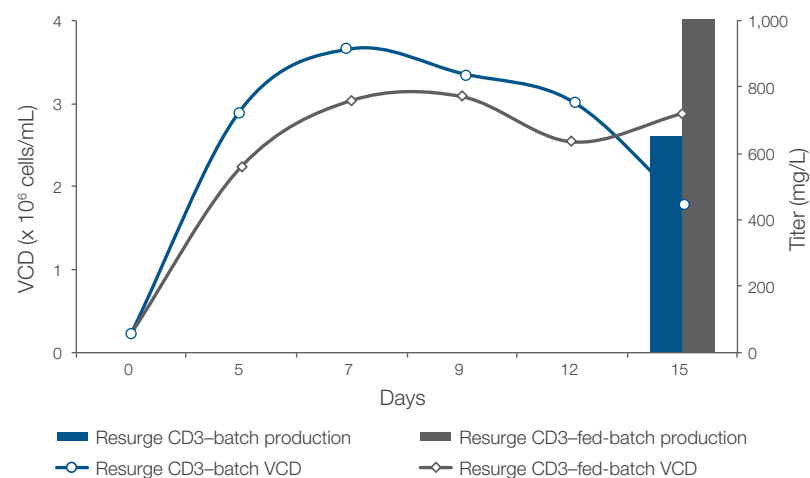


Figure 5. Growth and production of CHO cell line 3 supplemented with Resurge CD3 in batch and fed-batch modes in 125 mL shaker flasks. Fed-batch cultures were supplemented from early- to mid-phase.

Performance of Resurge CD3 supplement in batch and fed-batch modes

Representative shaker flask and bioreactor studies are shown below for the Resurge CD3 supplement. Figure 5 shows batch and fed-batch data using shaker flasks, while Figure 6 shows bioreactor data.

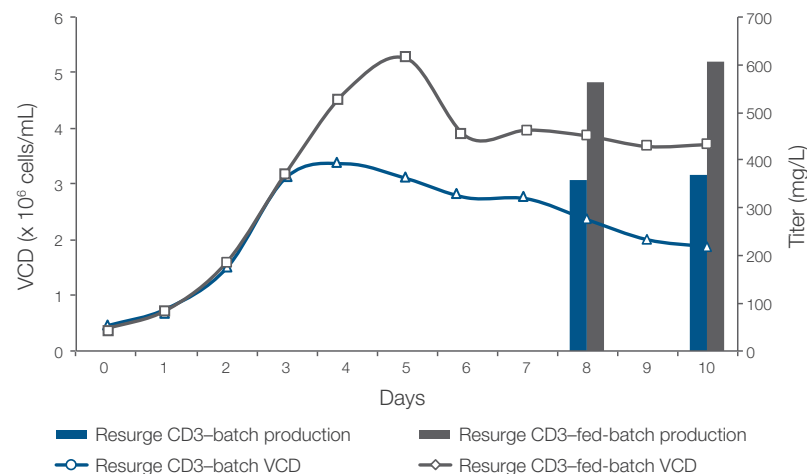


Figure 6. Growth and production of CHO cell line 3 supplemented with Resurge CD3 in a 20 mL microbioreactor. The study was performed using an optimized batch-mode process for both conditions.

Resurge CD4 supplement

Gibco™ Resurge™ CD4 supplement is optimized to drive both growth and production by balancing concentrations of key formulation components, such as amino acids and vitamins.

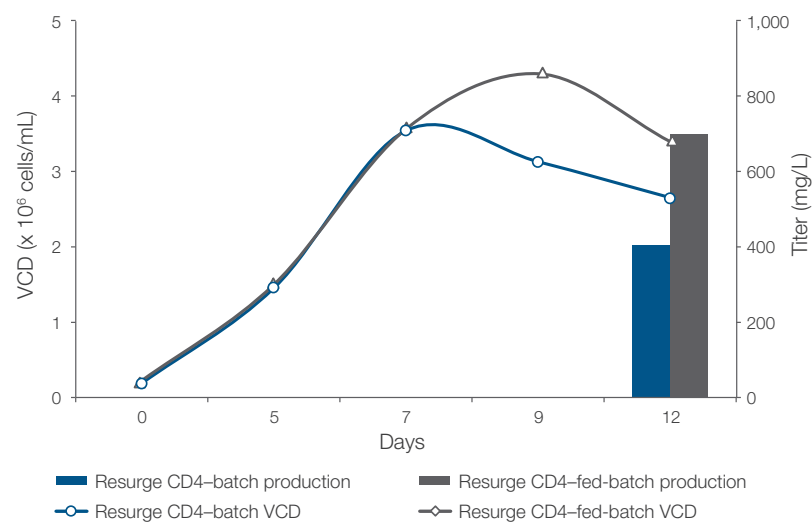


Figure 7. Growth and production of CHO cell line 3 supplemented with Resurge CD4 in batch and fed-batch modes in 125 mL shaker flasks. Fed-batch cultures were supplemented from early- to mid-phase.

