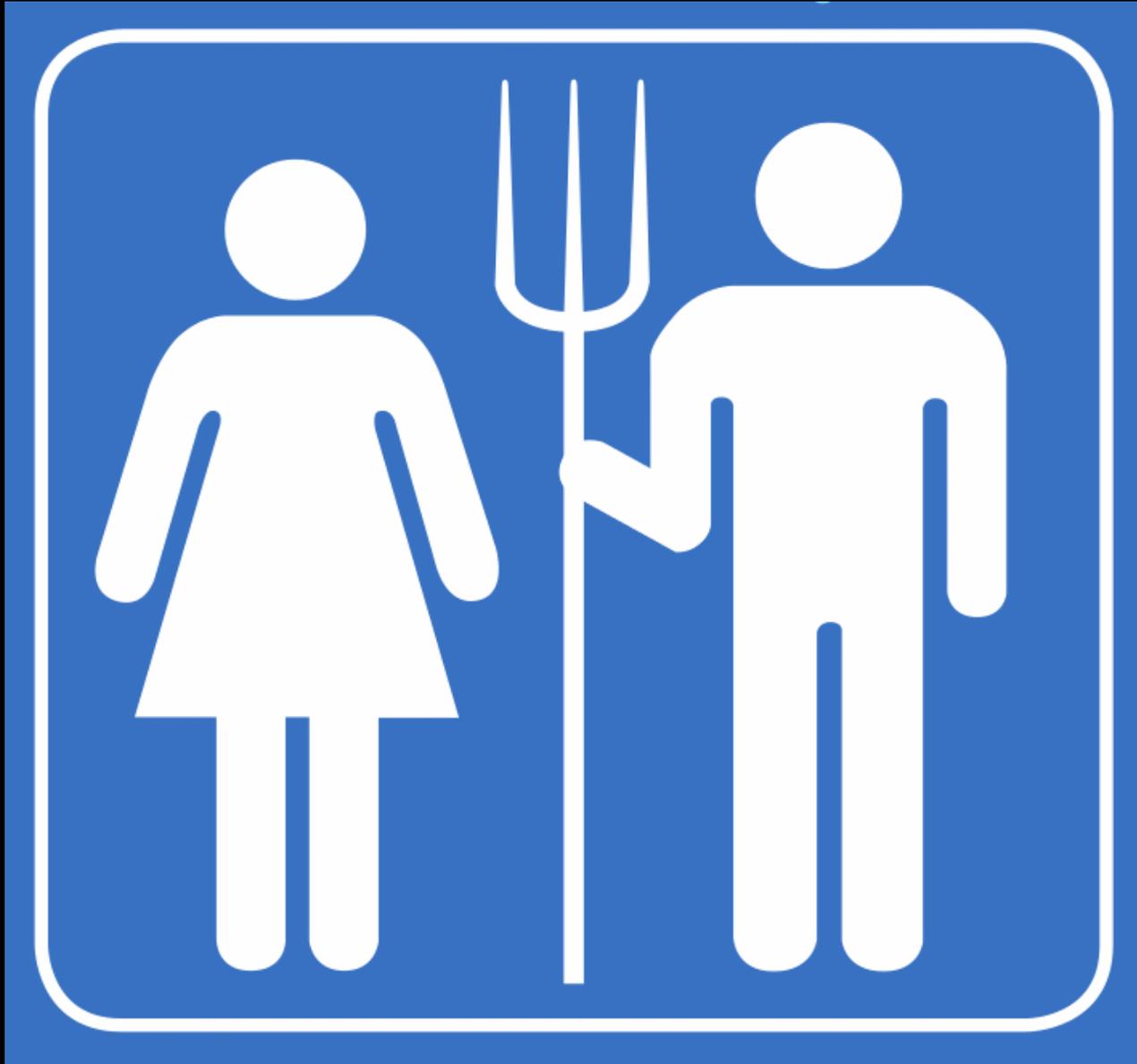
