

Why Are Eggs a Possible Source of Lead Exposure?

Have you ever wondered why we recommend testing eggs for lead - even when they are chooks in your own garden?

Volcano Art Prize (VAP) Entry

Photographer: Emily Grace

Title: Backyard Chickens

Lead-Safety Message: Lead in home-grown eggs from urban areas tends to be higher than in commercial eggs; as soil lead increases, the concentration of lead in eggs tends to increase. Test your soil for lead with a LEAD Group DIY-sampling lab analysis kit.

<https://volcanoartprize.com/portfolio-item/backyard-chickens/>



Photograph by Emily Grace. Volcano Art Prize Entry.

According to the 1996 article Human exposure to soil contaminants through the consumption of home-grown produce by Cross, Sue J and Taylor, E R. (Roscoe), most of the lead ingested by hens goes into the shell of their eggs. Thus roosters on the same lead-contaminated soil can be expected to have much higher blood lead levels than the hens. The Cross and Taylor article states:

"Despite substantial faecal excretion of orally administered lead (as lead acetate), lead was also found to accumulate in the eggs" (Maziah et al, 1989). However, partitioning within the egg appears to follow the order: Shell » Yolk » White (albumen), with no apparent accumulation of lead in the egg white.

Cross and Taylor's conclusion from an experiment in which hens were purposefully dosed with liquid lead acetate ("treated") and a control group was "untreated" (not purposefully lead poisoned) was:

"The eggs of untreated hens contained some lead, with the shell containing approximately ten times more lead than the yolk, which itself contained more than twice the lead content of the egg white. The lead content of egg whites was unaffected by the oral administration of lead, but the egg yolk and shell residues increased by at least five fold."

The following interpretation advice regarding lead in eggs is by Australian Egg heavy metal researchers Emily Grace & Geoff MacFarlane, from their study: Assessment of the bioaccumulation of heavy metals in chicken eggs from residential backyards in the Lower Hunter (December 2013):

"This study found that the lead content of home-grown eggs was generally higher than commercial eggs..."

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“Although soil lead contamination was a contributing factor in egg lead contamination, soil lead only explained some of the variation in egg lead. In contrast, Waegeneers et al. (2009a) concluded that the major source of lead in Belgian home-grown eggs was ingestion of contaminated soil...”

“There are no Australian guidelines for the lead limit in soil to safely keep poultry.”

In July 2022 in “Lead poisoning of backyard chickens: Implications for urban gardening and food production”, Yazdanparast et al from Macquarie University in Sydney, found that:

“Older homes were correlated with higher chicken blood Pb [lead] and egg Pb ... and younger chickens (<12 months old) had greater Pb [blood and egg lead] concentrations... (i) in order to retain chicken blood lead below 20 µg/dL, soil Pb needs to be < 166 mg/kg; (ii) to retain egg Pb < 100 µg/kg (i.e. a food safety benchmark value), soil Pb needs to be < 117 mg/kg. These concentrations are significantly lower than the soil Pb guideline of 300 mg/kg for residential gardens. This research supports the conclusion that a large number of inner-city homes may not be suitable for keeping chickens [until lead abatement work and re-testing is carried out - Grandma Lead] and that further work regarding production and consumption of domestic food is warranted...”

In California, since 1989 any product, including food, which adds more than a specified amount of 900 chemicals to a person when used/ingested as intended, must carry a warning label re health harms. For example, 0.5 micrograms per day (0.5 µg/day), is the safe harbour for lead (also known as the Maximum Acceptable Dose Level, or MADL. See About Proposition 65 and Court Affirms Lead Limits Under Proposition 65 (2018).

So let's look at an example...

If your LEAD Group Kit egg lead result was 25 µg/kg and (1.5 µg/egg) you'd be right in thinking the Australian government would be fine with you feeding this egg to your child, but the US government advice would be to take into account that just one of these backyard eggs per day would be half the maximum recommended daily intake of 3 µg/day and if you were to sell that egg in California, it would require a health warning.

If you lived in the US, because they do so much more lead research there and awareness-raising media campaigns, you'd probably be aware that there's lead (and other heavy metals) in children's food. For instance, on 11th August 2022, CNN published “Homemade baby food contains as many toxic metals as store-bought options, report says” at <https://edition.cnn.com/2022/08/11/health/homemade-baby-food-toxic-metals-wellness/> stating that:

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"Lead was found in 90% of manufactured baby food bought by shoppers for the report and 80% of store- bought family food and homemade purees."

The Food Standards Australia and New Zealand, 2019 "Market Basket Survey" or "25th Australian Total Diet Study" cited above by Yazdanparast et al (2022) also states:

"The major contributing food categories to lead exposures were 'Beverages' (28–57%), 'Fruits and nuts' (14–36%) and 'Cereals and cereal products' (9–29%) for all age groups assessed. 'Meat, poultry, seafood and eggs' (8–10%) was a major contributor for those aged 6 years and above and for the general population aged 2 years and above. 'Sugars and confectionary' (6–9%) was a major contributing food category for all population groups aged 2 years and above. 'Vegetables' was a minor contributor (2–4%) for all population groups. In the 'beverages category', water (all sources) and intensely sweetened soft drinks (28–57%) were a major contributing food group for all age groups."