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Food Waste Reduction Program

ReFresh Nebraska

Exploring Food Waste Issues — *Fall 2024*

EMERGING ISSUES IN FOOD WASTE MANAGEMENT:

Persistent Chemical Contaminants

Focusing on plastic contamination, the fall 2021 issue of ReFresh Nebraska, contained the first in a series of EPA investigations into emerging issues in food waste management. Below is a summary of another emerging issue - chemical contaminants.

Food waste—defined as food that is produced for human consumption but not ultimately consumed by humans— is a major global environmental, social, and economic challenge. Recognizing the critical importance of reducing food loss and waste, in September 2015, the U.S. Environmental Protection Agency (EPA) and U.S. Department of Agriculture announced the U.S. Food Loss and Waste Reduction Goal to halve food loss and waste by 2030. One of EPA's strategies to help meet this goal is to encourage diversion of food waste from landfills to composting and anaerobic digestion facilities to reduce methane emissions and recover value (e.g., nutrients or energy) from the food. However, stakeholders have expressed concerns about the levels of persistent chemical contaminants in products made from food waste streams, which may include items other than food waste, such as compostable and non-compostable food contact materials. To achieve the environmental benefits of diverting food waste from landfills on a large scale, EPA must better understand the contribution of food waste streams to persistent chemical contamination in compost and digestate, the potential risks to human health and the environment posed by land applying compost and digestate made from food waste, and the most effective strategies to prevent or mitigate the risks and communicate these findings to affected stakeholders.

This issue paper demonstrates that food waste streams are a source of per- and polyfluoroalkyl substances (PFAS) contamination in composts and digestates, with PFAS detected in food waste, food contact materials, and composts produced from food waste. While data on PFAS in food waste is limited, one study reported concentrations of three PFAS in the range of 0.11–1 μg/kg in samples collected from grocery stores, hospitals, schools, restaurants, retirement communicates, and residences. The presence of PFAS in food waste is further supported by multiple studies reporting PFAS in food (i.e., precursor of food waste) from non-contaminated areas, with concentrations generally <10 μg/kg. Seafood, followed by meat, may be important contributors to PFAS in food items, possibly due to bioaccumulation. Compared to PFAS concentrations in food contact materials, which ranged from <1 to 485 μg/kg, the limited data show that food contact materials may contribute more to overall PFAS levels in food waste streams.

Composts made from a variety of mixed feedstocks, such as food waste, green waste (leaves and grass), and manure, showed total PFAS levels ranging from 2.3 to 75 μg/kg. Comparison of composts made with and without food waste showed that food waste compost had higher PFAS levels than green waste compost. Comparing results across three studies, which originated from the same research group, PFAS concentrations in decreasing order were: biosolids-based products (i.e., treated biosolids, composted biosolids) > food waste compost > green waste compost ≈ other organic composts. An additional study on composts in Europe also showed that kitchen waste compost had higher PFAS concentrations than green waste compost. Furthermore, the limited data also showed that PFAS concentrations were higher in composts with compostable food packaging and that compostable food contact materials have higher PFAS concentrations that non-compostable samples. No data on digestates were identified that would enable the determination of whether food waste digestates would have higher, similar, or lower PFAS concentrations compared with digestates produced from other feedstocks.

There are currently no standards for PFAS in composts or digestates; however, guidelines and standards have been recently adopted by some cities and states to prohibit PFAS in food packaging and some manufacturers have begun voluntary phase-out of the PFAS 6:2 FTOH in food contact materials. Compostable food contact materials certified by the Biodegradable Products Institute may no longer contain intentionally added fluorinated chemicals. These guidelines and standards should lead to decreased PFAS levels in food waste streams. In addition, states have begun to implement protective measures regarding PFAS in compost, such as screening composts made from biosolids (Maine) or requiring collection and treatment of contact water from composting sites that accept food waste (Minnesota).

Much remains unknown about the risks to human health and the environment posed by the land application of food waste compost and anaerobic digestate containing PFAS. When present in land-applied biosolids, PFAS have the potential to be taken up by plants and crops and/or leach into groundwater, which can be consumed by humans or used for agricultural purposes. Full risk assessments are not available, and the data needed to estimate with confidence the human health and environmental risks are very limited. Research on PFAS fate and transformation during composting and anaerobic digestion is needed. The limited data available show no clear trends when comparing PFAS concentrations in the feedstock with PFAS concentrations in the final product. This is further complicated by the potential presence of precursors in the feedstock.