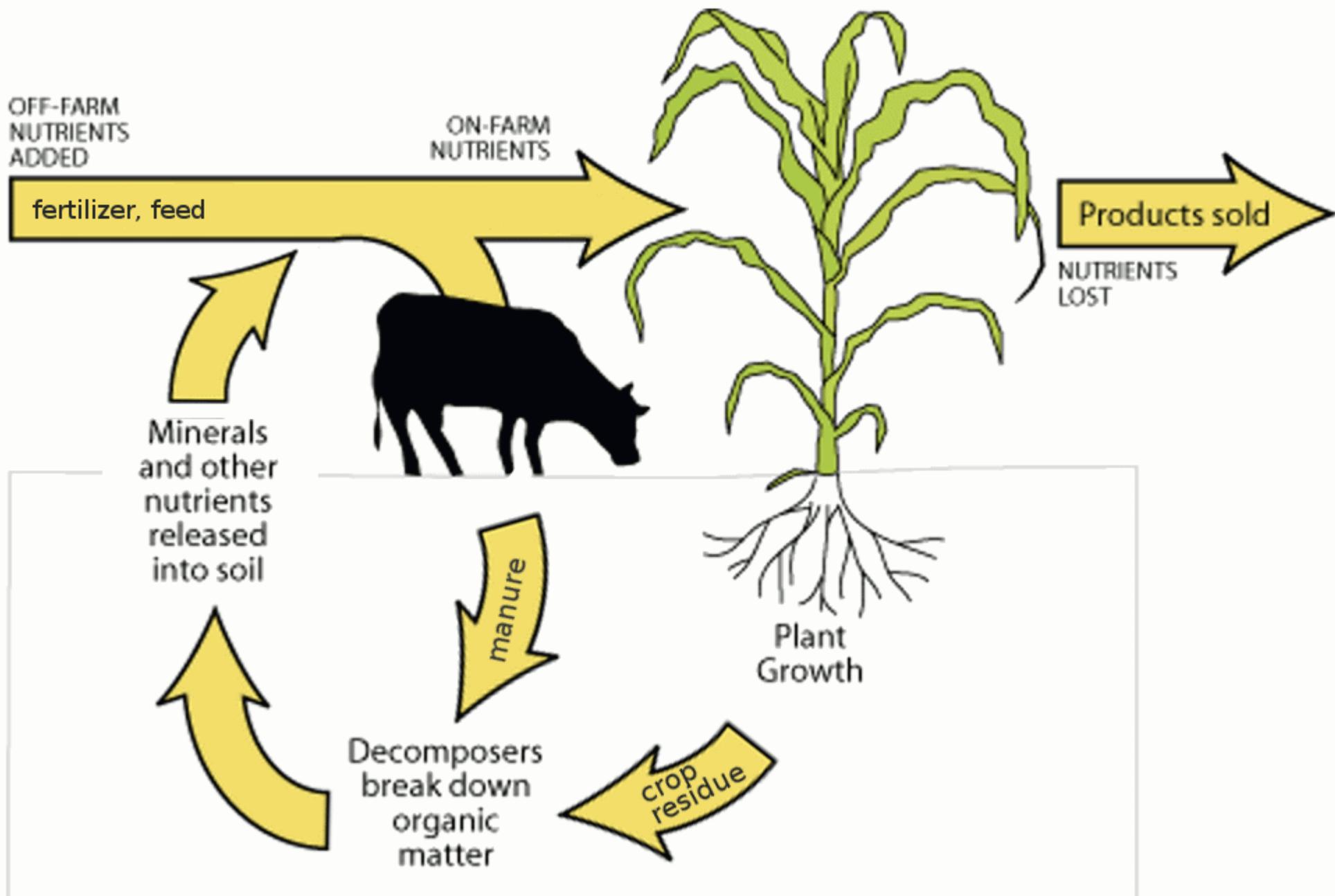


