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Anti-depressant drug affects wild starlings' feeding behaviour

Anti-depressant drugs can affect the behaviour of wild animals in ways which may reduce their survival, new research has shown. The researchers fed half a group of starlings fluoxetine (commonly produced as 'Prozac') at concentrations they would be likely to encounter in the wild, if they fed on invertebrates contained in the waste water at treatment plants. Those fed the anti-depressant showed reduced feeding rates compared to the rest of the group, possibly putting their survival at risk.

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Source: Bean, T. G. Boxall, A. B. A., Lane, J., *et al*. (2014). Behavioural and physiological responses of birds to environmentally relevant concentrations of an antidepressant. *Phil. Trans. R. Soc. B*. 369: 20130575. DOI: 10.1098/rstb.2013.0575.

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Vast amounts of pharmaceuticals, both human and veterinary, are used every day across the globe. Many are not fully absorbed by the body and often excreted in their active form. Furthermore, removal of these chemicals by sewage treatment plants is often incomplete and a portion can remain in the treated water discharged to waterways, raising concern over the possibility of negative impacts on wildlife. In addition, wildlife can be exposed to pharmaceuticals in sewage sludge applied to land.

Wastewater treatment involves open-air stages, and the invertebrates feeding on the nutrients in the water can in turn become prey for animals such as birds and bats, thus allowing contaminants such as pharmaceuticals to enter and possibly accumulate up the food chain, with potentially damaging consequences.

For this study, researchers examined the effect of fluoxetine on starlings (*Sturnus vulgaris*). Fluoxetine has several side effects in humans, such as loss of appetite which, if replicated in birds, could reduce their chances of survival. Other studies have detected fluoxetine in both wastewater and insect tissues, showing that starlings, which often rely on treatment plants as a source of prey, are likely to ingest this substance in the wild.

The researchers captured 24 wild starlings and held them in large outdoor aviaries for 22 weeks, allowing them four weeks of acclimatisation. On five days every week 12 of the birds were each fed a worm that had been injected with 1.3 micrograms of fluoxetine solution. This amount was representative of exposure from levels found in the wild. The remaining 12 birds (the control group) were fed on worms that had been injected with a placebo.

The results showed that those fed on fluoxetine visited the food trays less than the control birds and did not show the same peaks in feeding at dawn and dusk. This difference could have an impact on survival in the wild, the researchers say, as feeding at those times is normal in the wild and best for maintaining energy and fat reserves and avoiding predators.

The researchers also investigated the effects of the drug on exploratory tendency, boldness and activity levels. To do this they isolated individual birds for two days, on the second day opening up a new area of the cage and assessing how much they explored it. Boldness was measured by the time taken to approach a bowl of food, and activity by the total number of movements. There were no significant differences between the two groups of birds. This is somewhat surprising, say the authors, who imply that a higher treatment dose, different assessment method or larger sample size might reveal an effect.

These results show that widely used pharmaceuticals such as anti-depressants can change the behaviour of wild animals with possibly fatal consequences. Furthermore, this study examined only a single drug, yet animals are likely to be exposed to a cocktail of the different pharmaceuticals found in wastewaters, some of which could act synergistically.

1.http://ec.europa.eu/environment/water/water-framework/index_en.html