

Ultrasonic-assisted pretreatment to reduce the content of antinutritional and antitechnological factors of lupin seed flour

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Lupin seeds is considered to be a rich source of protein. In addition, lupine cultivation is better adapted to Mediterranean climate and poor soils than soybeans. However, lupin flour presents a high content of antinutritional (ANF) and antitechnological factors (ATF), such as alkaloids of quinolizidine group, saponins and fat, which could negatively affect the protein digestibility. Thus, this work addressed how the ultrasonically-assisted pretreatment of the lupin seed flour affects the content of ANF and ATF.

The extraction solvents used were water and 20% ethanol aqueous solution using a solid/solvent ratio of 1:15 (w/v, g/mL) and a total extraction volume of 200 mL. Conventional and ultrasound extraction processes at two temperatures (and) and two treatment times (3 and 9 min) were carried out. Conventional extraction process was conducted with mechanical agitation (952 rpm). In the ultrasonic-assisted extractions (UAE), the stirrer was replaced by an ultrasonic probe system immersed into the extraction solution and working in cycles of 0.5 s and 790 W/L of power density. After the treatment, the content of ANF and ATF including alkaloids, saponins and fat was measured.

The initial alkaloids, saponins and fat content of the lupin seed flour was g lupine/kg dm, g oleanolic acid/100 g dm and g lipid/100 g dm, respectively. In general terms, ultrasonic-assisted extraction led to larger removal of ATF and ANF than conventional one. Thus, using ethanol 20% as solvent during 3 min, the reduction of alkaloids, saponins and fat reached , and , respectively. Therefore, ultrasonic-assisted pretreatment could be considered a feasible technique to remove the content of ANF and ATF of lupin flour. Further investigations should explore how this pretreatment affects the protein loss and establish an appropriate recovery process.