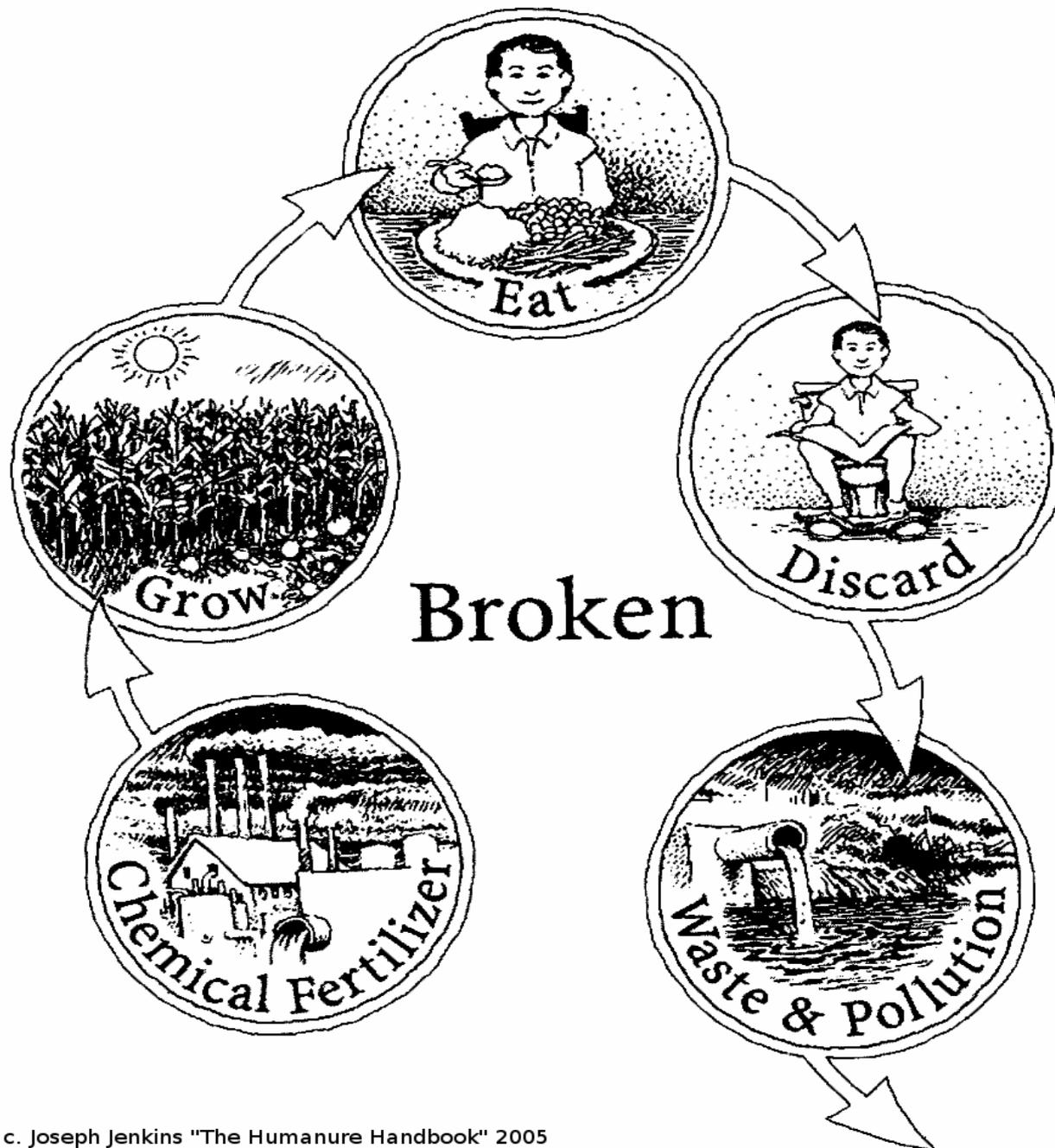
Urine Source-Separation and Reuse: a Community Scale Pilot Project

