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氯化胆碱和维生素K₃饲料添加剂中二英类化合物浓度及其单体分布特征

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Feed Additives of Choline Chloride and Vitamin K₃:Dioxin Compound Concentrations and the Distribution Characteristics of Monomers

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摘要 本试验旨在调查2种常用饲料添加剂氯化胆碱和维生素K₃中二(口恶)英类化合物浓度及其单体分布特征。共检测17个氯化胆碱和29个维生素K₃样品,二(口恶)英化合物分别采用加速溶剂萃取仪和自动纯化系统进行提取和净化,并采用同位素稀释-高分辨气相色谱/高分辨双聚焦磁式质谱联用技术(HRGC/HRMS)进行准确定量分析检测。结果表明:氯化胆碱与维生素K₃中二(口恶)英类化合物浓度分别为4.370和13.871pg/g,它们的毒性当量平均浓度分别是0.184和0.379pg WHO-TEQ/g,其中有1个氯化胆碱样品和5个维生素K₃样品中毒性当量浓度超过欧盟限量标准值(0.75pg WHO-TEQ/g)。2种饲料添加剂均以八氯二苯并呋喃(OCDF)为最主要的污染同系物,毒性当量的主要贡献均以2,3,4,7,8-五氯二苯并呋喃(2,3,4,7,8-PeCDF)和1,2,3,4,7,8-六氯二苯并呋喃(1,2,3,4,7,8-HxCDF)为主,分别为42%和55%。污染同系物分布特征以氯化二苯并呋喃(PCDFs)为主要优势污染物。PCDFs在氯化胆碱和维生素K₃中的贡献率分别占总浓度的88%和97%。

关键词: 饲料添加剂 二(口恶)英 同位素稀释 高分辨气相色谱/高分辨双聚焦磁式质谱联用技术 氯化胆碱 维生素K₃

Abstract: This study was conducted to investigate dioxin compound concentrations and the distribution characteristics of monomers in two kinds of common feed additives (choline chloride and vitamin K₃). Seventeen samples of choline chloride and 29 samples of vitamin K₃ were detected. Dioxin compounds were extracted by accelerated solvent extraction system (ASE), purified by fluid management system (FMS), and quantitative analyzed by isotope dilution high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS). The results showed as follows:the concentrations of dioxin compounds in choline chloride and vitamin K₃ were 4.370 and 13.871 pg/g, respectively. The average concentration of toxic equivalent was 0.184 and 0.379 pg WHO-TEQ/g, respectively. The toxic equivalent concentration in 1 choline chloride sample and 5 vitamin K₃ samples exceeded the executive standard of European Union (0.75 pg WHO-TEQ/g). OCDF was the dominant contributory congener both in the samples of choline chloride and vitamin K₃, and the main contributors of toxic equivalent were 2,3,4,7,8-PeCDF and 1,2,3,4,7,8-HxCDF. Furthermore, PCDFs accounted for 88% and 97% of total toxic equivalent in choline chloride and vitamin K₃, respectively, and was the main pollutant in the distribution characteristic of polluttional congeners.

Keywords: feed additive, dioxin, isotope dilution, HRGC-HRMS, choline chloride, vitamin K₃

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