

Rabbit's food brings luck in decreasing estrogen levels in wastewater

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UC's Ruth Marfil-Vega and Makram Suidan at Cincinnati's Mill Creek Wastewater Treatment Plant. They were part of the research team that experimented with rabbit's food as a treatment to decrease estrogen levels in wastewater in the lab. Credit: Dottie Stover, University of Cincinnati

The November 2010 issue of *Environmental Pollution* details successful experiments at the University of Cincinnati wherein rabbit's food resulted in the abiotic (non-biological) transformation and absorption of four different types of estrogen, reducing the levels of these estrogen hormones by more than 80 percent in wastewater.

The research has practical implications since it could point to inexpensive treatment technologies and materials for reducing estrogens in wastewater.

Currently, estrogen in wastewater represents a major conduit for the entry of the hormone, whether in its naturally occurring forms or synthetic form (birth-control pills), into the environment. There, it's believed the hormone causes responses in the endocrine systems of fish, birds and other wildlife in and around streams and [rivers](#), groundwater, sediments and sludge. In other words, causing effects in wildlife such as the presence of both male and female sex organs, feminization of males, abnormal and malformed [reproductive organs](#), skewed sex ratios, reduced fertility and more.

Population growth and the use of synthetic estrogens (birth-control pills) have increased the presence of the hormone (both in its naturally occurring forms and its synthetic forms) in the environment.

In an article titled "Abiotic Transformation of Estrogen in Synthetic Municipal Wastewater: An Alternative for Treatment" in this month's issue of [Environmental Pollution](#), authors Makram Suidan, UC professor of environmental engineering; Mark Mills, research engineer with the U.S. Environmental Protection Agency's National Risk Management Research Laboratory; and Ruth Marfil-Vega, UC doctoral student in environmental engineering, detail their success in harnessing natural materials in improving the removal of estrogen from the environment.

The experiments hold great promise, according to lead author Makram Suidan because "it would be an inexpensive process to replicate in wastewater treatment plants and because the UC experiments with the rabbit food proved effective in dramatically reducing the levels of naturally occurring estrogens but also the synthetic estrogen, which typically has the longest staying power in wastewater and the environment."

While the UC team tested a variety of materials – clays, casein (a protein molecule found in cheese and milk), tryptone (an amino acid) and starch

– only the rabbit food proved effective in greatly reducing estrogen levels. In fact, in testing the clays, casein, typtone and starch for effects on wastewater hormone levels, the UC experiments found that these four alternate materials only reduced wastewater estrogen levels by 10 percent.

Stated Suidan, "We are now experimenting to find out, specifically, why the rabbit food proved so effective in reducing [estrogen levels](#). Rabbit food was a material we chose because, unlike dog food, rabbit food is hormone free. Rabbit food is merely ground up, organic vegetable matter – not unlike vegetable matter that could safely be added to wastewater."

The experiments were repeated several times using synthetic wastewater in stainless steel containers (to avoid any absorption of the tested hormones that might have been possible with plastic containers). As stated, the rabbit food reduced the levels of the four estrogens by more than 80 percent after a 72-hour contact period.

Explained Suidan, "While absorption of estrogen by the rabbit food played some role, we believe that a catalytic process occurred, meaning the estrogen compounds appeared to bind to the rabbit food when oxygen was present."

In the experiments, the UC team not only tested materials that might reduce [estrogen](#) levels in wastewater but also tested the efficacy of these same materials (rabbit food, casein, clays, tryptone and starch) in reducing the levels of male hormones (testosterone, androstenedione and progesterone) in wastewater.

However, none of the treatment materials – including the rabbit food – had any effect on the presence of these male hormone levels in the wastewater.

Provided by University of Cincinnati

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