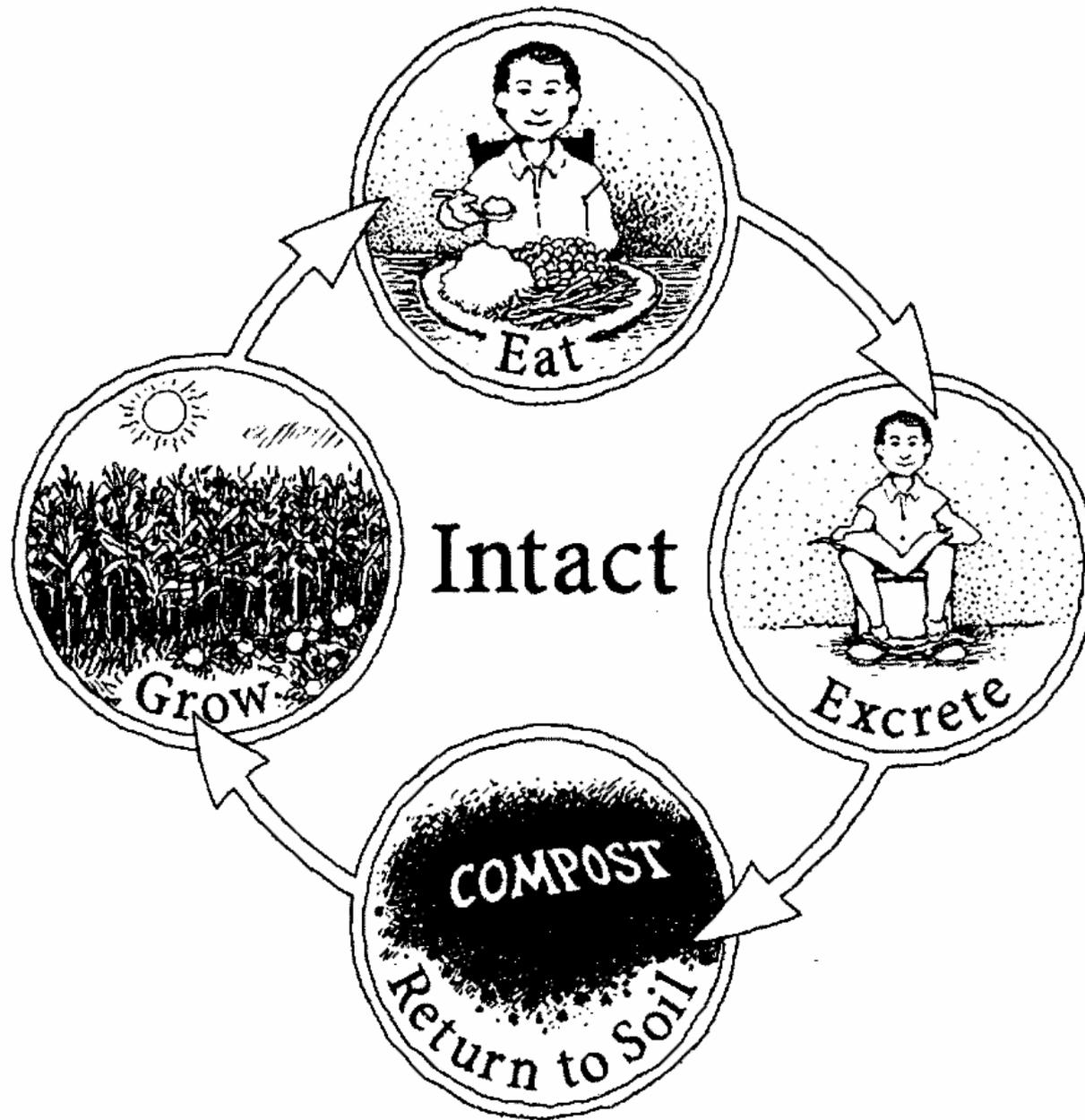




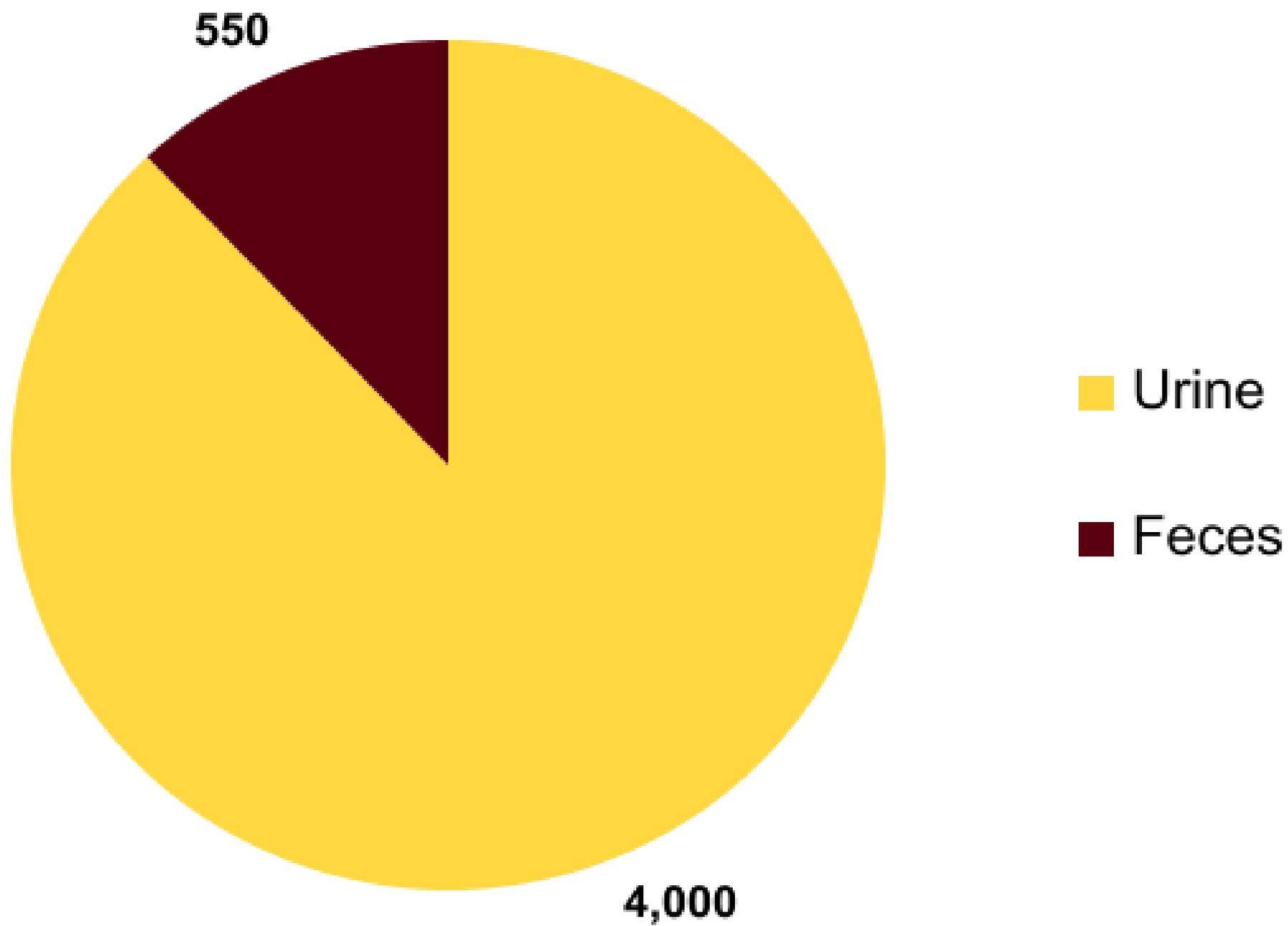


On a well-run farm, animal and plant wastes are recycled, conserving nutrients and preventing water pollution. But fertilizers still need to be added to make up for nutrients exported in the crops sold.



