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Effects of noodle making and cooking on the levels of a mycotoxin deoxynivalenol in Japanese soft wheat varieties

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Abstract

The retention of a *Fusarium* mycotoxin deoxynivalenol during noodle making and cooking was investigated using flours of Japanese wheat cultivars artificially infected with *Fusarium* fungi. Grains of three major cultivars of Japanese soft wheat were milled and patent flour samples prepared were further processed to noodles and cooked with fifteenth volume of water. The content of deoxynivalenol in raw noodles (before cooking) and in boiled noodles and the broth left over after boiling noodles (after cooking) was analyzed with an in-house validated analytical method using HPLC with a UV absorbance detector. The values were adjusted with moisture content of patent flour for the calculation of substantial processing factor. As a result, there was no significant change in the levels of deoxynivalenol at the stages of patent flour and raw noodle, while significant reduction was observed at the final food product of boiled noodle with substantial processing factors of 0.39-0.46. Large transfer ratio (43-59%) of deoxynivalenol in the broth was observed after cooking, showing hydrophilic property of this toxin. The results of this study showed that noodle cooking with large volume of water was effective to reduce deoxynivalenol in final noodle products with substantial processing factors below 0.5.

Keywords : processing factor, transfer ratio, raw noodles, boiled noodles, broth

I Introduction

Deoxynivalenol (DON) or vomitoxin (Fig. 1) is a naturally occurring mycotoxin produced mainly by *Fusarium graminearum* and *F. culmorum*, typical field fungi widely distributed in crops, especially in wheat and barley. The contamination by DON in cereals is one of the most serious concerns for food and feed safety worldwide. Ingestion of DON induces diarrhea, vomiting and food refusal, alters immune function, and also inflammation and necrosis are found in various tissues of the gastrointestinal tract, the bone marrow and lymphoid tissues of animals.[1] DON is not considered to be carcinogenic and a tolerable daily intake (TDI) value for DON of 1 μg/kg body weight per day was established in 1999 by the European Commission[2] and in 2001 by JECFA as PTDI (provisional TDI). The value was derived from the NOAEL (no observed adverse effect level) of 0.1 mg/kg body weight per day from a chronic dietary study with mice for two years.[3]

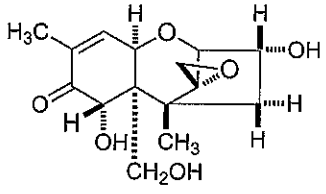

Fig. 1. Chemical structure of deoxynivalenol (DON)

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