

TECHNICAL WHITE PAPER: DISCOVERY AND VALIDATION OF PREBIOTIC PROPERTIES OF ULTRA-FILTERED COW COLOSTRUM AND CHICKEN EGG YOLK

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OBJECTIVE

The purpose of this study was to determine the oligosaccharide components in ultra-filtered cow colostrum and validate their use, along with chicken egg yolk, as a prebiotic ingredient.*

BACKGROUND

Prebiotics were discovered in the mid-1990s as nondigestible compounds that pass through the upper part of the gastrointestinal tract and colonize in the large bowel. While there, they stimulate the growth of beneficial bacteria by acting as their food substrate.

There are several types of prebiotics, including oligosaccharides, which are complex sugars that can be derived from dairy products like milk. Cow colostrum also contains these prebiotic molecules, which are typically less than 1,000 daltons in size.

The filtration processes used to concentrate 4Life Transfer Factor® molecules also have the ability to concentrate oligosaccharides, which makes them a potential rich source of prebiotics. Therefore, 4Life initiated a study about prebiotics in ultra- and nano-filtered cow colostrum and chicken egg yolk.*

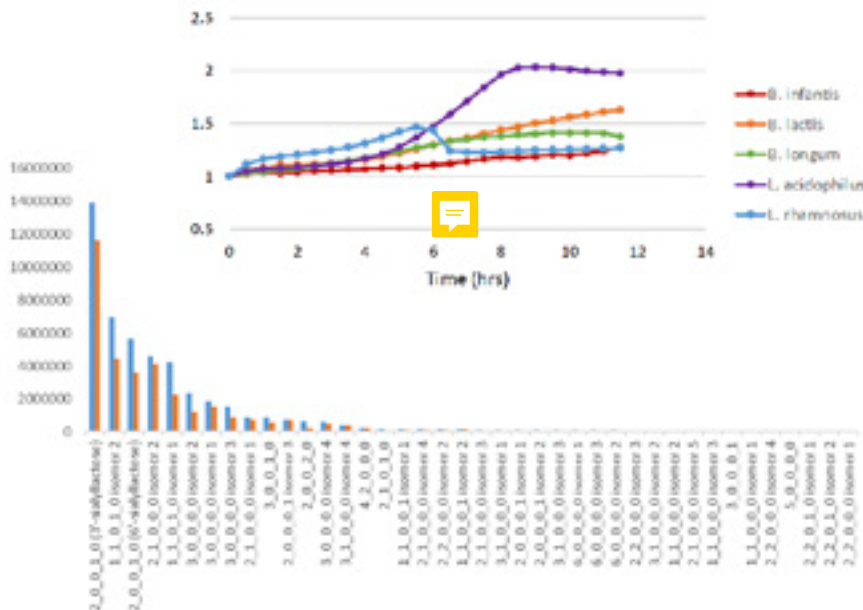
STUDY

Oligosaccharide Determination and Quantification Ultra-filtered bovine colostrum oligosaccharides were isolated and purified via chloroform-methanol extraction, protein precipitation, and solid phase extraction. The extracts were analyzed using an Agilent 6520 accurate mass Quadrupole Time-of-Flight mass spectrometer with a microfluidic nano electrospray liquid chromatographic chip. Data was acquired in the positive ion mode.

Oligosaccharides were quantified using a Thermo Scientific ICS 5000 high-performance anion-exchange chromatography system with pulsed amperometric detection, equipped with an electrochemical cell with a disposable gold working electrode. Chromatographic separation of the oligosaccharides was carried out with a Dionex CarboPac PA200 analytical column.

In-Vitro Experiments Lactobacillus and Bifidobacterium strains were grown separately in MRS broth. Both organisms were incubated at 37 °C. Each culture was inoculated into sterile 12- or 24-well spectrophotometer plates containing ultra- and nano-filtered bovine colostrum and chicken egg yolk. All experiments were done in triplicate at a physiological pH of 5. Inoculated plates were placed in a Tecan Infinite M200 spectrophotometer and incubated at 37 °C with growth readings taken regularly for up to 12 hours.

Probiotic enhancement Ultra- and nano-filtered cow colostrum and chicken egg yolk demonstrated a stimulatory effect on each probiotic strain which could be measured and differentiated. Probiotic enhancements ranged from 111% to 868% compared to the baseline.*



RESULTS AND DISCUSSION

Identifying oligosaccharides in cow colostrum A total of 40 oligosaccharides were identified in the ultra-filtered cow colostrum by matching raw mass spectrometric data to an in-house library containing components that were previously identified from cow milk. Of the elucidated structures, 40% were sialic acid-containing, with the most concentrated being on the order of 10s to 100s mg/L.*

CONCLUSION

Forty different oligosaccharides were found within ultra-filtered cow colostrum. Colostrum and egg yolk components of 4Life Transfer Factor demonstrated their versatility as prebiotic ingredients.*