



## FMX in **PROBIOTICS** Production

Higher Concentration  
for Higher Productivity

## INDUSTRY TRENDS

Recent media coverage of advances in organic health supplements has highlighted the benefits of administering probiotics, non-pathogenic living microorganisms that positively affect the intestines of host humans or animals by restoring indigenous microbial balance. While applications for the relatively nascent probiotics market exist in functional foods & beverages, dietary supplements, and animal feed, significant R&D is underway to innovate new products for expanding commercial usage. With this anticipated expansion in probiotic applications alongside the ongoing surge in the functional food market, the global probiotics market is expected to witness steady growth from current day to be worth over 46 billion USD by 2020.

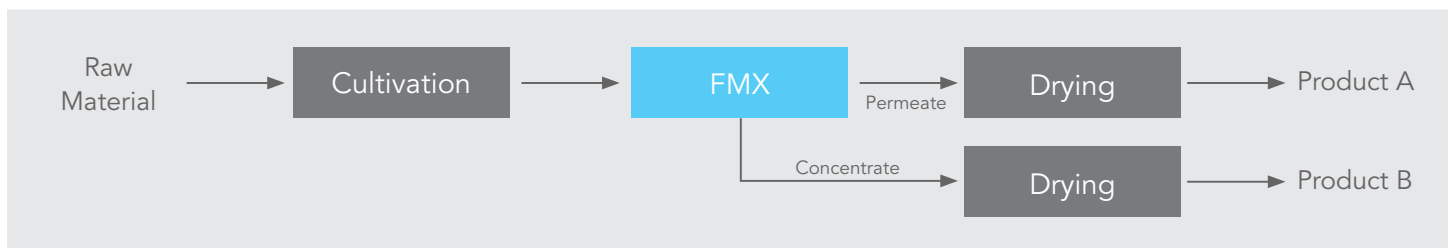
## CONVENTIONAL PROCESS & CHALLENGES

### *Probiotics Production Process*

Typical probiotics production processes follow a similar structure, proceeding from raw material to cell culture in a bioreactor before entering a liquid-solid separation stage. Prior to a final drying or evaporation process, each process train may then integrate a unique set of additional stages depending on the final product goal, i.e. the introduction of a fermentation stage to achieve particular cell derivatives.

### *Challenges in Production*

Both the cultivation broth emerging from the bioreactor and fermentation are challenging high-solids concentrate streams. When compared to current industry standards in membrane filtration, FMX is reliably capable of achieving higher recovery and higher concentration with lower run time, while offering additional economic benefits through boosting efficiency of the drying process and reducing power consumption.



## WHAT IS THE FMX?

FMX is a membrane filtration system specifically designed to prevent fouling, especially for applications with high solids loading. Currently, FMX is applied widely in production processes across a diverse range of industries, including chemical, biochemical, and food & beverage, because it can be adapted to utilize any type of flat sheet membrane, created from a variety of materials (including ceramic and metal) and for any pore size (e.g. MF, UF, NF, LPRO).



## FMX IN ACTION: BIFIDO

### Primary Challenges & Goals

Industrial production of probiotics belonging to the lactobacilli family necessitates the production of high biomass in a short time with low cost. Due to issues with after-care maintenance for its existing equipment, Korean health supplement manufacturer BiFiDo was motivated in 2013 to explore new technology for these aims.

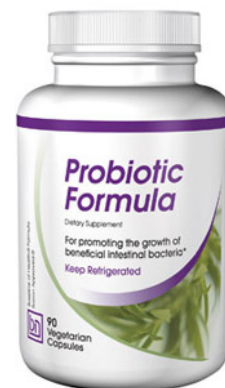
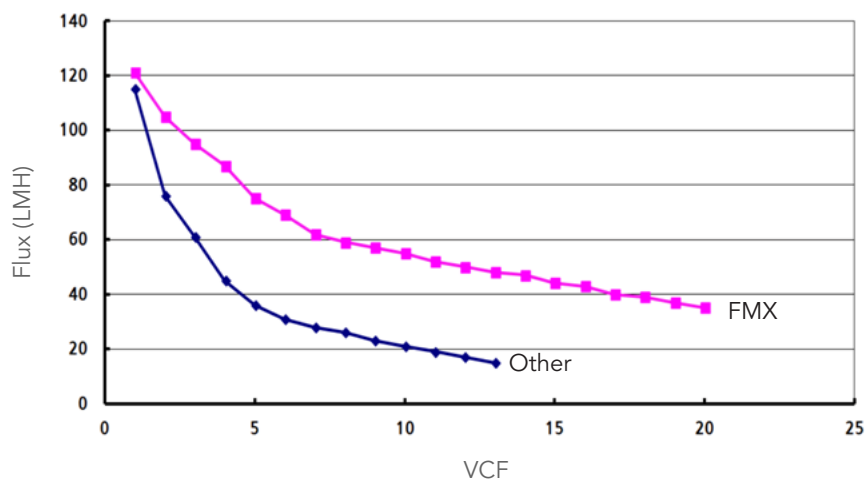
- Higher concentration of targeted lactic acid bacteria
- Better service and customer care

### The FMX Advantage: Higher Concentration & Productivity

When applied downstream of cell cultivation or fermentation, FMX has increased product purity and process efficiency across the board, minimizing the incidence of membrane fouling while reliably delivering higher concentration than conventional technologies.

### Key FMX Benefits

- 30% increase in *productivity* over existing equipment
- Achieved *10 times* the previous *concentration* for higher product value
- Minimized loss of *targeted lactic acid bacteria* and reduced cultivation frequency
- Decreased energy consumption from the drying process



The comparison between the effects of the FMX and that of the previously employed membrane filtration system is clearly seen in the above graph. Overall, FMX was able to increase the desired concentration *10 times*, resulting in a dramatic increase in both productivity and product value.

Commissioning having been completed in 2015, FMX continues in full-scale operation at BiFiDo's probiotics production facilities, successfully maintaining stable operation to the present day.