Performance of Resurge CD4 supplement in batch and fed-batch modes

Representative shaker flask and bioreactor studies are shown below for the Resurge CD4 supplement. Figure 7 shows batch and fed-batch data using shaker flasks, while Figure 8 shows bioreactor data.

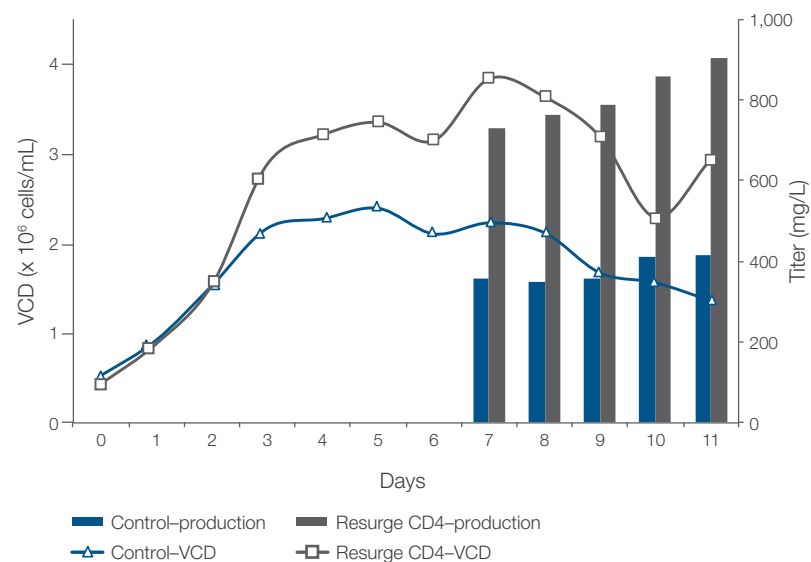


Figure 8. Growth and production of CHO cell line 3 supplemented with Resurge CD4 in a 2 L stirred-tank bioreactor. The study was performed using an optimized batch-mode process for both conditions.

Resurge CD5 supplement

Gibco™ Resurge™ CD5 is enriched in trace elements, amino acids, and vitamins, this formulation increases both growth and production.

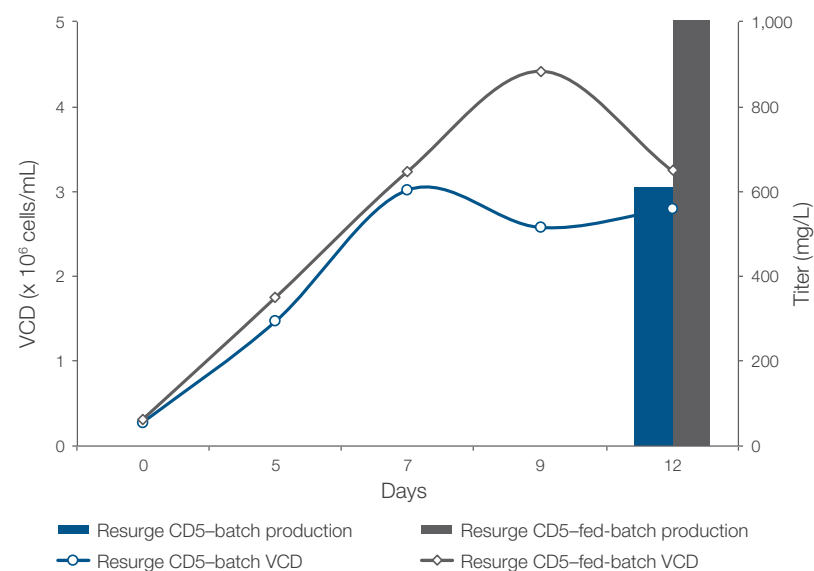


Figure 9. Growth and production of CHO cell line 3 supplemented with Resurge CD5 in batch and fed-batch modes in 125 mL shaker flasks. Fed-batch cultures were supplemented from early- to mid-phase.

