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OPTIMIZATION OF INULIN AND BARLEY ADDITION ON TECHNOLOGICAL AND STRUCTURAL PROPERTIES OF DURUM WHEAT SPAGHETTIS USING A MIXTURE DESIGN APPROACH

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A new functional pasta using Tunisian durum wheat semolina with added barley flour and inulin, extracted from chicory roots, was developed. The objective of the present work was to evaluate the effect of the percentage of durum wheat semolina, barley flour and inulin on the cooking quality (water absorption capacity, cooking loss, cooking time), textural analysis (hardness) and color of the pasta. Microstructure of the obtained pasta was examined with scanning electron microscope. Results show that the incorporation of barley flour and inulin makes modifications on some technological and textural parameters. The results demonstrated that pasta with inulin ingredient had decreased cooking time and increased cooking loss percentage and luminosity values compared with control pasta (100% durum wheat semolina). Microscopy showed the starch granules in pasta were apparently encapsulated by a protective coat of inulin which makes a disruption to the gluten- starch matrix. Also, wheat semolina with barley flour rich in β-glucan resulted in improved barley pasta containing the recommended amount of β-glucan per serving and enhanced β-glucan properties. Due to β-glucan hydrophilicity and competition with starch for water, the replacement of increasing amounts of semolina with barley flour was able to increase the cooking time. We noted that the formulated pasta had higher hardness in comparison with the control pasta. Application of a mixture design, with constraints, allowed finding the optimal composition to achieve the desirable technological and textural properties using response surface methodology. However to produce a satisfactory quality of pasta it was possible to define the following optimal formulation: 94.65% durum wheat semolina, 3.7% barley flour and 1.5% inulin. In conclusion, the information provided here suggests that the new developed functional pasta could represent a high-quality product for its suitable nutritional appeal and potential beneficial properties.