Regardless of risks to human health and the environment and whether PFAS are actually present at levels of concern in composts and digestates made from food waste, concerns about contamination can, and have, affected the marketability and value of these products. Concern over PFAS contamination can also affect decisions and policies applicable to food waste collection, management, processing, and consequently, the reduction of food waste. Strategies to mitigate risks due to the land application of composts and digestates contaminated with PFAS include upstream solutions, such as phase-outs and bans; feedstock restrictions to avoid processing of waste streams likely to have the highest levels on PFAS; use restrictions for soil amendments (e.g., application as a landfill cover versus on farmland); and concentration limits for soil amendments.

For persistent herbicides, food waste streams are likely not a major source of contamination for the four persistent herbicides of interest—clopyralid, aminopyralid, picloram, and aminocyclopyrachlor. No studies were identified that reported concentrations of these four persistent herbicides in food waste or feedstock mixtures containing food waste; however, clopyralid has been detected in food samples in the United States. The detection of only clopyralid in food samples is consistent with the registered use sites of the four persistent herbicides, where only clopyralid had agricultural settings (e.g., fruits, vegetables, and cereal grains) as a registered use site. No studies were identified that investigated these four persistent herbicides in commercial composts, but documented cases of compost contaminated with clopyralid, aminopyralid, picloram, and/or aminocyclopyrachlor show that the source of contamination is green waste, manure, or hay. Food waste has not been indicated in any documented incident to date. The available data on two additional chemical contaminants—polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs)—in food waste and associated composts and digestates were briefly summarized in this issue paper but were not further discussed due to the lack of recent U.S. compost or digestate data and in the case of PCBs, due to the U.S. ban on PCBs.

PFAS contamination in food waste presents challenges for a broad range of stakeholders, including but not limited to those involved in waste management and recycling facilities, and those who purchase and intend to use compost and digestate as soil amendments. Additional research is needed to inform decisions and policies applicable to food waste collection, management, processing, and consequently, the reduction of food waste. Priority research needs include:

-Research to obtain additional field data on PFAS species and concentrations in finished composts and digestates generated from food waste and used as soil amendments in the United States.

-Research to obtain additional data on PFAS species and concentrations in food waste streams in the United States.

-Research to assess exposure and potential risks to human health and the environment from land application of PFAS-contaminated compost and digestate produced from food waste.

-Research to understand the comparative risks of different management options, including further research to determine the fate of PFAS through various wastewater and solids treatment processes.

Additional research needs include (i) development of a multilaboratory-validated analytical method to detect PFAS in solids; (ii) expansion of PFAS analytical methods to identify more compounds; (iii) research on PFAS fate and transformation during composting and anaerobic digestion; (iv) research to support determination of an acceptable PFAS limit for land-applied soil amendments; and (v) research on the long-term impacts and transformation of PFAS after land application of PFAS-contaminated soil amendments.

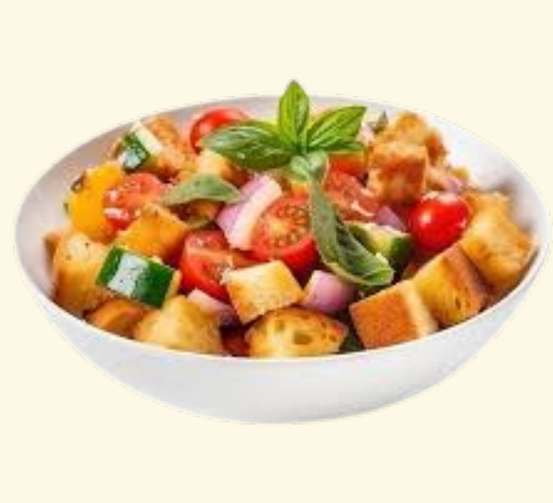
For the full report, go to: Emerging Issues in Food Waste Management: Persistent Chemical Contaminants (pdf)

ReFresh Recipes

Shopping your fridge first is an important strategy for reducing food waste.
Here's a recipe idea that will help you use what you have before buying more!

Panzanella

THE SECRET INGREDIENT TO THIS BRIGHT DISH? STALE BREAD



This salad shows off summer vegetables at their peak. The bread makes it a meal, but it can be made even more substantial with mozzarella balls, some olives, diced chicken, or grilled shrimp. Soak the onion in cold water to take the edge off its bite and keep it from dominating the rest of the dish.

