

他誌掲載論文

(抄録)

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食品衛生学雑誌, 66(6), 165-171 (2025).

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- 3 Quantitative Real-Time PCR for *Fusarium graminearum* sensu stricto and *F. asiaticum* Infection in Wheat Kernels

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- 4 Survey of trichothecene contamination in imported and domestically produced feed in Japan

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1 Trial for *cyp51A* gene variants to discriminate Japanese *Aspergillus oryzae* from *A. flavus*

KANAZASHI Yuhei, YAMAGAMI Yohei,
FURUKAWA Tomohiro, YABE Kimiko and
KUSHIRO Masayo

Aspergillus section *Flavi* contains *Aspergillus oryzae*, an important species in Japanese traditional brewing, and also *A. flavus*, an aflatoxigenic species. Genetic discrimination of *A. oryzae* from *A. flavus* is very tough since they share over 99% sequence identity of their genome. Recently, *cyp51A* gene variants were reported to be a promising indicator to discriminate strains of *A. oryzae* from those of *A. flavus*. In this study, we applied the indicator for Japanese *A. oryzae* strains. Consequently, contradictory results were obtained for more than one Japanese *A. oryzae* strain.

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2 LC-MS/MS による飼料作物サイレージ中のゼアラレノンおよびデオキシニバレノール分析法の室間共同試験

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A collaborative study was conducted by eight laboratories to validate a method for the determination of zearalenone (ZEN) and deoxynivalenol (DON) in silage using LC-MS/MS. Corn silage and whole-crop rice silage were spiked with ZEN and DON at the following levels: 0.2–2.2 mg/kg of ZEN and 1.2–14 mg/kg of DON for corn silage, and 0.48–2.6 mg/kg of ZEN and 0.8–10 mg/kg of DON for whole-crop rice silage. The resulting mean recoveries ranged from 104% to 111% for ZEN and from 97.9% to 107% for DON. The repeatability and reproducibility, expressed as relative standard deviations (RSD_r and RSD_R), were less than 6.1% and 8.8% for ZEN, and less than 8.3% and 19% for DON, respectively. The HorRat values were less than 0.53 for ZEN and less than 1.2 for DON. These results demonstrated that the method is suitable for the inspection of ZEN and DON in silage.

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3 Quantitative Real-Time PCR for *Fusarium graminearum* sensu stricto and *F. asiaticum* Infection in Wheat Kernels

YAMAGAMI Yohei, KANAZASHI Yuhei,
INOUE Hiroyoshi, NAKAGAWA Hiroyuki,
KUSHIRO Masayo and FURUKAWA Tomohiro

To develop effective measures for controlling *Fusarium* head blight and mycotoxin contamination in wheat, accurate quantification of *Fusarium* infection is essential. We developed a species-specific real-time PCR assay as a reliable quantification method for *Fusarium graminearum* sensu stricto (s. str.) and *F. asiaticum* infection in wheat. Two types of assays were evaluated: SYBR Green and TaqMan assays. Total DNA was extracted from wheat kernels harvested from a field where *F. graminearum* s. str. and *F. asiaticum* infection in wheat was artificially promoted, and *EF1a* gene copy numbers were quantified using both assays. Strong correlations were observed between the copy numbers obtained from the two assays ($r = 0.97$ for bulk samples), as well as between the *EF1a* gene copy number (SYBR Green assay) and ergosterol content ($r = 0.88$). These results indicate that real-time PCR provides a reliable method for quantifying *F. graminearum* s. str. and *F. asiaticum* infection. In particular, the primer and probe sequences prepared in this study were specific to *F. graminearum* s. str. and *F. asiaticum*, making the TaqMan assay suitable for quantifying infections by these species.

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4 Survey of trichothecene contamination in imported and domestically produced feed in Japan

YAMAGAMI Yohei, NOMURA Masayo and
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As part of the Surveillance/Monitoring Programme

by the Ministry of Agriculture, Forestry and Fisheries of Japan, we investigated trichothecenes in 301 feed ingredient and 176 complete feed samples collected from across Japan between 2016 and 2022. Ten trichothecenes, including six type B trichothecenes—deoxynivalenol (DON), 3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol (15-AcDON), deoxynivalenol-3-glucoside (D3G), nivalenol (NIV), and fusarenon-X—and four type A trichothecenes—T-2 toxin, HT-2 toxin, diacetoxyscirpenol, and neosolaniol—were quantified using liquid chromatography–tandem mass spectrometry. Type B trichothecenes were frequently detected, whereas type A trichothecenes were less common. Maize contained the greatest diversity of trichothecenes, with higher concentrations of DON in samples from the United States and of NIV in samples from Brazil. Contamination in maize varied depending on its origin. As a primary component of complete feed, maize contributed to overall trichothecene contamination, as indicated by similar yearly variations in total (type A and B) trichothecene concentrations; positive correlations among DON, 15-AcDON, and D3G; and the same most frequent combination, DON + 15-AcDON + D3G + NIV detected in both matrices. Although DON concentrations in complete feed samples remained below the guidance values in Japan, multiple trichothecenes were frequently detected. These data provide a baseline for regulatory monitoring for both imported and domestically produced feeds in Japan. Furthermore, feed diversification, attributable to increased feed costs and climate variability necessitates continued monitoring of susceptible ingredients, as trichothecene occurrence and concentrations can vary by feed type, origin, and year.

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