Performance of Resurge CD5 supplement in batch and fed-batch modes

Representative shaker flask and bioreactor studies are shown below for the Resurge CD5 supplement. Figure 9 shows batch and fed-batch data using shaker flasks, while Figure 10 shows bioreactor data.

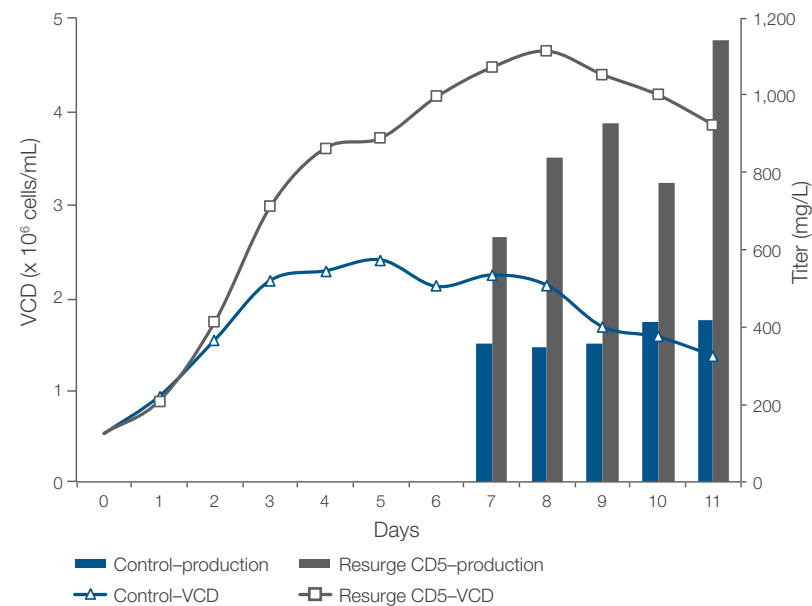


Figure 10. Growth and production of CHO cell line 3 supplemented with Resurge CD5 in a 2 L stirred-tank bioreactor. The study was performed using an optimized batch-mode process for both conditions.

Performance comparison

Data comparison with commercially available supplements

The Resurge CD1–CD5 supplements and eight commercial cell culture supplements were tested for both their effect on growth (data not shown) and production. Each cell line was cultured in an optimized medium. The study was performed in batch mode. All supplements were used per the manufacturers' recommended protocols. Protein yields from using Resurge CD supplements were generally equivalent or superior to results obtained using other commercial supplements (Figure 11).