USES UP	MAKES
Stale Bread & Summer Veggies	8-10 Servings

INGREDIENTS

- 1 loaf stale bread in 1" cubes
- 1/2 cup plus 2 Tbsp olive oil
- 1 Tbsp Dijon mustard
- 2 Tbsp red wine vinegar
- Salt and freshly ground black pepper
- 1 Tbsp capers
- 1 cucumber, peeled, seeded, 1" dice
- 2 large tomatoes, seeded, 1" dice
- 1 green bell pepper, 1" dice
- 1 yellow bell pepper, 1" dice
- 1 small red onion, thinly sliced
- 1 handful of basil leaves, torn
- Additional ingredients, such as olives, fresh mozzarella cut into cubes, diced grilled chicken, or grilled shrimp

DIRECTIONS

Preheat the oven to 350°F. Drizzle the bread cubes with 2 tablespoons of the olive oil and bake for 10 to 15 minutes, until beginning to brown. Remove from the oven and allow to cool completely.

In a large bowl, whisk the mustard, vinegar, and a pinch of salt and pepper to combine. Slowly drizzle in the 1⁄2 cup of olive oil, whisking constantly to emulsify the dressing. Add the capers and stir to combine. Add the toasted bread cubes, cucumbers, tomatoes, peppers, and onion and toss to combine. Let it rest for 30 minutes to allow the bread cubes to absorb the dressing and the water from the vegetables. Add the basil and additional ingredients, if using, and toss to combine. Adjust the seasoning and serve.

CREDIT

From "Eat it Up!" by Sherri Brooks Vinton, Da Capo Lifelong Books, 2016

FOOD STORAGE TIPS FROM SAVETHEFOOD.COM

PANTRY STAPLES

SUGAR, BROWN

REFRIGERATE IT: No **AT FRESHEST:** Indefinitely

OPTIMAL STORAGE: Opaque, airtight, moisture-proof container in a cool location.

FREEZING: Necessary only if storing for a very long time or in a very dry area.

Place in an airtight container. Thaw for 2 to 3 hours. If ice crystals form after long freezer storage, gently stir the sugar as soon as it thaws to prevent pockets of moisture from causing damage.

USE IT UP/REVIVAL: Brown sugar hardens easily. To soften hardened brown sugar, place in a bowl with a slice of bread, an apple slice, or a couple of damp paper towels. Cover tightly, and let sit for about 2 days. Remove the bread or apple or towels after the sugar absorbs the moisture and softens. Stir the sugar with a fork. To soften more quickly, remove from the package and pour into an oven-safe container. Place in a 250ºF/120ºC oven. As soon as it's soft, measure out the amount you'll need, as it will quickly harden. Use caution, because it will be very hot

SUGAR, WHITE

REFRIGERATE IT: No **AT FRESHEST:** Indefinitely

OPTIMAL STORAGE: Opaque, airtight, moisture-proof container in a cool, dry location.

FREEZING: Not recommended.

USE IT UP/REVIVAL: To soften granulated sugar that has caked together, preheat oven to the lowest temperature. Remove the sugar from the package and put in an oven-safe container that will hold the sugar. Place in the warm oven for approximately 15 minutes. Tap the sugar with a spoon. If it starts to fall apart, turn off the oven and leave the sugar in the oven for 1 to 2 hours to completely dry out.

WHOLE GRAINS

REFRIGERATE IT: No **AT FRESHEST:** 6 to 12 months

OPTIMAL STORAGE: Airtight container in a dry, dark, cool place, or freeze in an airtight container.

FREEZING: Airtight container.

USE IT UP/REVIVAL: Whole grains are great in kids' craft projects, such as gluing different grains onto paper to make a mosaic art piece. Make a garland of popped popcorn for your trees; the birds will love it. Make a popcorn ball to prolong the life of popcorn that you've popped.

Quick Tricks! Brought To You By:

Institute of Agriculture and Natural Resources

NEBRASKA EXTENSION

QUICK TRICKS

Food tossed is money lost. One way to add new life to still edible foods is to re-purpose leftovers and reuse them in new ways and new recipes. This booklet will get you started with simple tips and recipes. You'll find "recycled" can taste just as good, maybe even better than the original recipe.

