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Functional extruded snack products based on chickpea (*Cicer arietinum L.*) and fenugreek (*Trigonella foenum-graecum*) flours

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Background – Chickpea and fenugreek are both legumes that confer several nutritional and functional virtues, especially to diabetes and associated metabolic syndrome conditions. They are high in protein and fibre, low in fat and prove to be low glycaemic. They also provide a gluten-free alternative to those suffering from celiac disease. Though these seeds are locally available, hardly any products appear on the supermarket shelves.

Objectives – The aim was to utilise the health and nutritional benefits of chickpea and fenugreek and develop acceptable snack products by extrusion technology.

Design – Preliminary trials were conducted with different proportions of rice and chickpea at a range of extruder conditions to optimise the raw material and processing conditions. Studies were then conducted at optimum processing conditions using a 7:3 chickpea and rice combination replacing with 2% fenugreek or 5, 10, 15 and 20% FenuLife® (deodorized fenugreek powder). Products were evaluated for their physical (expansion, crunchiness and colour) and sensory (texture, colour, flavour and overall acceptability) characteristics in order to identify their suitability as snack products.

Outcomes – Addition of chickpea up to 70% with rice showed increased expansion and stable product characteristics. Addition of fenugreek and FenuLife®, indicated slight reduction in product expansion (radial) and crunchiness. However, the product made with 20% FenuLife® had significant changes in expansion, crunchiness and colour values. The median scores of sensory evaluation indicated that all products were within the acceptable range. Inclusion of fenugreek showed lower ratings for flavour due to the strong bitter taste of fenugreek. There were no significant differences between products containing FenuLife® (5-15%) in their colour, flavour, texture and overall quality.

Conclusion – This study demonstrates an opportunity for using chickpea and fenugreek in functional product development. Fenugreek in the form of deodorize powder (fenulife®) could be incorporated up to 15% in a mixture of chickpea and rice to develop snack products of acceptable physical and sensory properties.

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Changes in fatty acid profiles in chicken eggs following oral supplementation of the probiotic, *Propionibacterium jensenii* 702, to layers

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Background – Probiotic supplementation to the diet of layer chickens has been demonstrated to improve egg quality in respect to mass, weight, size and specific gravity. In addition, supplementation with certain probiotic strains has also resulted in changes in the egg cholesterol level and the composition of fatty acids.

Objective – The aim of this study was to investigate the effect of daily oral supplementation of the probiotic *Propionibacterium jensenii* 702 on fatty acid profiles of chicken eggs.

Design – In this study, twenty eight starter pullets were divided equally into a control and treatment group. A novel probiotic, *Propionibacterium jensenii* 702, which was originally isolated from raw bovine milk, was orally administered to the treatment group daily at a dose of 10⁷ cfu. Over an eight week period, 10 eggs from each group were selected weekly for measurement of egg cholesterol and fatty acid content. Cholesterol and fatty acids composition of whole egg was detected by GC-MS.

Outcomes – The results demonstrated changes in the egg cholesterol and fatty acids in the treatment group compared to the control group associated with the probiotic supplementation. Significantly lower levels of Myristic acid (*P*<0.001), Palmitoleic acid (*P*=0.001) and all-cis-11, 14- Eicosadienoic acid (*P*=0.02) were observed in the treatment group.

Conclusions – Dietary supplementation with the probiotic *Propionibacterium jensenii* 702 has the potential to alter fatty acid profiles in egg. If probiotic supplementation is going to be safely implemented in animal food production, consideration of the alterations to the final food product should be undertaken to ensure the overall outcomes of the supplementation are beneficial to the end product consumer.