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The Microflora of Raw Milk and the Impact of Milk on their Survival at Low pH



**MASSEY
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Abstract

Milk is an excellent food source as it contains a plentiful supply of nutrients and minerals. Although normally consumed after pasteurisation, there is growing evidence that raw milk provides health benefits beyond nutrition alone. Epidemiological studies of children have shown that those who regularly consume raw milk appear to have a lower incidence of asthma and non-specific allergy than those who consume processed commercial milk. The gastrointestinal tract is a key location for immune development as interaction with microflora can occur at the mucosal surface. Milk may have a role to play in the early stages of this process either due to the microbes it harbours or to the physical and chemical properties of milk itself.

The aim of this study was to identify bacterial isolates unique to raw milk, that would not survive pasteurisation; and to determine whether milk allowed for a greater survival of these bacteria during ingestion. Bacterial isolates were cultured from either raw or pasteurised milk and tested for their ability to survive pasteurisation. A subset of thermosensitive isolates were identified for further analysis representing those species likely to be present in raw milk but not processed. This thermosensitive subset was challenged for their ability to tolerate acid conditions (pH 2.5) both in the presence and absence of milk to determine the likelihood of their survival during ingestion. A high throughput acid tolerance test was developed to screen raw milk bacteria for acid tolerance. Data supports the hypothesis that milk significantly increased the survival of raw milk bacteria exposed to pH 2.5 and that specific components found specifically in milk were, at least in part responsible for this effect. In conclusion, a unique subset of bacteria found only in raw bovine milk, and not in processed milk, has been identified that when ingested with milk are able to come through an acid challenge not dissimilar to that of the stomach and survive. This opens the possibility that these bacteria present in raw milk are able to enter the lower GI tract and interact with the immune system via Peyer's patches.

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List of Presentations

de Vegt, P., Withers H., & Flint S.H. (2010), *The Effect of Milk Microflora on the Host-Microbe Interaction of the Gut*, 12-Month Confirmation , Massey University, Palmerston North

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Abbreviations

aOR	adjusted Odds Ratio
APC	Antigen Presenting Cell
APT	All Purpose Tween
CFU	Colony Forming Units
CI	Confidence Interval
CM	Casein Micelle
DC	Dendritic Cell
DGGE	Denaturing Gradient Gel Electrophoresis
EDTA	Ethylenediaminetetraacetic acid
GAD	glutamic acid decarboxylate
GI	Gastrointestinal
GLMM	Generalised Linear Mixed Model
Ig	immunoglobulin
IL	Interleukin
IFN- α	Interferon-alpha
LB	Luria Bertani
LSD	Least Significant Difference
M	Molar (mol / L)
M-PCA	Milk-Plate Count Agar
mM	milli-Molar
MRD	Maximum Recovery Diluent
OR	Odds Ratio
PCA	Plate Count Agar
r16S	ribosomal 16S
SD	Standard Deviation
SSCP	Single Strand Conformational Polymorphism
T _H 1	T-Helper type 1
T _H 2	T-Helper type 2
TSA	Tryptic Soy Agar
TSB	Tryptic Soy Broth
UHT	Ultra-high Temperature
WPC	Whey Protein Concentrate