Transforming by-products of plant protein production for a sustainable and cost effective ingredients manufacturing

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Surge of negative environmental evidence of impact over production and consumption of animal proteins over the last few years has been a major driver to look for sustainable alternatives. Due to industry and consumer demands, plant protein production in Australia and more broadly has increased rapidly in recent years, and it is projected to grow even further over the next decade. The main raw material used in the Australian plant protein production is pulses. However, most pulses only contain 25-30% protein, a large proportion is non-protein components, therefore large quantities of waste are generated (about 3 kg dry waste per 1 kg plant protein) and make these processes economically challenging. More importantly creating large quantities of wastes makes the existing plant protein production from pulses unsustainable. Global growth in demand for plant protein is seen to be a long-term market trend and hence its related waste can be even higher as the Australian and global pulse production has the capacity to support higher plant protein production. However, waste streams are seen as a major hurdle against further expansion of plant protein production.
Current industry challenges and strategies in dealing with the waste streams of plant protein production will be critically analysed and reviewed. Challenges and possible solutions of large-scale processing of plant protein production wastes will be addressed. With an industry lens, engineering opportunities for large scale recovery and transformation of waste streams into functional as well as health promoting food ingredients will be discussed.
In particular, process options for recovering premium quality starch and invisible pulse fibre from plant protein production wastes are highlighted. Transformation of the extracted products into value added and healthy ingredients such as soluble and insoluble dietary fibres, special purpose starches, fat replacers and invisible fibre through physical and other approved/green technologies for food and non-food applications are reviewed.