Strategies for cereal by-products valorization to added-value food stock

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Endosperm, the central part of the wheat grain, is used for food preparation because of its favorable technological properties. However, bran inclusion in the leading food formulas is complicated because most functional compounds of the wheat grain are concentrated in the outermost tissues, which, till now, are utilized as a low nutritional value feedstock. Also, undesired compounds, i.e., mycotoxins, occur in outermost cereal fractions. In addition to well know mycotoxins identified in non-treated plant material, the formation of masked mycotoxins during the technological processes could be formed.

For this reason, different extrusion parameters were tested for selecting the safest strategy for wheat bran (WeBr) valorization to added-value food stock (at different temperatures: 115 and 130°C and different speeds of extruder screw: 16, 20, and 25 rpm). Further, the different, previously isolated from spontaneous sourdough showing the desirable antimicrobial and antifungal properties *Lactobacillus plantarum*, *L. uvarum*, *L. casei*, *L. paracasei* strains for extruded WeBr fermentation were applied. In addition to the main physicochemical and technological parameters, mycotoxins' emerging and masking concentration in treated and control samples was evaluated. Along with higher nutritional value and better technological parameters, the lowest mycotoxins' content in extruded at 130°C using a screw speed of 20 and 25 rpm and fermented with *L. uvarum* WeBr was established. Thus, further, mycotoxins' biotransformation *in vivo* was tested. A 36-day experiment was conducted using 25-day-old Large White/Norwegian Landrace piglets, randomly distributed into two groups: the control group, fed with basal diet, and the treated group, fed with fermented feed.

The mycotoxin analysis of non-treated and fermented feed and control and treated piglets' feces showed alternariol monomethyl ether (AME) and altenuene presence in the 61-day-old control piglets' feces and fermented feed samples. However, AME was not detected in treated piglets' feces, and this allows concluding that fermentation with selected strains had a positive influence on better mycotoxins' detoxication *in vivo*. For this reason, at the second stage of the experiment, WeBr, extruded at 130 °C at a screw speed of 25 rpm and fermented with a *L. uvarum* strain, was used for wheat bread (WB) preparation. The contribution of newly developed stock to the quality of WB, including volatile compounds and their relationship with emotions induced for consumers, was analyzed. A comparison study on the WB (prepared with 5, 10, and 15% untreated and valorized WeBr) quality parameters was carried out. It was found that the valorized WeBr increased the overall acceptability of WB, and a strong positive correlation between overall acceptability and the intensity of the emotion 'happy' induced to the judges was observed. In WB prepared with valorized bran, a higher content of pyrazine, methyl-, pyrazine, 2-ethyl- and other specific volatile compounds was found. Finally, it can be stated that the newly developed food stock leads to the formation of a particular volatile compounds' profile in product, which is associated with the higher overall acceptability of WB.