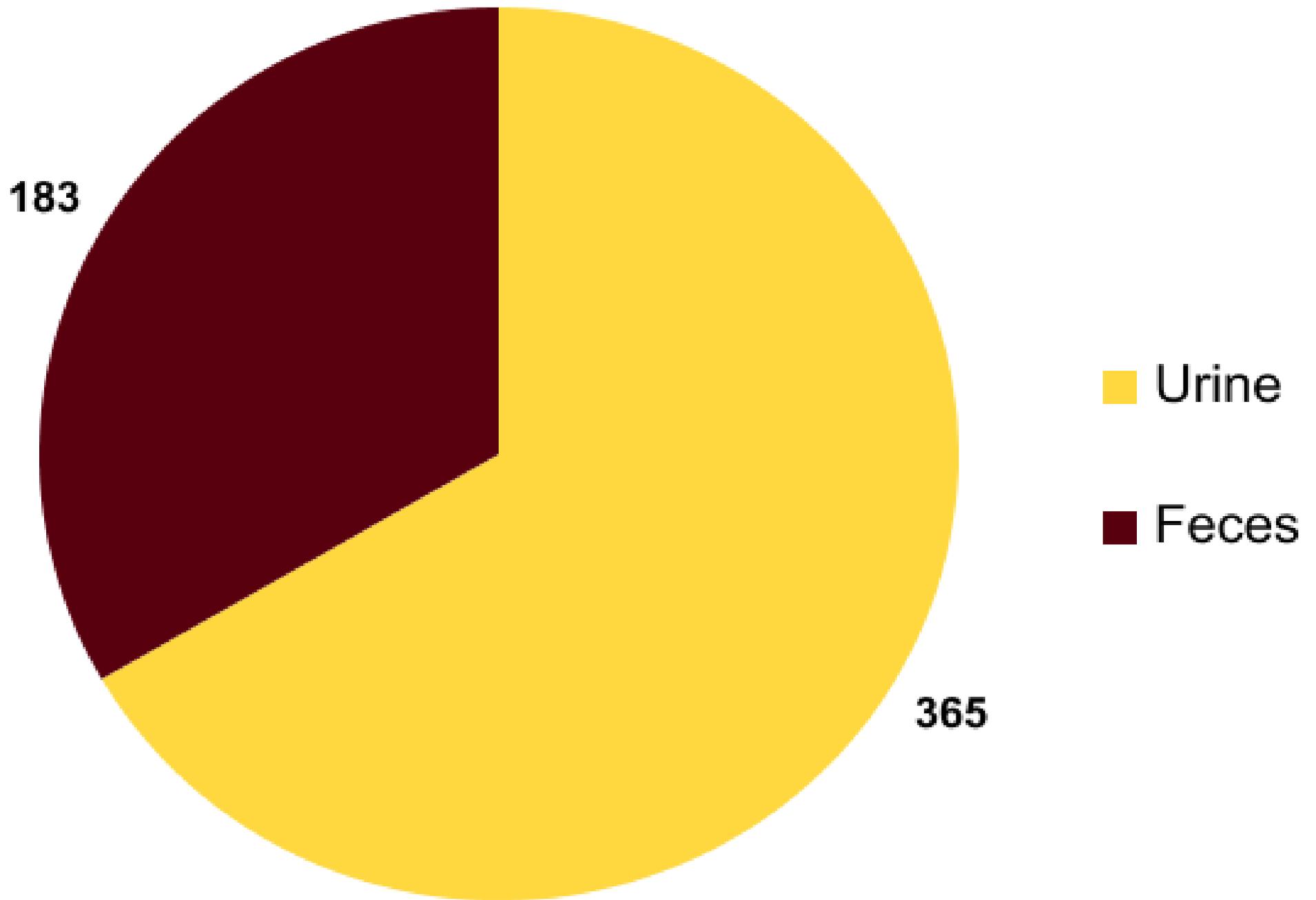


Nitrogen in urine and feces



g/person per year

Phosphorus in urine and feces



g/person per year

Source of nutrient pollutants in wastewater

	Urine	Feces	Combined
Nitrogen	75%	5-10%	80-85%
Phosphorous	55%	25%	80%

(Larsen and Gujer 200, Otterpohl 2002, Maurer *et al.* 2006, Lienert *et al.* 2007, Vinneras *et al.* 2002, and Meinzinger and Oldenburg, 2009)









Figure 21 . Large scale application of urine using a slurry spreader with trailing hoses. Photo: Mats Johansson. from Elisabeth Kvarnström, Karin Emilsson, Anna Richert Stintzing, Mats Johansson, Håkan Jönsson, Ebba af Petersens, Caroline Schönning, Jonas Christensen, Daniel Hellström, Lennart Qvarnström, Peter Ridderstolpe, Jan-Olof Drangert (2006)

After treatment, urine can be spread as a liquid fertilizer. Instead of being a polluting waste, urine can be a valuable resource.