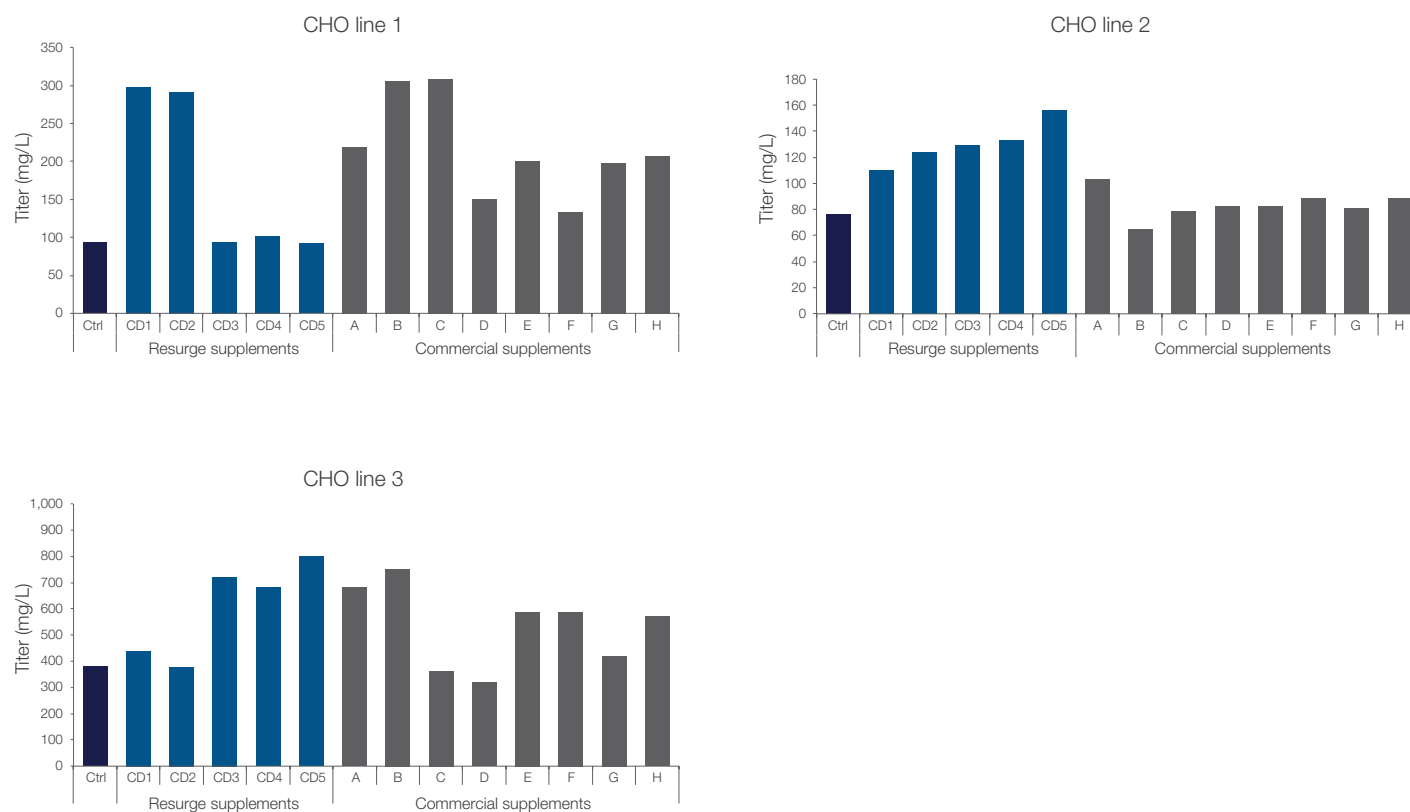


Figure 11. Performance comparison of Resurge CD1–CD5 supplements and other suppliers' supplements in multiple CHO cell lines.

Performance of Resurge CD supplements in multiple media

The Resurge CD supplements were evaluated in multiple chemically defined commercial and in-house base media for their impact on growth (data not shown) and production across two different CHO cell lines. The study was performed in batch mode (Figure 12).

