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Created on: 24 APR 2025
Revision number: 20250506
Created by: Julian Arjuna Bisten
Last approved by: Julian Arjuna Bisten

Product Specification Sheet
Food Grade DMEM/F12

Traditional basal media formulations like DMEM/F12 have long been essential for cell culture but remain unsuitable for large-scale food production due to pharmaceutical-grade components and regulatory challenges. This creates significant barriers for companies in the cellular agriculture sector seeking to move from lab to commercial scale.

At Multus, we've developed DMEM/F12-FG, a food-grade basal media specifically designed to address these challenges. By leveraging AI and automation to identify functionally equivalent food-grade ingredients, our product provides essential nutrients required for optimal cell growth while ensuring regulatory compliance. Both formulated to food-grade specifications and manufactured in our FSSC 22000-certified facility, DMEM/F12-FG was developed in collaboration with global food and feed ingredient companies to ensure supply chain stability and scalability for confident advancement toward commercial production.

Functional Profile

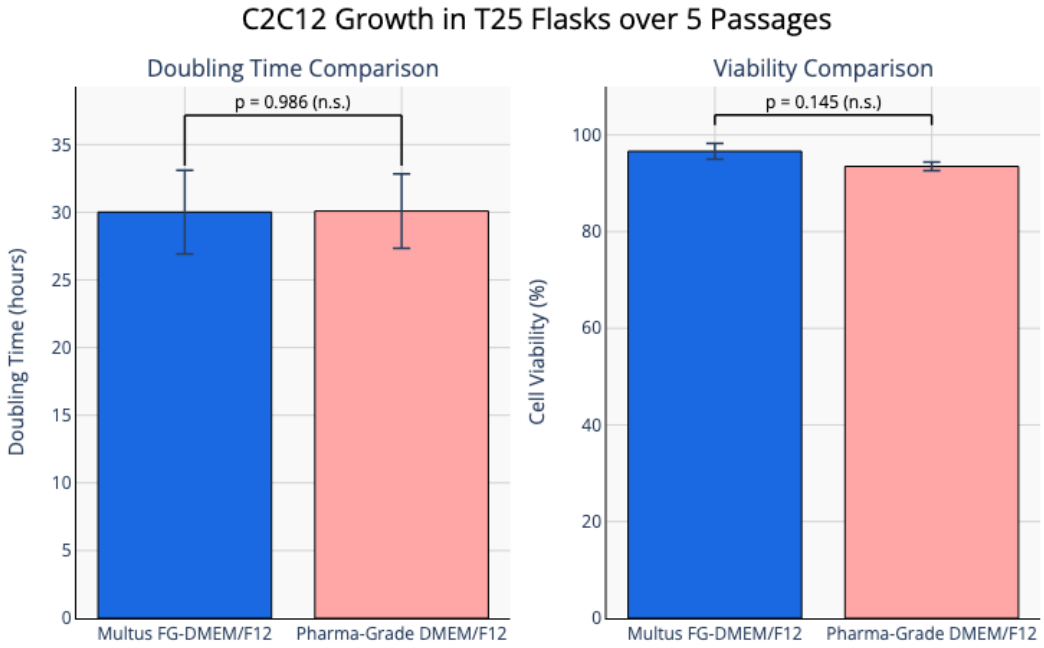

Figure 1: *C2C12 Growth in T25 Flasks over 5 Passages. Left panel shows doubling time comparison between cells cultured in Multus DMEM/F12-FG (blue) and pharma-grade DMEM/F12 (pink), p = 0.986 (n.s.). Right panel shows viability comparison between the same conditions, p = 0.145 (n.s.). Both media were supplemented with 1X Proliferum M serum.*

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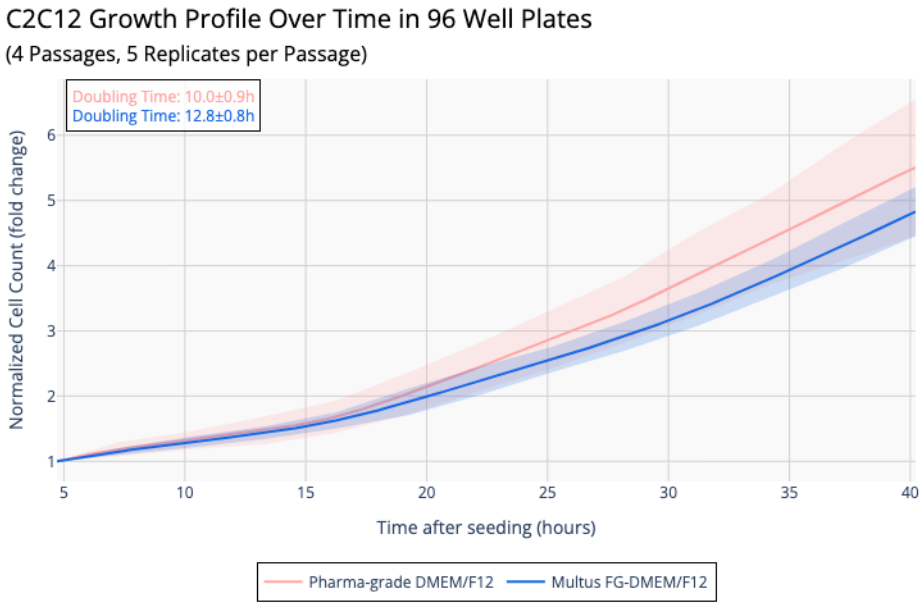

