**Figure 1: Representative pyrrolizidine alkaloid (PA) structures and their relative toxicity**

Retronecine monoesters (a) display the lowest toxicity to 14-day-old rats. Heliotridine monoesters (b) are two to four times as toxic as the retronecine monoesters, while diesters of both retronecine and heliotridine are 4 times as toxic as corresponding monoesters. The most toxic PAs are the macrocyclic diesters (c). The N-oxide forms (d) of each pyrrolizidine alkaloid are non-toxic, but are readily converted to the toxic parent base in the gut [22,23].