

## Posters

### Viability of probiotic bacteria in foods during storage

SL Lahtinen, AC Ouwehand, M Gueimonde, SJ Salminen

*Functional Foods Forum, University of Turku, PharmaCity, 20014 Turku, FINLAND*

**Background** - Viability of probiotic bacteria in foods has recently received increasing interest partly because of new findings suggesting that yoghurts containing viable bacteria are more beneficial to health and nutrition than heat-sterilized yoghurts containing only non-viable bacteria. Recently, probiotic bacteria have been shown to enter a dormant state during storage.<sup>1</sup> Nutritional significance of such dormant probiotics is yet to be defined.

**Objective** - To assess viability status of probiotic bacteria by monitoring different intrinsic properties of the bacteria during storage.

**Design** - Nine fermented probiotic products were prepared and the viability of the cells was measured by plate counts, quantitative reverse-transcriptase PCR, and flow cytometry combined with three different fluorescent staining procedures measuring membrane condition, enzyme activity, and internal pH of the cells.

**Outcomes** - A significant subpopulation of probiotic cells entered a dormant state during storage. Internal pH and membrane condition of the cells remained unchanged, while cells with esterase activity decreased by 1 log units. Cell activity measured by RNA levels remained unchanged. In comparison, plate counts of the cells decreased 6-8 log units, suggesting that the cells had become dormant.

**Conclusions** - It has become apparent that the viability of probiotic cells is not just a question of the cell being simply dead or alive, and that a multi-method approach may be needed for reliable assessment of viability. The health effects and nutritional significance of so-called dormant probiotic cells needs to be assessed, and the occurrence of such bacteria in foods should be taken into account when regulations and guidelines for products containing probiotic bacteria are set.

#### References

1. Lahtinen SJ, Gueimonde M, Ouwehand AC, Reinikainen JP, Salminen SJ. Probiotic bacteria may become dormant during storage. *Appl Environ Microbiol* 2005;71:1662-3.

---

### Nutritional quality of grain legumes

CL Nalle, G Ravindran, V Ravindran

*Institute of Food, Nutrition and Human Health, Massey University, Palmerston North, New Zealand*

**Background** - Grain legumes are potential substitutes for soybean meal in poultry feed formulations, but their utilisation is limited due to uncertainty about their nutritional quality. Limited data are available on the nutritive value of grain legumes grown under New Zealand conditions.

**Objective** - To determine nutritional quality of four grain legumes for poultry.

**Design** - A total of 68 samples representing narrow leaf lupin, white lupin, chickpeas and peas were analysed for protein and amino acids. In addition, the protein quality was determined in studies with broiler chickens from day 1 to 12 post-hatching. Semi-purified diets containing raw legumes and a control soybean meal were fed to broiler chickens for 10 days. Weight gain and feed intake were recorded, and the protein efficiency ratio (PER) was calculated. The effects on organ weights (heart, liver and pancreas) were also recorded.

**Outcomes** - PER values and amino acid scores suggested that the protein quality of the test ingredients was in the following order: soybean meal > chickpeas > peas > lupins. Mortality was not increased by feeding of raw forms of legumes, suggesting that these do not contain significant levels of any anti-nutritive factors. The lack of effects ( $P > 0.05$ ) on the relative organ weights indicated that the levels of anti-nutrients in these legumes were low.

**Conclusion** - The protein quality of the tested legumes for poultry was poorer compared to soybean meal, which is related to the deficiency of key limiting amino acids, rather than to the presence of anti-nutrients.