論　文
Regular article

日本食品化学学会誌、Vol. 25(3), 160-166(2018)
Japanese Journal of Food Chemistry and Safety (JJFCS)

市販ELISAキットを用いたビール中に残留するデオキシニバレノールのスクリーニング法としての妥当性評価

（2018年7月24日受付）
（2018年9月26日受理）

斉藤貢一[a)]、高橋拓海[a)]、石井里枝[b)]、加藤美穂子[c)]、黒川千恵子[d)]、高橋美津子[e)]、谷口　賢[f)]、寺田久屋[f)]、堀井裕子[g)]、伊藤里恵[a)]

a) 星薬科大学　薬品分析化学教室
b) 埼玉県衛生研究所
c) ㈱フロンティア研究所
d) さいたま市健康科学研究センター　生活科学課
e) 横浜市衛生研究所　理化学検査研究課
f) 名古屋市衛生研究所　食品部
g) 富山県衛生研究所　化学部

Validity evaluation as a screening method of deoxynivalenol remaining in beer using commercially available ELISA kit

(Received July 24, 2018)
(Accepted September 26, 2018)

Koichi Saito[a)], Takumi Takahashi[a)], Rie Ishii[b)], Mihoko Kato[c)], Chieko Kurokawa[d)], Mitsuko Takahashi[e)], Masaru Taniguchi[f)], Hisaya Terada[f)], Yuko Horii[g)], Rie Ito[a)]

a) Hoshi University
b) Saitama Prefectural Institute of Public Health
c) Frontier Institute Co., Ltd.
d) Saitama City Institute of Health Science and Research
e) Yokohama City Institute of Health
f) Nagoya City Public Health Research Institute
g) Toyama Institute of Health

Abstract

A screening method for deoxynivalenol (DON) residue in beer by use of a commercially available ELISA-kit was applied for its accuracy management for method validation. DON in beer sample was subjected to acetonitrile extraction and cleanup with a MycoSep #227 multifunctional column. Recovery experiments indicated that the trueness of the low concentration sample (10 ng/mL) and that of the high concentration sample (100 ng/mL) were higher than 90%, respectively. The relative standard deviation (RSD) of repeatability and that of intermediate precision were less than 25%, respectively. In addition, the interlaboratory precision of seven laboratories was determined as an external quality control test with and without sample cleanup. The interlaboratory precision of the high concentration sample (100 ng/mL) showed an acceptable Z-score (less than 2.0 and greater than -2.0; $|z| < 2$) for all the seven laboratories, regardless of whether or not cleanup was performed. In addition, the gap between the added concentration and the average value (most probable value) was less than 20%. On the other hand, in the case of the low concentration sample (10 ng/mL) without cleanup, the Z-scores were "$|z| < 2$" for all the seven laboratories, but the residual variance was large and the deviation from the most probable value was increased. However, by performing cleanup pretreatment, DON concentrations down to 10 ng/mL could be measured by ELISA. Then, sixteen commercially available beer samples were subjected to DON determination using the present ELISA and a confirmation test using GC/MS. DON was detected in 9 beer samples (56.3%); the mean concentration was 14.3 ng/mL and the highest concentration was 54.8 ng/mL. The correlation coefficient (r) was high at 0.887. The results suggest that the ELISA-kit with the cleanup method is useful for a screening of low level DON in beer.

Keywords：デオキシニバレノール、ビール、ELISA、スクリーニング、精度管理
deoxynivalenol, beer, ELISA, screening, accuracy management

連絡先：〒142-8501　東京都品川区荏原2-4-41　星薬科大学 薬品分析化学教室　斉藤貢一
Corresponding author: Koichi Saito, Department of Analytical Chemistry, Hoshi University, 2-4-41, Ebara, Shinagawa-ku, Tokyo 142-8501, Japan