Alice Henneman, MS, RDN Extension Educator

Grains

- Use older bread to make croutons, bread crumbs, bread pudding, stratas and French toast.
- Use leftover rice in stir-fried rice, pudding and rice bowls.
- Heat leftover pasta in a pan over medium heat with some olive oil. Sprinkle with Parmesan cheese. Add a little extra pizazz by topping the pasta with fresh herbs..

Fruits

- Freeze lemon or lime juice in ice cube trays. Transfer to freezer bags. Pop into water for flavored water. NOTE: It's easier to remove frozen food from silicone ice cube trays and muffin pans than plastic trays or metal pans as silicon is more flexible.
- Roll citrus fruits with your hand on a hard surface before juicing to get more juice from them.
- Refrigerate ripe bananas to make them last a few days longer. They may be brown on outside, but still a good color on the inside.
- Freeze lemon slices in water in cupcake pans for large, flavored ice cubes.
- Freeze washed, peeled, bite-size pieces of fruit for smoothies. Place on baking sheet with sides and cover with plastic wrap. Transfer frozen pieces to freezer bags. Toss into smoothies.

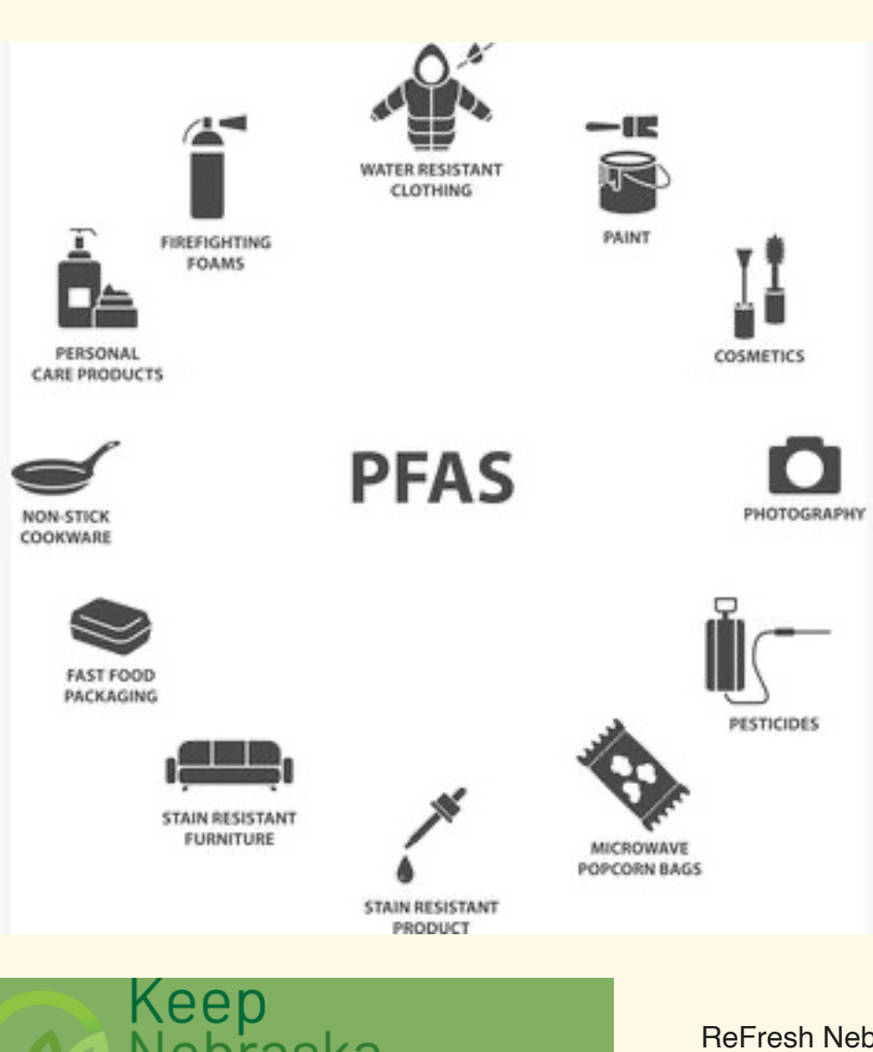
Protein Foods

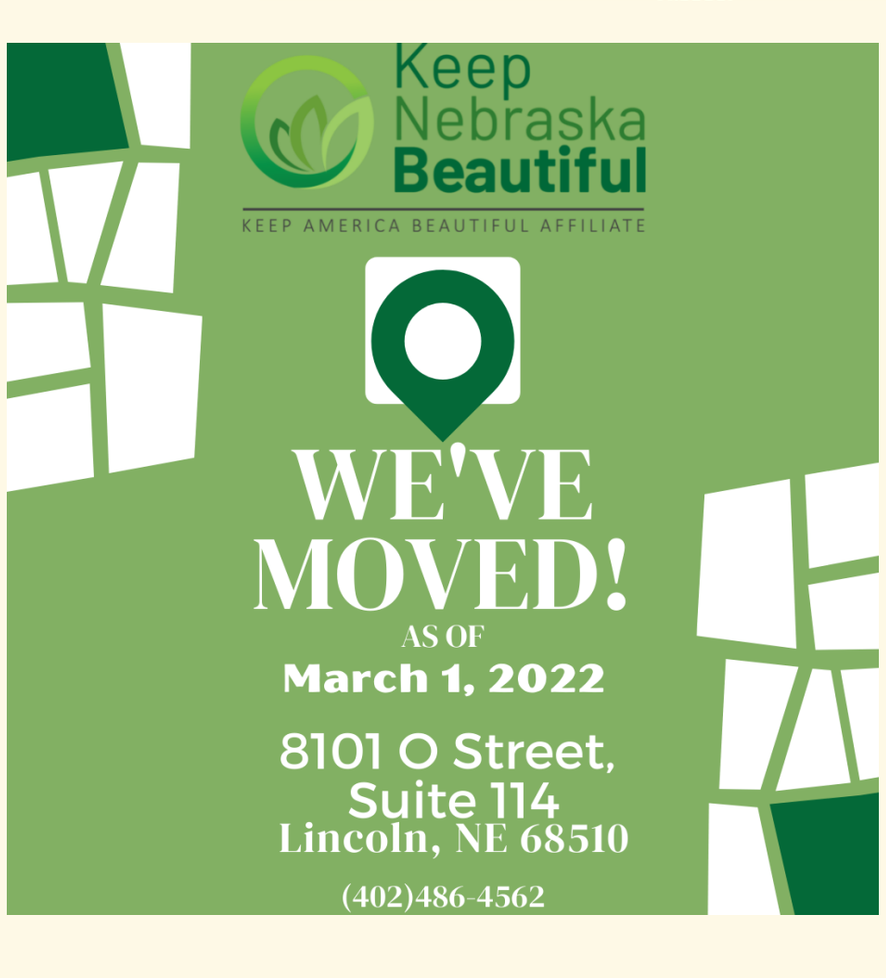
- Use leftover meat in flavorful foods such as barbecued meat dishes, chili and tacos to mask any flavor of "warmed over meat." Plus, being covered by a sauce or liquid helps prevent further flavor changes in the meat.

Vegetables

- Freeze chopped mature onions by adding directly to a freezer bag. Lay flat to freeze. To separate the onions before use, give bag a slight "whap" on kitchen counter.
