NUTRITIONAL CHARACTERISATION OF AN ORTHOPTERAN (BUFONACRIS CLARAZIANA) AS FEED SUPPLY

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INTRODUCTION

Insects are an important natural resource that can be used to feed animals. Numerous studies about the impact of insects and their derived ingredients on the feed conversion ratio of animals reflect the positive results associated with their inclusion in fish, poultry and swine diets. For example, in aquaculture producers are interested in developing insect powder with high nutritional value (rich in proteins, vitamins, fatty acids, etc.) to replace traditional diets. The objective of this study was therefore to determine the nutritional composition of Bufonacris claraziana, a herbivorous insect known as the toad grasshopper and considered a pest in the Patagonia region of Argentina, with an eye to it being used as an alternative source for fish feed.

METHODOLOGY

A sample of adult grasshoppers of the species B. claraziana was collected from a natural grassland located in the town of Cushamen in the province of Chubut, Patagonia, Argentina and analysed to determine their nutritional composition. The insects were slaughtered by freezing at -20 °C and then washed with water. In order to obtain the powder, the sample was dried at 130 °C for approximately 1 hour using a forced air oven, to a water activity less than 0.6. The dried grasshoppers were ground to achieve a desired particle size and then sifted through a 1 mm sieve. Finally, the chemical composition of the powder was analysed. The total protein content was determined using the Kjeldahl method. Total fat was measured by Soxhlet extraction, moisture and ash by gravimetric methods, drying at 102-105 °C for 16-18h and incinerating at 550 °C, respectively. The presence of vitamins B1 and B2 was determined following Journal of Food Composition and Analysis 19 (2006) 831-837, with modifications (limit of quantification: 0.077 mg/Kg), whereas the fatty acids profile was analysed by gas-liquid chromatography of the methyl esters of the total fatty acids (AOCS Ce 1k-09: 2009 and ISO 12966-4: 2015).

RESULTS

The results showed that B. claraziana powder contained 70 % protein, 11 % carbohydrates, and relatively low percentages of moisture, fat and ash (below 10 %). Almost all the parameters evaluated (except ash content) exceeded the average value recorded for other species of edible orthopterans. The results of the fatty acid composition indicate that oleic, linoleic and palmitic acids are the most abundant, while the values of vitamin B1 and B2 are 3.9 and 8.3 (mg/kg.) respectively.

DISCUSSION

Bufonacris claraziana is particularly rich in protein, comparable to beef and milk. The level of carbohydrate is higher than other orthoptera such as Locusta migratoria. Almost all the parameters evaluated (except the ash content) exceed the registered average value for edible orthopterans. The results of fatty acid composition indicate that oleic, linoleic and palmitic acids were the most abundant. Oleic and linoleic are unsaturated fatty acids whose main functions are to protect the cardiovascular system, to improve immunity and to decrease body fat levels. Palmitic acid is a saturated fatty acid that favours energy production. On the other hand, the presence of vitamins B1 and B2 was a standout. These results demonstrate that B. claraziana constitutes a potential nutritional resource for future development of fish feed diets. Future studies are expected to determine nutritional quality in comparison with traditional diets and possible toxic effects. This innovative and preliminary study is an initial step towards designing technological interventions capable of strengthening feed security, sustainability and self-sufficiency of protein production for producer farmers.