

Microalgae production using liquid fertilizers derived from animal husbandry

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Background:

- Microalgae biomass is a potential source for green energy and raw materials due to its high yield potential and composition (proteins, oils, fatty acids, pigments)
- Using waste streams as fertilizer is interesting from an environmental as well as economical point of view
- Using products from animal husbandry will reduce the environmental impact of animal husbandry

Objective

- Selection of suitable nutrient sources from animal husbandry
- Assessing algae growth potential using the selected nutrient sources

Methodology

Wellplate test

- *Chlorella sorokiniana* microalgae species was used
- Well plates were placed above white LED light
- Well plates and LED plate were placed on stirrer in climate cabinet at 25 °C constant
- Products were diluted to 40 mg N/l

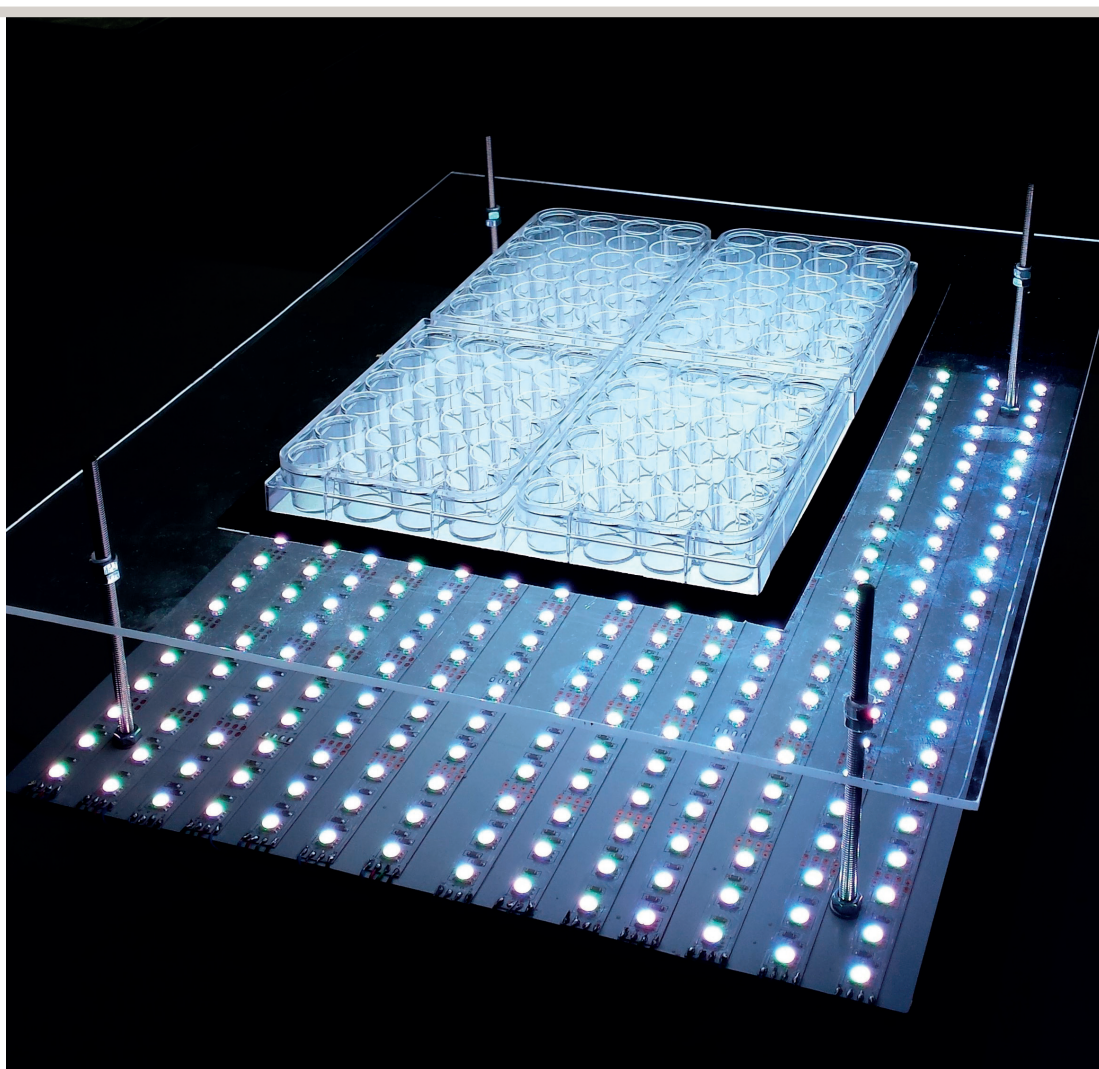


Table 1. Overview of selected products.