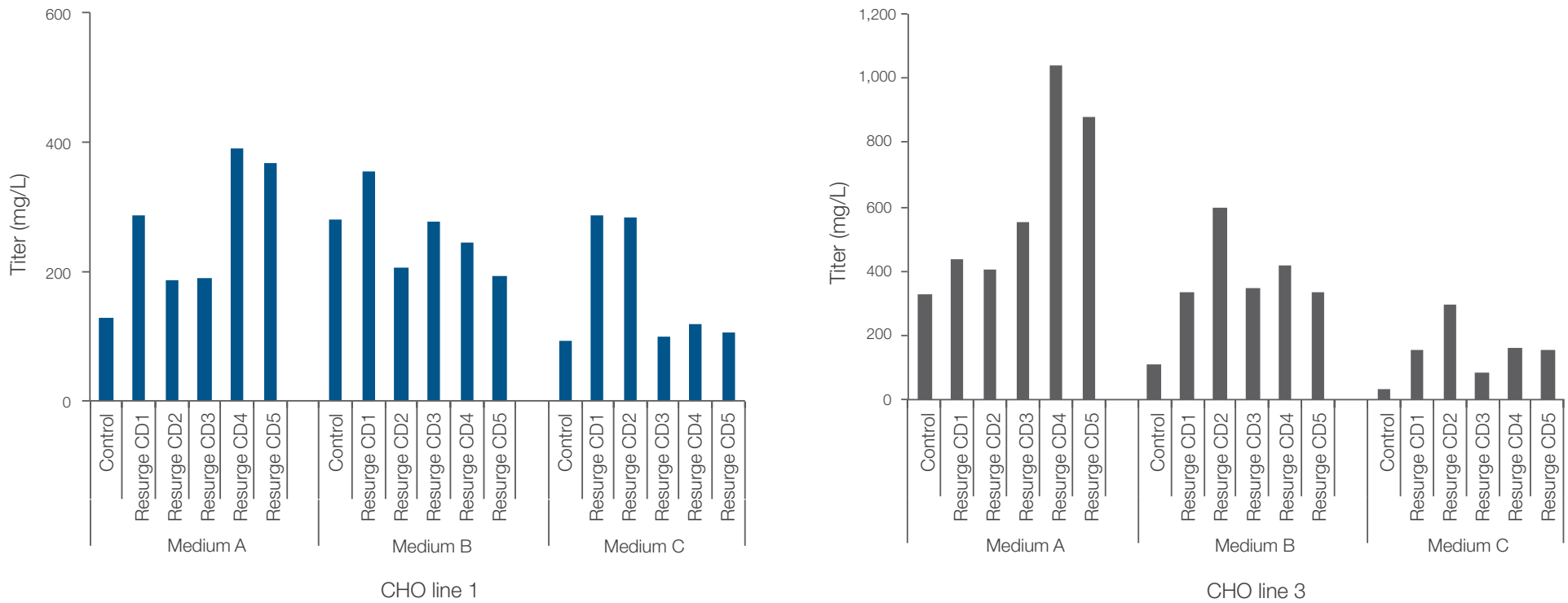


Figure 12. Performance of Resurge CD supplements in multiple base media across two CHO cell lines that express monoclonal antibodies (mAbs) at different baseline titers.

Protein quality

Protein quality with Resurge CD supplements

To measure the impact on protein quality, the N-glycan profiles of mAbs in medium supplemented with Resurge CD supplements in control conditions were analyzed. The structures and relative composition of the most prevalent glycans from each cell line are depicted in Figures 13 (CHO line 1) and 14 (CHO line 3). Differences between the supplemented and control conditions were similar to those seen when using other supplements, such as peptones (data not shown).

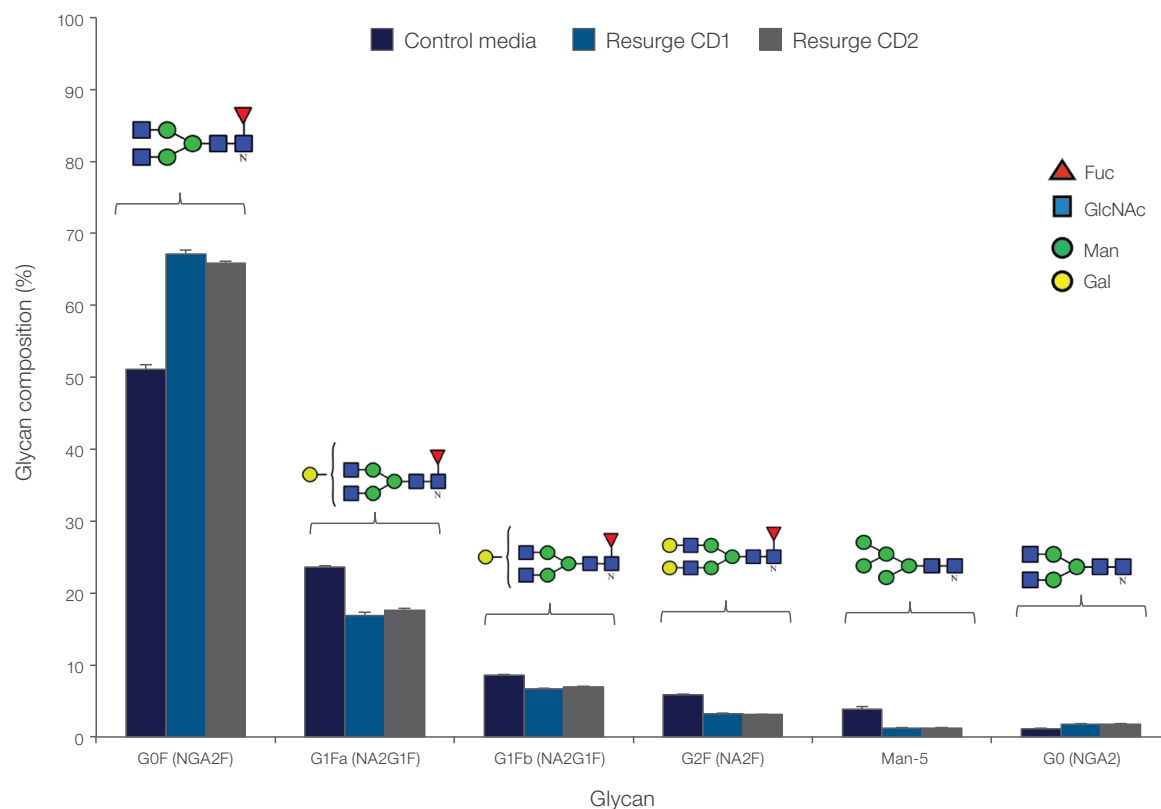


Figure 13. Relative glycan composition of mAbs isolated from CHO line 1, supplemented with Resurge CD1 and CD2.

