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Sparrowhawk study suggests why PBDE contaminant levels vary

Sparrowhawks and their eggs are used to assess environmental concentrations of polybrominated diphenyl ethers (PBDEs), chemicals that were used until relatively recently as flame retardants. Recent research may help explain why different studies report different PBDE levels in sparrowhawks for the same countries and time periods. It appears nutrition may play an important role in determining PBDE concentrations in birds.

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Source: Crosse, J. D. Shore, R.F., Jones, K.C., Pereira, M.G. (2013). Key factors affecting liver PBDE concentrations in sparrowhawks (*Accipiter nisus*). *Environmental Pollution*. 177:171-6. DOI:10.1016/j.envpol.2013.02.006.

Contact: rfs@ceh.ac.uk

Theme(s): Chemicals

Two of the three main forms of PBDEs have been phased out in the EU; the third form is not considered a risk for human health or the environment. However, because these chemicals are still found in products that are still in use, they are considered 'existing chemicals'[1] under the Existing Substances Regulation (EEC) 793/93. This means that manufacturers and importers are required to carry out risk assessments and take steps to reduce the risks posed by these chemicals. Penta-PBDEs (PeBDEs) were the most common form of PBDE identified in this study, despite being banned or phased out in the EU.

Levels of PBDEs in birds are used as indicators of environmental concentrations more widely. Some studies report increased levels in European bird populations in recent years, while others report decreased levels. These conflicting results may be caused by the way that studies are carried out, or by different levels of PDBEs in different countries.

According to the authors of the new study, it is not clear from looking at egg concentrations of PBDEs exactly when the female sparrowhawks were exposed to the chemicals; simply analysing eggs does not provide a complete picture of exposure in any particular species, nor reveal whether birds increasingly accumulate contaminants over time.

The researchers analysed PBDE concentrations in the bodies of 59 birds collected in the UK between 1998 and 2009 to gain a more accurate picture of tissue concentrations and probable exposures. A previous study by the same authors[2] covering this period, based on sparrowhawk egg concentrations, suggests that levels of PBDEs were higher in the UK than anywhere else in Europe around this time.

The researchers looked specifically at concentrations in the livers of dead birds. Some of the highest PBDE concentrations reported in this study were indeed higher than any reported previously. On average, however, liver concentrations were found to be similar to those reported elsewhere in Europe – in contrast to the results of the previous study using egg concentrations.

Around half of the variation in PBDE levels observed in male birds was accounted for by differences in body condition and age. In female birds, the same factors accounted for around a quarter of the variation. In both sexes, starved birds in poor body condition accumulated higher concentrations of PBDEs in their livers than birds in better condition.

These starved birds may also have been more susceptible to the chemicals' toxic effects. The researchers suggest that the body condition of birds examined in different studies may help explain why reports of PBDE levels seem to vary so widely within similar periods.

1.http://ec.europa.eu/environment/chemicals/exist_subst/

2. Crosse J.D., *et al*. (2012) Long-term trends in PBDEs in sparrowhawk (*Accipiter nisus*) eggs indicate sustained contamination of UK terrestrial ecosystems. *Environmental Science and Technology*. 18;46(24):13504-11. Doi: 10.1021/es303550f.