Acid Stability of Protexin Probiotic Micro-organisms

In vitro unbuffered growth at pH 2.0 for 2 hours contact time

Summary:
Samples of probiotic micro-organisms (*Enterococcus faecium* NCIMB 10415) contained in Protexin Veterinary formulations were tested for stability under acidic conditions to mimic the extreme fasting pH of the stomach.

Introduction:
In order to produce beneficial effects within the gastrointestinal (GI) tract, probiotic micro-organisms must have the capacity to survive and metabolise in the gut. They must therefore be resistant to GI tract levels of acid.

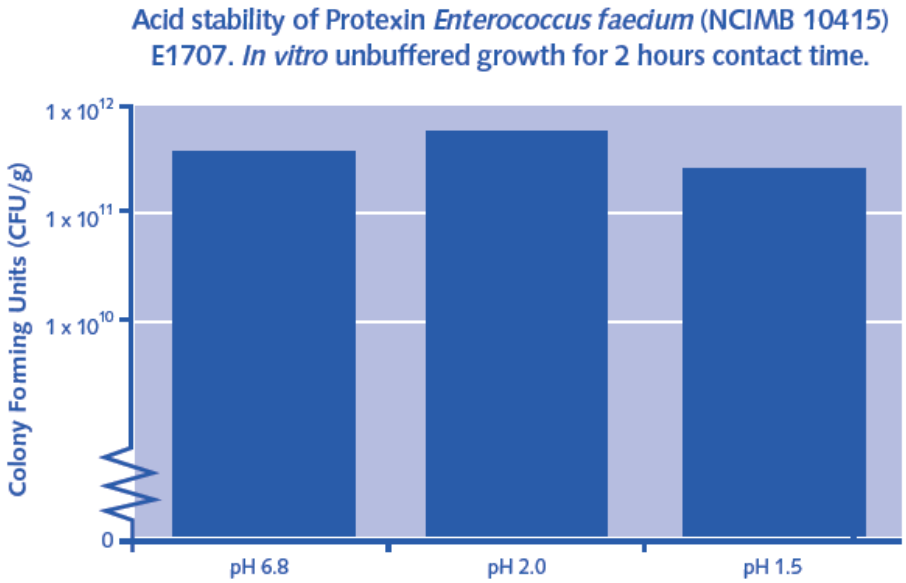
Probiotic formulations also need to contain large numbers of viable organisms (highly concentrated) which, on ingestion, survive the rigorous onslaught of the mammalian upper gut in order to deliver their bacterial content to the small intestine. One of the primary barriers to the passage of bacteria is the acidity of the stomach. The pH of the stomach varies throughout the day under the influence of the buffering action which food or liquid may have on the stomach.

The food itself will have some neutralising effect on the pH of the stomach and hence a pH of 2.0 is probably the lowest to which the bacteria will be subjected. In addition the food may also have a physically protective role to play.

It should also be noted that the laboratory conditions (*in vitro* tests) designed for these tests, whilst attempting to mimic the conditions within the stomach are, in fact, only a simplistic view of what is, in fact, a very complex situation.

Results:

Microbial strain	Control pH 6.8 (CFU/g)	Test pH 2.0 (CFU/g)	Test pH 1.5 (CFU/g)
Enterococcus faecium (NCIMB 10415) E1707	5.0×10^{11}	5.8×10^{11}	3.5×10^{11}



When held at a pH of 2.0 and pH 1.5 for a 2 hour period there is no significant loss in viability/concentration of the probiotic. The contact time is extreme - a two hour contact time period without any buffering effect of e.g. food or water, before plating out.

Conclusions:

Bacterial counts do not reduce in viability/concentration after contact with acid of pH 2.0 and pH 1.5 for 2 hours. This means that a high concentration of micro-organisms survive, which could reach the small intestine and establish themselves as part of the normal microflora. Laboratory tests are not necessarily a reflection of *in vivo* conditions although the experiments were designed to mimic the situation as closely as possible.