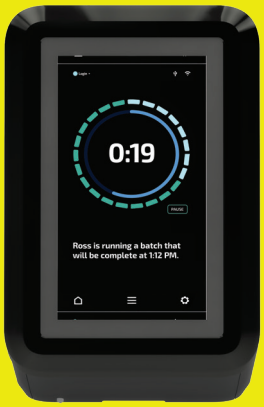
REBEL

APPLICATION SNAPSHOT

Comparison of the essential amino acid contents of Sf9 and Sf21 insect cell media.



BACKGROUND

Insect cell lines like Sf9 and Sf21 were isolated initially from *Spodoptera frugiperda*. They are commonly used for recombinant protein expression, vaccine development, and viral vector production. These cell lines are very adaptable to both culturing in adherent and suspension cultures, and in traditional media with serum, serum-free media, and protein-free media. The selection of the appropriate media is based on a variety of conditions, but one of the most important is the amino acid content. Many amino acids are not synthesized by insect cells, and some are crucial to be added to cell media for optimal growth and/or protein production. Knowledge of the insect cell metabolism coupled with an understanding of the amino acid content of the cell media allows for a more informed process development analytics strategy to correlate changes in cell growth/viability and productivity to the nutrient contents of the media.

THE EXPERIMENT

Three different cell medias intended for Sf9 or Sf21 insect cell line growth were used in this study. The insect cell media tested included a traditional media, a chemically-defined media, and a serum-free media. All media samples were handled following the manufacturers' instructions. The samples were diluted 100x before analysis on the Rebel with no additional sample preparation. For simplicity, only the essential amino acids are shown for a comparison of the three media. (Figure 1)

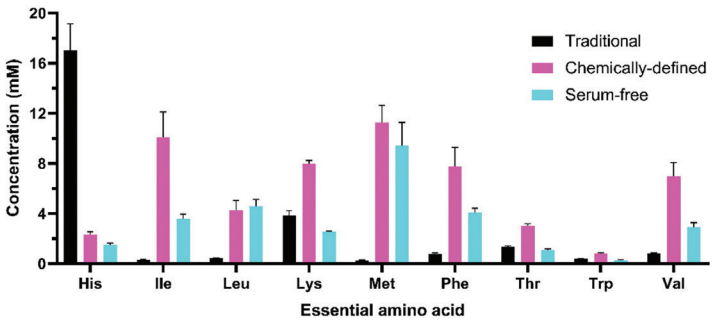
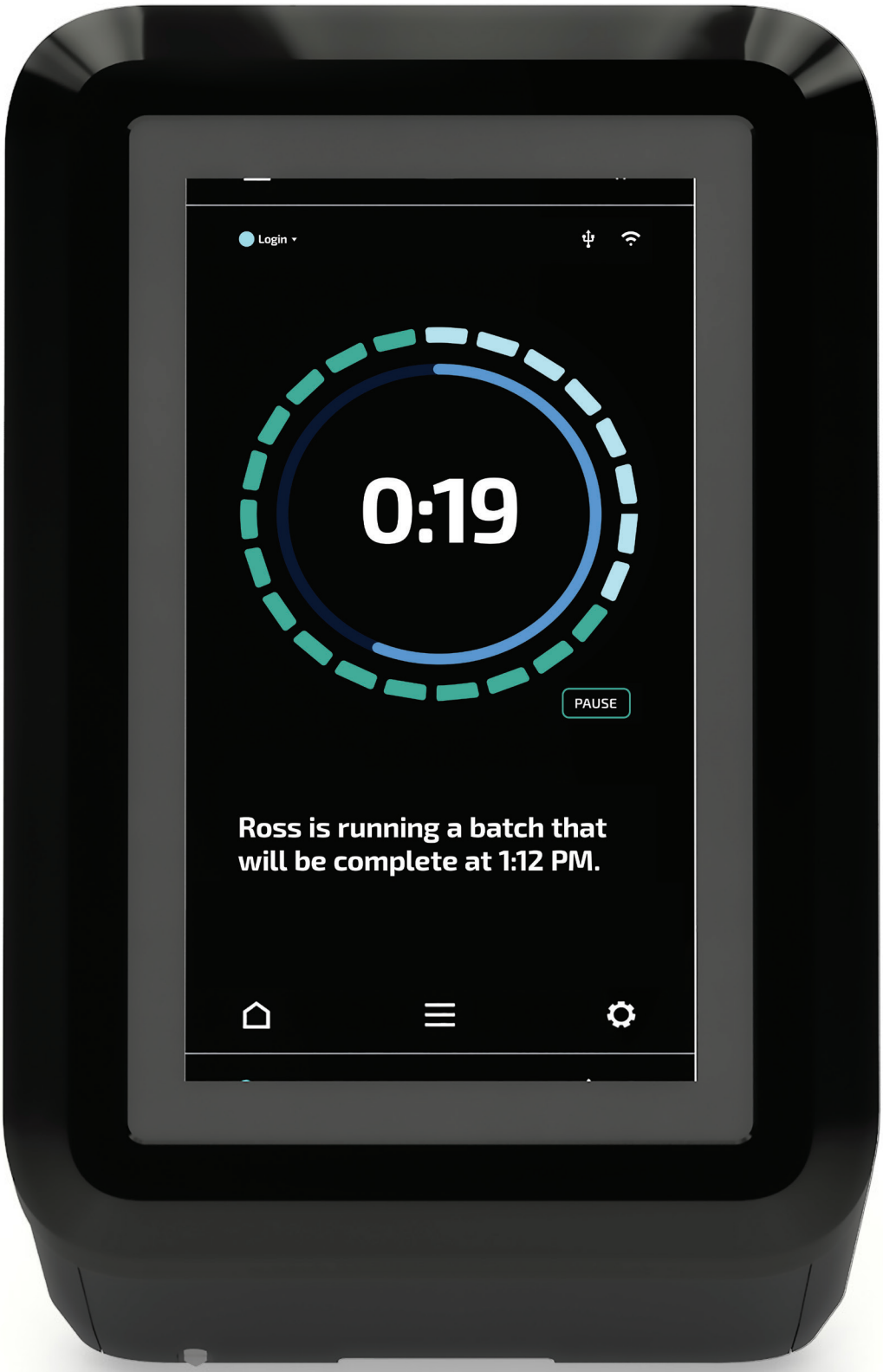


Figure 1: Essential amino acid profile from traditional, chemically-defined, and serum-free insect media. Error bars are from the standard deviation of n = 5 replicates.

DISCUSSION

There were varying levels of all the essential amino acids, regardless of the type of media formulation. The traditional media had substantially higher levels of His compared to the chemically-defined and serum-free media by 7.4x and 11.3x, respectively. However, the traditional media had the lowest levels of five amino acids – Ile, Leu, Met, Phe, and Val. The chemically-defined media had the highest levels of Ile, Lys, Met, Phe, Trp, and Val. Also, it was tied with the serum-free media for the highest levels of Leu. Other than Leu, the serum-free media had the second or third most amount of any other essential amino acid shown here. This brief analysis demonstrates how it is vital to consider measuring the composition of amino acids in insect cell media. Researchers should consider how the amino acid composition, in conjunction with the undefined components in traditional media (e.g., serum) and serum-free media (e.g., peptones, hydrolysates, yeastolates), may all affect the growth and productivity of their processes.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