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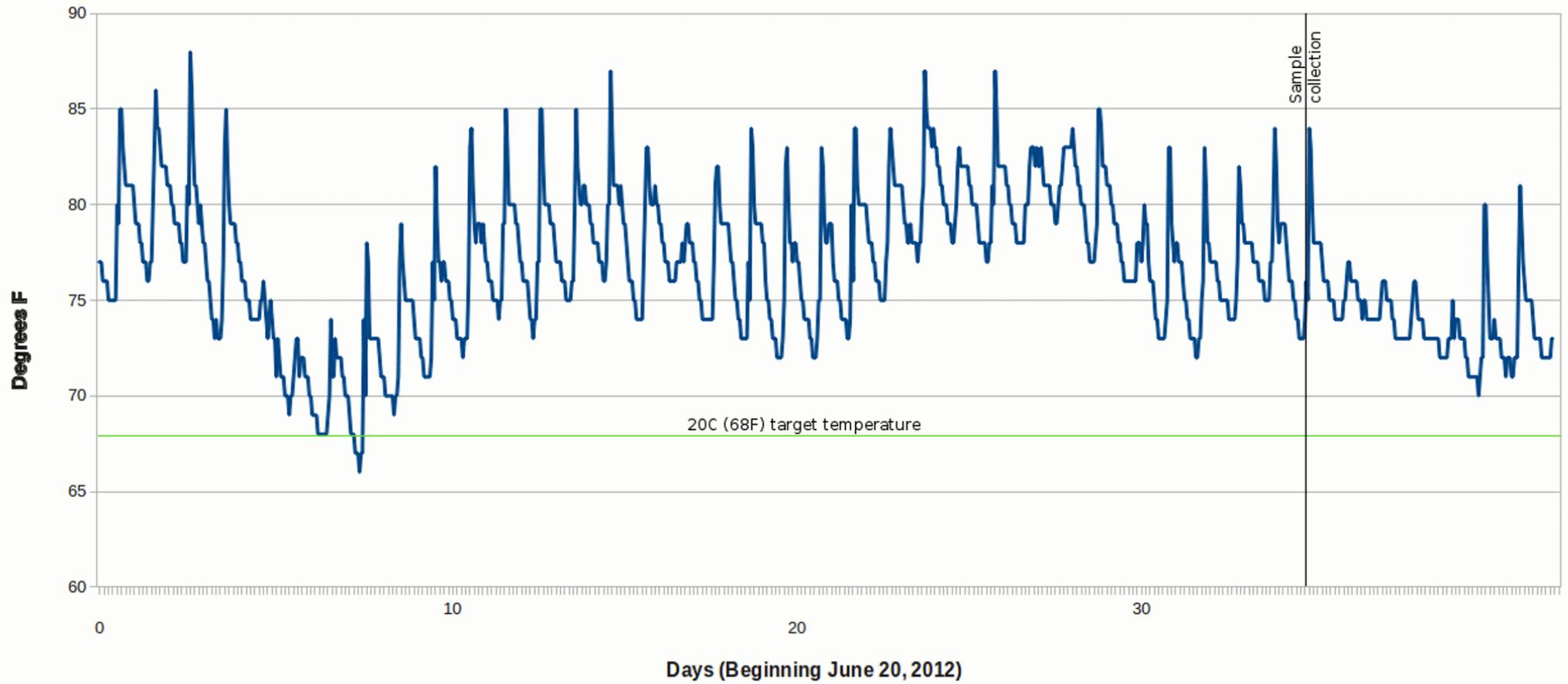
It's Easy
to Beat
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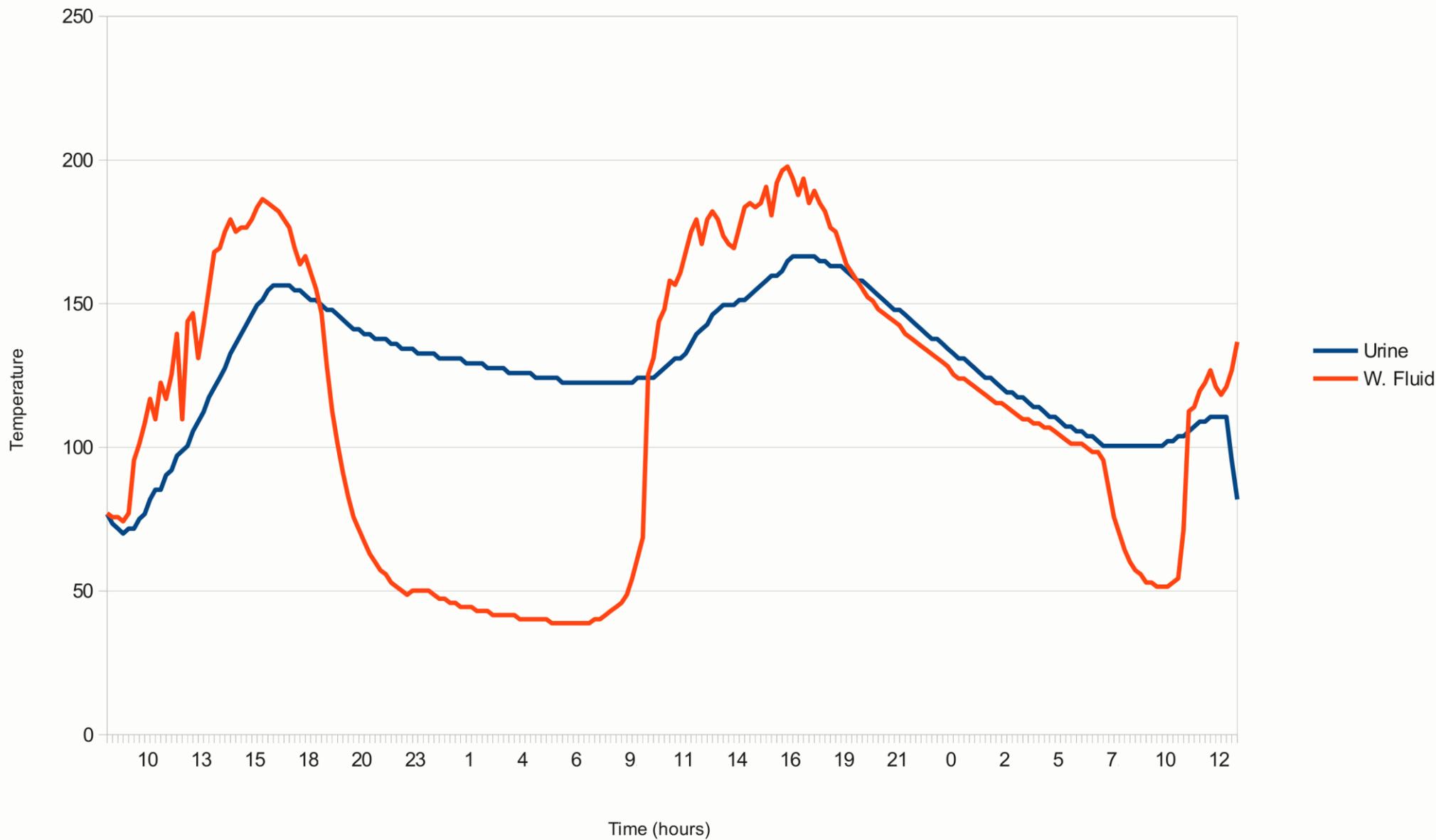
Long Term Storage Urine Temperatures





