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Carry-over of dioxins, furans, and PCBs from feed to eggs of laying hens: Congener specific modeling

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Previously the carry-over of a mixture of 29 dioxins, furans and dioxin-like PCBs from contaminated feed to body fat and egg yolk fat of laying hens has experimentally been determined (Hoogenboom et al., 2006). The results of this experiment were used to develop a kinetic model for the carry-over of dioxins, furans and PCBs from feed to the hen's body and eggs (van Eijkeren et al., 2006). The calibration of this model however



was restricted to the level of the total TEQ concentration i.e. the concentrations of dioxins, furans, and PCBs in feed, body fat, and egg yolk fat were expressed in terms of equivalents of 2,3,7,8-TCDD (TEQ approach).

Though generic the calibration of the kinetic model on the basis of the total TEQ may lead to over- or underestimate of the carry-over of the mixture. The reason for this is that the carry-over kinetics of the congeners in fact differ from each other, thereby leading to a different contribution of each congener to the total TEQ concentration in the egg. For this reason the development of congener specific transfer models is one of the aims of the EU QSAFFE project. Within this project the kinetic model as described in van Eijkeren et al. was refined to the level of individual dioxin, furan or PCB congeners. In this approach, further referred to as the congener specific approach, the TEQ concentration in egg yolk fat and body fat is derived from the transferred congener concentrations.

Both approaches were compared with respect to the carry-over of dioxins, furans and PCBs in laying hens as determined in the experiment of Hoogenboom et al. Furthermore both approaches were applied on a number of recent feed incidents in which the levels of dioxins, furans and PCBs in (pre)feed exceeded the current EU limit in feed.

The consequences of both approaches in simulating the carry-over as well as their application in controlling the levels of dioxins in eggs of laying hens are discussed.

Keywords dioxins;PCBs;carry-over;laying hens

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