

Results of a pilot monitoring on residues of highly toxic pesticides, requiring single residue methods (SRM), in infant formulae

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Introduction

EFSA has identified several highly toxic pesticides, for which the default MRL of 0.01 mg/kg in formulae for infants up to 16 weeks of age may not be sufficiently protective [1]. These were essentially compounds having ADI values below a health-based guidance value (HBGV) of 0.0026 mg/kg bw per day. In 2020, the EURLs for single residue methods (EURL-SRM) and for food of animal origin (EURL-AO) were requested by DG-SANTE to run a pilot monitoring to check the residue situation of those critical compounds in infant formulae as well as in milk. The EURL-SRM focused on compounds not amenable to multiresidue methods and on some additional relevant compounds.

Samples

The infant formulae (all for children up to the age of 16 weeks) were procured from all over Europe. The samples were divided into six categories such as lactose-free and hypoallergenic infant formulae.

Table 1: Number of samples and categories.

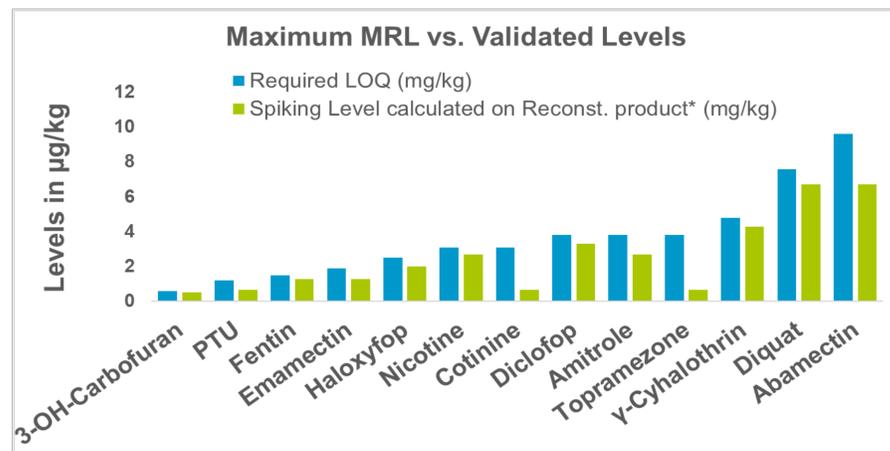
Category	Abbreviation	#samples
Conventional Infant Formula	Normal	41
Lactose-Free Infant Formula	L-free	8
Hypo-Allergenic Infant Formula	HA	18
Anti-Reflux Infant Formula	AR	8
Infant Formula for Digestive Disorders	Comfort	3
Plant-Based Infant Formula	Plant-based	2
TOTAL infant formulae		80
Milk	-	54

80 infant formulae and 54 milk samples were analysed, thereof 14 and 3 samples respectively were of organic production. The samples were collected from 23 countries but were only produced in 10 countries. For 13 of the samples the country of production could not be identified based on the labelling. Most of the collected infant formulae were produced in Germany.

Scope, methods and validation

The EURL-SRM focused on the analysis of 13 particularly toxic SRM compounds (abamectin, emamectin, fentin, 3-hydroxy-carbofuran (3-OH-carbofuran), γ -cyhalothrin, dicofol, haloxyfop, amitrole, nicotine, cotinine, PTU, diquat, topramezone) and additional 5 frequently occurring substances (chlorate, perchlorate, phosphonic acid, trifluoroacetic acid (TFA), melamine) as well as for paraquat. For the highly toxic compounds, the highest possible MRL (refers to the reconstituted product) that would be still considered safe for children up to 16 weeks of age was calculated, and this value was used as a guidance for the validation levels (see Figure 1). The samples were extracted using QuEChERS, acidified QuEChERS or QuPPE [2]. Fig. 1 shows the validated levels in comparison to the level that is still considered safe. For more details on the analytical methods used and their validation and on the project overall visit the EURL-SRM [website](#) ([2,3]).

Figure 1: Maximum safe MRLs versus validated levels



Results

Of the 13 highly toxic substances only nicotine was detected, but only at trace levels (see Fig. 2). Of the additionally analysed compounds chlorate and phosphonic acid were noticeable. Besides being detected in each sample, chlorate was determined at levels >MRL in 11 infant formulae and in 9 milk samples. Phosphonic acid was detected in 2 infant formulae at levels >MRL.

Figure 2: Residue findings at trace levels (<LOQ)

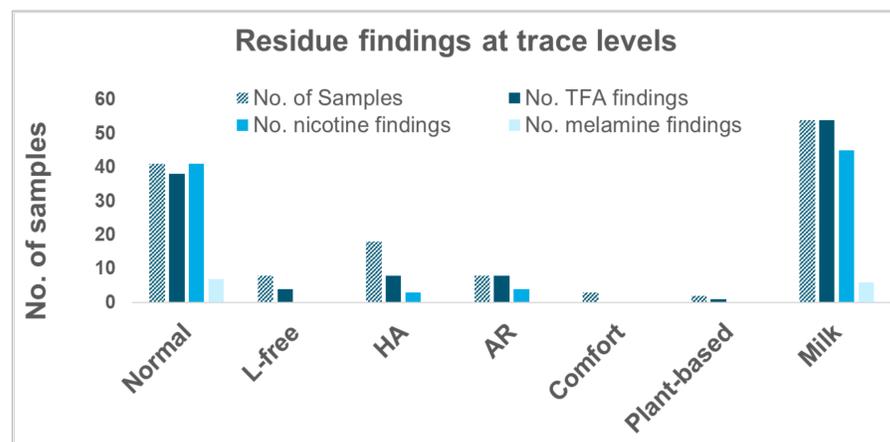


Table 2: Residue findings of frequently detected compounds

Categorie	Total No. of Samples	No. of findings chlorate		No. of findings perchlorate		No. of findings phosphonic acid		No. of findings thiocyanate	
		<LOQ	>LOQ	<LOQ	>LOQ	<LOQ	>LOQ	<LOQ	>LOQ
Normal	41	41	41	32	9	41	3	41	40
L-free	8	8	3	8	7	8	3	8	6
HA	18	18	14	4	2	18	3	18	11
AR	8	8	8	8	6	8	0	8	7
Comfort	3	3	3	0	0	3	2	3	2
Plant-based	2	2	2	1	1	1	1	1	0
Milk	54	54	12	29	0	41	0	0	0

Summary

Among the 13 toxicologically critical compounds sought for in formulae for infants up to 8 weeks of age, only nicotine was occasionally encountered at levels below the toxicological threshold. In milk the nicotine levels were also negligible. Among the additionally analyzed compounds TFA and melamine were encountered at trace levels, but chlorate, perchlorate, phosphonic acid and thiocyanate were detected above the respective LOQ in infant food formula, with chlorate and phosphonic acid even exceeding the MRL. Overall however, a risk for children up to 16 weeks of age, was not observed at least for the compounds included in the study.

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