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Development of low cost feed grade soybean protein concentrates for aquafeed

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One emerging area in the global soy industry, particularly the U.S. soybean industry, has been developing soy-based feeds as an alternative protein source to meet the growing needs of aquaculture worldwide. Fishmeal has traditionally been a key protein ingredient in fish diets. Yet, because of high demand and stagnating supply, its cost has increased. This makes development of fishmeal replacement an urgent task. At present, defatted soymeal is a widely used ingredient for fish feed because of its low cost and abundant availability. However, defatted soymeal is far from an ideal fishmeal replacement, because its protein content is significantly less than fishmeal and because the presence of soluble and insoluble carbohydrates limits its inclusion levels for some fish. In contrast, soy protein concentrate (SPC) is better suited for fish feed. Yet, there are two major constraints that currently limit use of SPC in animal feed (particularly in aquafeed): high production costs associated with current processing methods and limited availability. To address these constraints, at the U.S. Department of Agriculture, Agricultural Research Service, we collaborated with Indiana Soybean Alliance in developing low cost feed grade SPC for aquafeed. Food grade and feed grade SPC have different requirements for protein content, levels of anti-nutritional factors, physical and functional properties, color, and flavor. Because of these differences, we were able to develop a method that lowers the cost of feed grade SPC production at both laboratory and pilot plant scales without sacrificing nutritional quality. Our strategies centered around three important aspects in SPC production: choosing a low cost raw material, using alternative solvents, and employing alternative drying methods. Feeding studies with rainbow trout showed that fish fed with the new feed grade SPC performed as well as those fed food grade SPC. The method is ready for commercialization.