- Freeze extra bell peppers in shapes needed for recipes. Freeze for a few hours on a baking sheet with sides until hard. Transfer to a freezer bag.
- Purée extra vegetables in a blender or food processor and heat with pasta sauce. Possible vegetables include carrots, butternut squash, red bell peppers and zucchini.
- Freeze extra tomato paste in tablespoon-size portions in an ice cube tray. Transfer to a freezer bag. Adding a tablespoon or two of tomato paste to soups, casseroles and pasta sauce enhances the flavor of these foods with its concentrated, almost meaty taste.
- Easily remove just the membrane part from peppers and the seeds from cucumbers and zucchini by using a melon baller or measuring spoon when preparing these foods to eat alone or use in recipes.
- Freeze chopped fresh herbs in olive oil for a quick, delicious addition to sauces and pastas.
- To revive leftover French fries, heat a small amount of oil in a heavy skillet over medium heat. Spread fries in a single layer, leaving plenty of space around the fries. Otherwise, they'll steam instead of sauté. Turn until all sides are evenly heated and crisp. Place on a paper towel to drain any extra fat.
- Sauté chopped cabbage and onion (about 1/2 head cabbage and 1/2 onion) in olive or canola oil in a skillet over medium heat until tender. Season as desired with salt and pepper.

For more waste reducing tips, go to:
www.food.unl.edu/cook-it-quick-documents/makeover-your-leftovers.pdf





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