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Study of The Influence of Process Parameters on Liquid And Supercritical Co_2 Extraction of Oil From Rendered Materials: Fish Meal And Oil Characterization

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- Pressurized CO_2 extraction of remaining fat from fish meal has been carried out.
- Extraction may be controlled by the solubility of the oil in CO_2 in the first stage.
- The lowest fat content in the fish meal was 0.7 % at 39.5 MPa and 40ºC.
- Production of fish protein concentrates at low operating T is beneficial.
- Fish meal after SC-CO_2 extraction presents lighter colour than the original fish meal

Abstract
Liquid and supercritical CO_2 has been used to extract the remaining fat content from rendered fish meal. The effect of pressure (10 – 40 MPa) and temperature (25 – 80 ºC) on the extraction kinetics and extraction yield has been investigated as well as the effect on the rendered fish meal. The extraction curves are initially linear with a slope close to the oil solubility value in pressurized CO_2. Based on previous fish oil solubility data reported in the literature, a general equation has been proposed to correlate fish oil solubility data as a function of temperature and density of CO_2. Fish meal has been characterized before and after extraction by determining the fat and protein content and its colour. Toxic trace elements have been also determined by ICP-MS in the fish meal showing that most of the toxic elements remained in the fish meal after extraction. Characterization of extracted oil was also performed by determining the fatty acid group composition and some physical parameters such as colour.

Keywords
Fish meal, liquid and supercritical CO_2, fish oil solubility

1 Introduction

Fish meal is one of the primary products resulting from the rendering process of fish discards, being Peru and Chili the two major producers [1]. The other main product is the oil fraction. Fish meal is the clean, dried, ground tissue of undecomposed whole fish or fish cutting, with or without the extraction of part of the oil [2].
Total protein in fish meal can be higher than 70 % with good digestibility of its amino acids which makes it an excellent source of nutritive protein. It is used to supplement