INTRODUCTION

In addition to high protein content, white lupin (WL) seeds are also a valuable source of high-quality oil, which can not only increase the nutritional quality of animal products when feeding it to farm animals, but it may also exhibit some therapeutic effects (Straková et al., 2010, Chiofalo et al., 2012). In addition, Volek et al. (2018) found that the dehulling of WL seeds may increase the content of some beneficial fatty acids (FA). Inclusion of WL seeds into rabbit diet in the mentioned study led to a favorable effect on the content of some FAs in rabbit meat.

The objective of this study was to evaluate the effect of dehulling white lupine seeds on the nutritional content of fats in Amiga and Zulika varieties, comparing the contents of both individual fatty acids and FA groups in target products of these 3 varieties.

MATERIALS AND METHODS

The white lupine varieties Dieta, Amiga and Zulika were the object of the study. All the white lupine varieties were grown on the farm of the Faculty of Veterinary Hygiene and Ecology, University of Veterinary and Pharmaceutical Sciences Brno, Czech Republic.

The following fatty acids were determined during the analysis: capric acid (C10:0), caprylic acid (C8:0), capric acid (C10:0), lauric acid (C12:0), tridecylic acid (C13:0), myristic acid (C14:0), palmitic acid (C16:0), margaric acid (C17:0), stearic acid (C18:0), arachidic acid (C20:0), tricosylic acid (C23:0), lignoceric acid (C24:0), cis-10,12-eicosadienoic acid (C20:2), cis-10,12-eicosadienoic acid (C20:2), cis-10-heptadecenoic acid (C17:1), oleic acid (C18:1n9), cis-11-eicosadienoic acid (C20:2n9), erucic acid (C22:1n9), nervonic acid (C24:1n9), linoleic acid (C18:2n6), γ-linolenic acid (C18:3n6), α-linolenic acid (C18:3n3), cis-11,14-eicosadienoic acid (C20:2n6), cis-11,14-eicosadienoic acid (C20:2n6), cis-11,14-eicosadienoic acid (C20:2n6), cis-11,14,17-eicosatrienoic acid (C20:3n3), cis-5,8,11,14,17-eicosapentaenoic acid (C20:5n3), cis-3,13,16-docosatrienoic acid (C22:3n9), cis-4,7,10,13,16-docosahexaenoic acid (C22:6n3).

The results were evaluated by statistical methods using the software UNISTAT for Excel version 56, applying Tukey’s HSD multiple comparison test. The contents of specific FAs are given in g/kg of sample dry matter in Tables 1 to 3 and Figure 2.

RESULTS

Regarding saturated fatty acids (SFA), their content (g/kg) increased in the kernel as compared to the whole seed oil from 8.3 to 9.9, for Amiga from 4.4 to 7.9 and for Zulika from 4.4 to 8.9. Of the SFA group, palmitic acid (C16:0) was most represented in the lupin oil of all the analyzed varieties, in all the monitored parts of the seed (Table 1, 2 and 3). Its contents in the whole seed and kernel were significantly lowest in the Zulika variety and the highest in the Amiga variety; its content in the hulls of the evaluated varieties then showed a completely opposite trend. The second most represented FA of SFA in the whole seed in all the varieties evaluated was stearic acid (C18:0), which is not in agreement with the findings of Chiofalo et al. (2012), who found the second most represented behenic acid (C22:0) in the WL varieties of Luxor and Rosetta, but which was not found in the varieties we evaluated. The share of SFA from the total amount of FA in whole seed oil ranged from 13.8% (Amiga) to 14.7% (Zulika), and this proportion was almost the same in their kernels (Figure 1). A slightly lower proportion of SFA from total FA in dehulled WL seeds of Zulika variety (10%) was found by Volek et al. (2018).

As for monounsaturated fatty acids (MUFA), their content (g/kg) in the kernel increased as compared to the whole seed for Dieta from 24.5 to 28.6, for Amiga from 26.4 to 30.8 and for Zulika from 12.6 to 26.7. Concerning polyunsaturated FAs, oleic acid (C18:1n9) was the most represented in the lupin oil of the varieties we analyzed, in all monitored parts of the seed - whole seed, kernel and hull. The second most represented FA in this group was erucic acid (C22:1n9). These findings are broadly consistent with the results of Chiofalo et al. (2012) and Volek et al. (2018) for the whole seed oil in our study ranged from 42.4% (Zulika) to 43.4% (Amiga). Somewhat higher MUFA levels for whole seeds of WL (50.9-53.5%) were found by Chiofalo et al. (2012) and their significantly higher proportion in dehulled Zulika variety (65.9%) was found by Volek et al. (2018).

CONCLUSIONS

From the point of view of diet, the quality of lupin fat is positive for its high content of unsaturated FA and a favorable proportion of individual groups of FA.

Regarding the group n-3 PUFAs, their content (g/kg) in the kernel increased as compared to the whole seed for Dieta from 10.1 to 12.1, for Amiga from 10.9 to 12.7 and for Zulika from 5.4 to 11.2. Of n-6 PUFAs, α-linolenic acid (C18:3n3) was most represented in the lupin oil of the evaluated varieties. Dehulling whole seeds of the studied varieties led to the highest increase in the C18:3n3 content of the Zulika kernel (Figure 2). The proportion of n-3 PUFAs from total FA in whole seed oil ranged from 17.8% (Dieta) to 18.3% (Zulika).

REFERENCES


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