Will dung beetles increase the incidence of *E. coli* O157:H7 in people in New Zealand?

This is considered to be extremely unlikely. As might be expected for such an important source of disease, a considerable amount of research has been done on *E. coli* O157:H7. This pathogen is a notifiable disease in many countries including Australia (meaning all cases must be reported by law so that health authorities can investigate the causes of any outbreaks).

The disease is both food and water borne (Chekabab et al. 2013). Cattle are the main reservoir of this bacterium and manure is a major source of contamination for the general environment (both as a fertilizer for crop production and as a contaminant in runoff from beef and dairy farms; http://www.fightecoli.com/?lang=en&pageID=1-3).

Globally, infection by *E. coli* 0157:H7 in humans is most often associated with ingesting food or water that has been contaminated by livestock dung. Infections have also been traced to direct contact with animals (e.g. at animal petting zoos). The disease occurs in other organisms, including birds (which may assist the spread of the disease through contaminated droppings; Wetzel & LeJeune 2006) and insects (for example house flies which, unlike dung beetles, are attracted to human food).

In the USA, 43% of carcasses coming out of the slaughter line at processing plants were contaminated with *E. coli* O157:H7 (http://www.fightecoli.com/?lang=en&pageID=1-2). Contamination of food crops occurs through contamination by infected faeces/manure, dust from livestock areas, contaminated water and flies (Gilbert et al 2007). For example, Talley et al. (2009) found that over 50% of filth flies (which feed and breed in cattle dung) collected from four leafy greens fields adjacent to cattle-occupied rangeland habitats tested positive for O157:H7 infection and were subsequently demonstrated to be capable of contaminating leafy greens under experimental conditions.

Transmission between cattle is is generally thought to occur either by direct contact between a naïve animal and an infected animal or by consumption of food or water containing the organism (Cornick & VuKhac 2008), although the potential for it to be vectored by flies, including house flies has been investigated (Alam & Zurek 2004; García *et al*. 2010; Kobayashi *et al.* 1999).

Public health experts in Australia have told us they are confident there are no health risks associated with dung beetles in Australia. Indeed, in Australia, dung beetles are generally considered to have a positive impact on public health by reducing the amount of dung in pastures and by reducing contaminated runoff into waterways. Rates of reported infections by all Shiga-toxin producing *E. coli* serotypes are considerably (c. 10x) lower in Australia than in New Zealand (Gilbert et al 2007). Moreover, Gilbert et al (2007) noted that infections by *E. coli* O157:H7 account for >90% of New Zealand cases and only 25% of Australian cases, so that rate of reported infections by *E. coli* O157:H7 are nearly 40 times higher in New Zealand than Australia.

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