Code	Description
LF DIG	Liquid fraction (after separation of co-digested pig slurry with screw press and centrifuge)
EF-BI	Effluent from a biological air scrubber (ammonium-nitrite-nitrate)
EF-CH	Effluent from a chemical air scrubber (ammonium sulphate)
UR	Urine from dairy cows (containing urea)
MC	Mineral concentrate (AgroAmerica)
MC-C4500	Mineral concentrate after centrifuge (4500 rpm)
MC-C10000	Mineral concentrate after centrifuge (10000 rpm)



Figure 1. Dilutions of the tested products as used in the algae growth test

Results:

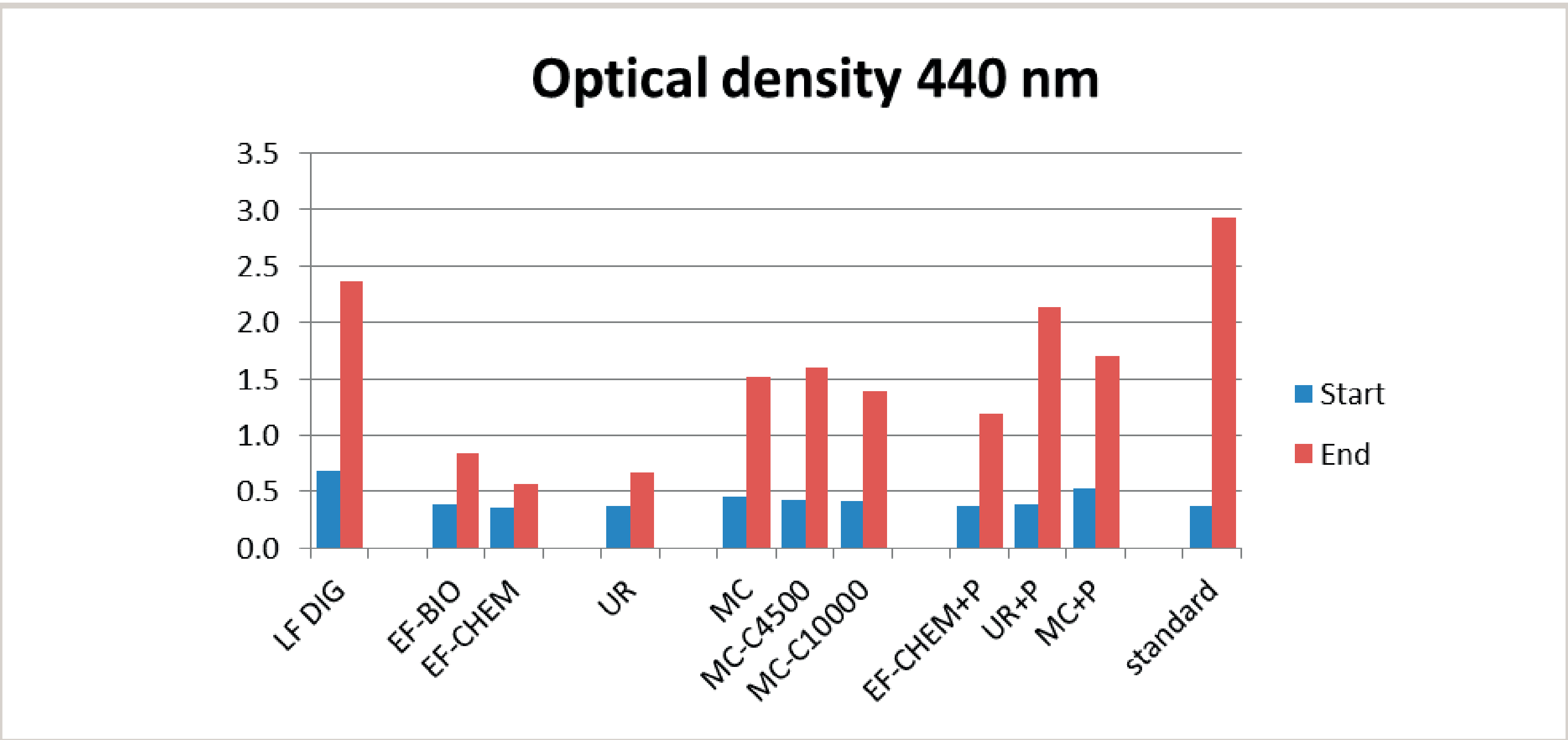


Figure 2. Optical density (440 nm) of algae culture at start and end of the experiment (after 4 days).