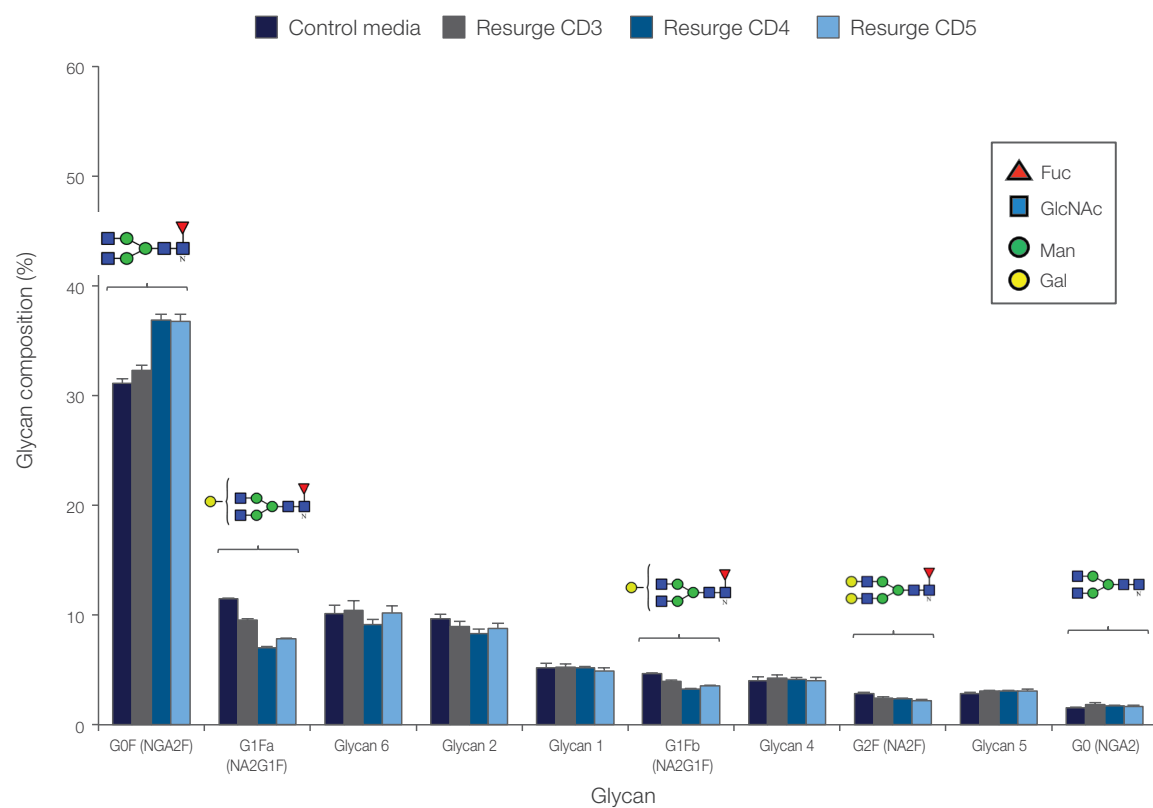


Figure 14. Relative glycan composition of mAbs isolated from CHO line 3, supplemented with Resurge CD3, CD4, and CD5. Note: Some unidentified species (glycans 1 through 6) in CHO line 3 were most likely due to high mannose and/or sialylated glycans; the levels of these components appeared to vary little with conditions of the supplements.



Start evaluating

To order a Resurge CD Pak, or any of the supplements included, go to thermofisher.com/advbio.

Ordering information

Product	Quantity	Cat. No.
Resurge CD Pak		670030
Resurge CD1	100 g	670011
Resurge CD2	100 g	670015
Resurge CD3	100 g	670018
Resurge CD4	100 g	670021
Resurge CD5	100 g	670024

Find out more at thermofisher.com/advbio

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