Urine and Working Fluid Temperatures

Solar Pasteurizer





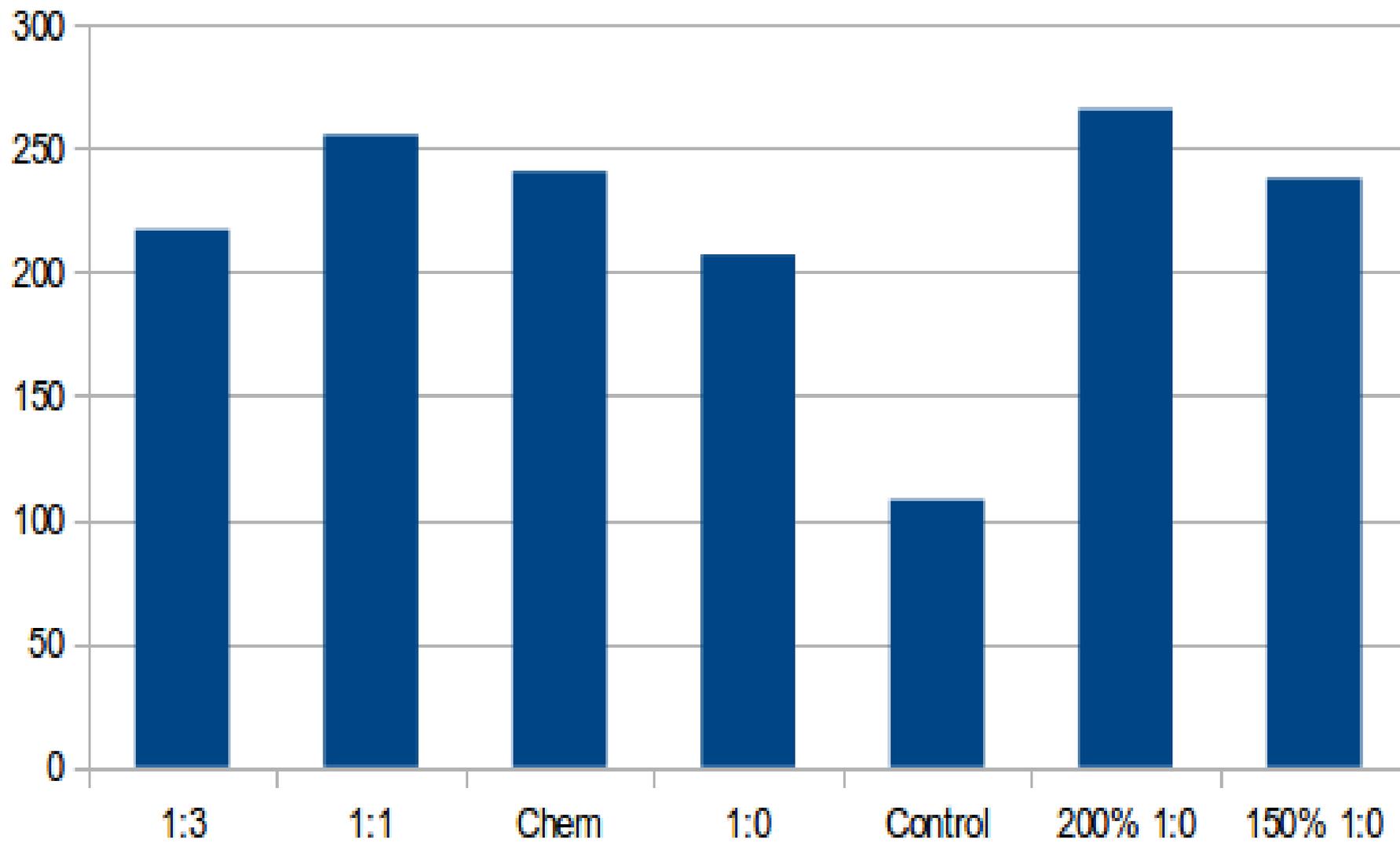








Hay yield in pounds



Contaminants in Urine

Heavy metals: very low

Personal care products: low

Industrial and household chemicals: low

Pharmaceuticals: significant

Fate of Pharmaceuticals

Rich Earth Institute's upcoming EPA study to track pharmaceuticals in urine used for agricultural fertilization in:

- Soil
- Groundwater
- Harvested crops



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