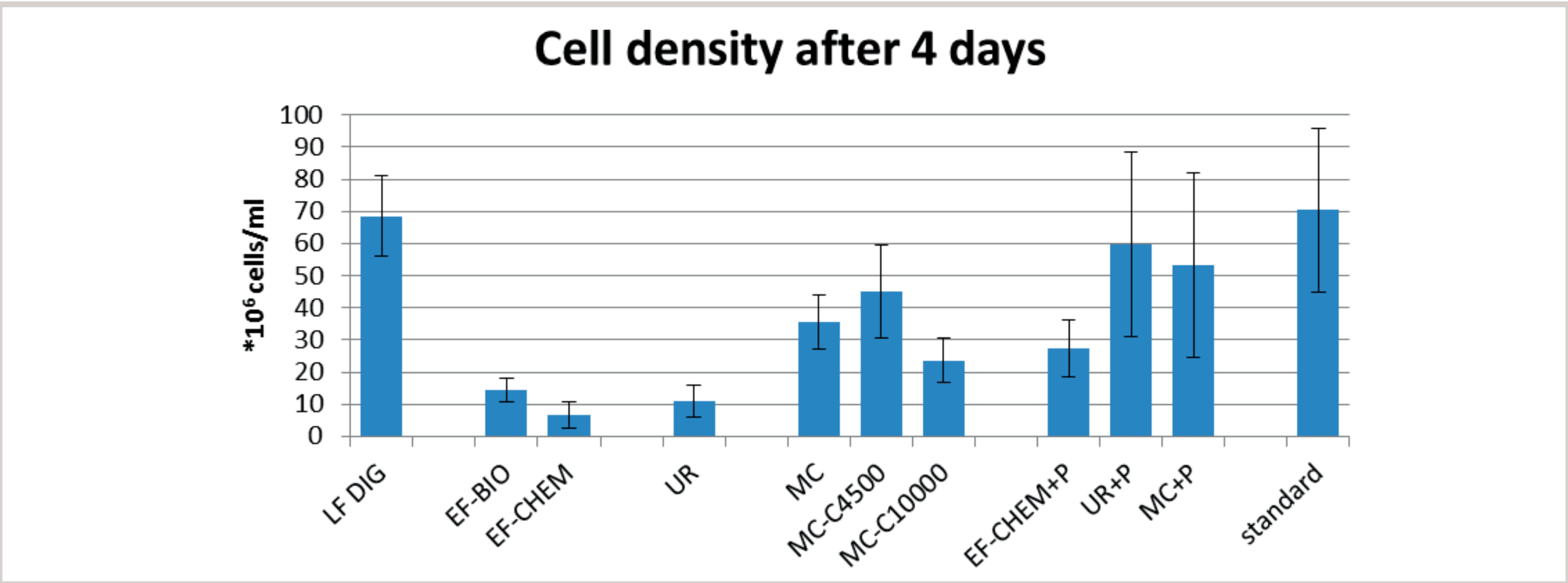


Figure 3. Cell density of algae culture at end of experiment

- The manure products (LF DIG and MC) showed significant algae growth. The growth could not predicted by the colour of the product.
- Addition of P (figure 2) improves the growth for products with low P content (urine and effluent from air scrubber)
- Results of the cell counts (figure 3) are in line with the optical density after 4 days (figure 2).

Conclusion

- Out of the control LG DIG gave the highest algae production followed by the MC products.
- If addition of organic matter to the algae culture is to be minimized in order to minimize contamination of algae biomass with manure dry matter, MC is the best candidate.
- Addition of P significantly increased algae growth on UR and EF-CH.
- The organic matter content and the colour of the products are not correlated with the algae growth potential.

Acknowledgements

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