Figure 2: *C2C12 Growth Profile Over Time in 96 Well Plates Over 4 Passages. Comparison between cells cultured in Multus DMEM/F12-FG (blue) and pharma-grade DMEM/F12 (pink) supplemented with 1X Proliferum M serum (n=5 per condition). No statistically significant differences were observed between culture conditions.*

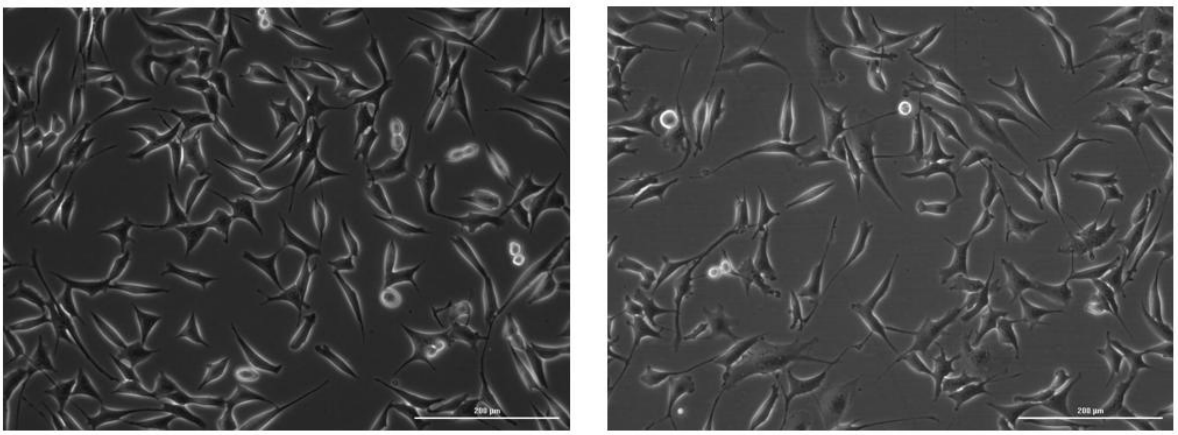

Figure 3: *C2C12 cell morphology after 3 passages in different media. Left: Multus FG DMEM/F12; Right: Pharma-Grade DMEM/F12. Both media supplemented with 1X Proliferum M serum. Phase contrast microscopy at 200 µm scale shows comparable cell morphology between conditions.*

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Quality Control

Table 1: *Quality Control (QC) tests and their specifications.*

Test	Specification
pH	7.0 – 7.5
Osmolarity (mOsm/kg)	290 - 340
Bacterial Testing	Negative
Fungal Testing	Negative
Mycoplasma Testing	Negative
Particulate Examination	Negative
Sterile Filtration	0.2µm
Cell Growth	Pass

Usage Instructions

- **Format:** Ready-to-use liquid. No dilution or reconstitution required.
- **Storage:** Store at 2-8°C upon receipt. Do not freeze. Protect from light to preserve light-sensitive components.
- **Sterility:** This product is manufactured under sterile conditions and sterile-filtered through a 0.2µm membrane. Additional filtration (0.2µm or 0.45µm) is not recommended, as it may affect product performance.
- **Shelf Life:** Use within 3 months of opening. Shelf life and stability under various conditions are currently under evaluation.
- **pH:** Final pH may vary depending on supplementation (e.g. serum or serum-free formulations). The product contains food-grade sodium bicarbonate, which is an effective buffer under CO_2-controlled atmospheric conditions.
    - **Cell culturing in non-CO_2 environments – research grade:** HEPES buffer may be added at 15 mM. Note, it will render the product non-food-grade.
    - **Cell culturing in non-CO_2 environments – food grade:** Citrate buffer may be used. Concentrations need to be determined based on the specific final formulation and existing conditions.
    - **Visual pH monitoring – research grade:** Phenol red may be added at 10–15 mg/L (0.001–0.0015%). Note, it will render the product non-food-grade.
    - **Visual pH monitoring – food grade:** Anthocyanin extracts or curcumin may be used. Concentrations need to be determined based on the specific final formulation and existing conditions.

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- **Osmolarity:** Final Osmolarity may vary depending on supplementation (e.g. serum or serum-free formulations). For cell types sensitive to osmotic stress, adjust osmolarity as needed using 5 M NaCl or equivalent salt solutions.
- **Preparation of Complete Media:** Supplement DMEM/F12-FG with your serum or animal component-free (ACF) media of choice following standard basal media dilution protocols. Allow the complete media to equilibrate to room temperature (~25°C) before use. Minimise exposure to light during handling.
- **Media Exchange:** For optimal cell health and performance, we recommend media exchange every 48 hours, or as required by your specific protocol.