

Rapid Alert System for Food and Feed: The semicarbazide notifications

K. HRUSKA, M. FRANEK

Veterinary Research Institute, Brno, Czech Republic

ABSTRACT: The recently instituted and easily accessible Rapid Alert System for Food and Feed (RASFF) has been tested on the semicarbazid (SEM), the residue of veterinary antibiotic nitrofurazone, using the RASFF Database Portal launched in July 2009 by the European Commission. The database holds weekly overviews, published by the EU for 30 years from 1979 and offers a number of other possibilities, such as searching for subjects of notification, the date of notification, notifying countries and product categories, countries of product origin and distribution. There is no doubt that the new database portal is an important contribution of the European Union to food safety and consumer protection.

Keywords: food safety; chemical contamination; RASFF; nitrofurazone

A comprehensive review on nitrofurans application, prohibition and residual analysis has been published recently (Vass et al., 2008). The Rapid Alert System for Food and Feed (RASFF) was put in place to provide food and feed control authorities with an effective tool to exchange information about measures taken when responding to serious risks detected in relation to food or feed. This exchange of information helps Member States to act more rapidly and in a coordinated manner in response to health threats caused by food or feed (Szeitz-Szabo and Szabo, 2007; Hollo-Szabone et al., 2008; Vass et al., 2008). The data available from 1979 in the RASFF weekly overviews are newly presented on the RASFF Portal Database, opened in July 2009 (European Commission, 2009) with more than 23 thousands records in November 2009. In the years 2003–2005, almost 200 nitrofurans alerts have been issued by the EU concerning products from 29 countries. Forty-seven percent of these have involved the detection of SEM; the majority

of the remainder being nitrofurans metabolite AOZ (Cooper et al., 2007).

The easy access to data is demonstrated on the nitrofurans metabolites notified in the RASFF database. The nitrofurans metabolite SEM alerts have been a focus of interest not only as an indicator of the directives banning the application of nitrofurans antibiotics but also due to the previous findings of high volumes of SEM in jars of processed baby foods. SEM was also found during the baking process in bread (Becalski et al., 2004, 2006) and flour-coated poultry products, in carrageen (a seaweed extract used as a food additive), starch and egg white powder treated with hypochlorite solutions containing 12% active chlorine (Hoenicke et al., 2004). It should be noted that the validity of SEM as a definitive marker for the nitrofurazone illegal use was recently questioned with respect to alternative contamination sources (Barnabas and Miklos, 2005; Bendall, 2009). Despite this fact, in EU legislation SEM remains the marker residue for this nitrofurans antibiotics.

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METHOD

Data obtained by a search on the RASFF database <https://webgate.ec.europa.eu/rasff-window/portal/> were pasted into Microsoft Excel tables and were manipulated in the usual manner for sorting, ordering and counting.

RESULTS AND DISCUSSION

Notifications which have appeared in the RASFF database should be interpreted as results of randomly selected samples not directly related to the true prevalence of contamination. Nevertheless, information on the number of samples evaluated, the number of notifiable results, products requiring action according to EU directives, and countries of origin and the RASFF itself contribute to an improvement in food safety and consumer protection. The contribution of reporting authorities to the database and the service carried out by the European Commission in publishing the RASFF data are invaluable contributions of the European Union to citizens of EU member states. The impact, however, is greater still, because data available are openly presented and can be used by parties both inside and outside the European Union. Therefore, national food safety authorities should be aware of the importance of the RASFF, should use the data presented, and should contribute to the knowledge pool for their own benefit and for that of the community at large. Properly

Table 2. SEM notified in the RASSF database

Year	Number of notifications
2002	45
2003	69
2004	24
2005	27
2006	41
2007	16
2008	36
2009 (weeks 1 to 45)	82
Total	340

used RASFF data and the sharing of results limits the expenditures of member states, promotes the use of approved and reliable methods, and focuses attention on the important gaps in consumer protection.

The numbers of nitrofurans metabolites notified in the RASFF database are summarized in Table 1. SEM has been notified most frequently (340 records).

Table 1. Search criteria and number of results

Nitrofurantoin	712
Nitrofurazone (SEM)	340
Furazolidone (AOZ)	282
Furaltadone (AMAZ)	105
Nitrofurantoin (AHD)	8

SEM notification by years are summarized in Table 2. The total number of notifications to week 45, 2009 was 340 with an apparent increase in the first six months of the current year, 2009. During weeks 1 to 45 SEM, have been notified in 82 products, whilst during the whole of the year 2008 the total was only 36 products. It is impossible to determine if these numbers result from the increasing interest of the food safety authorities or from increasing contamination in the countries where the products originate.

Products contaminated by SEM are listed in Table 3. It is evident that SEM have been analysed and found most frequently in crustaceans from Asian countries, in which the highest concentrations were notified. Poultry meat and poultry meat products, mostly from Brazil, were also notified with the highest SEM concentrations.

Baby food, bread and other products in which SEM can be present have not yet been notified in the RASFF. The main reason is the mentioned food products are not included in EU legislation. The second reason is that toxicity of SEM is relatively low compared with parent nitrofurans drug and also with respect to measured SEM concentrations in foods. Research teams should be encouraged to report data concerning SEM in baked products and the risk it poses for consumers, whilst food safety authorities should add more commodities to the screening programs.

Table 3. Summary of SEM notification data

Crustaceans and products thereof		Food additives	
Number of notifications	227	Number of notified analyses	2
Range of contamination (min–max, µg/kg – ppb)	0.44–7 500	Range of contamination (min–max, µg/kg – ppb)	> 1.00
Contamination > 5 µg/kg – ppb (No.)	125	Countries of origin	No. of products
> 10 µg/kg – ppb (No.)	51	Canada, Chile, Indonesia, Tanzania (sea weeds)	1
> 1 000 µg/kg – ppb (No.)	7	Italy	1
Countries of origin	No. of products	Honey and royal jelly	
Bangladesh	112	Number of notified analyses	6
Brazil	1	Range of contamination (min–max, µg/kg – ppb)	1.1–11.0
China	6	Contamination > 10 µg/kg – ppb (No.)	1
India	68	Countries of origin	No. of products
Madagascar	1	Hungary	3
Malaysia	1	China	1
Myanmar	1	India	2
Sri Lanka	6	Meat and meat products (other than poultry)	
Thailand	26	Number of notified analyses	16
Vietnam	5	Range of contamination (min–max, µg/kg – ppb)	0.1–14.4
Eggs and egg products		Contamination > 5 µg/kg – ppb (No.)	5
Number of notified analyses	4	> 10 µg/kg – ppb (No.)	1
Range of contamination (min–max, µg/kg – ppb)	1.0–2.4	Countries of origin	No. of products
Countries of origin	No. of products	Brazil	1
Brazil	1	China	13
France	1	Indonesia	2
India	1	Poultry meat and poultry meat products	
Israel	1	Number of notified analyses	37
Farmed crustaceans and products thereof – (obsolete)		Range of contamination (min–max, µg/kg – ppb)	0.5–47.0
Number of notified analyses	27	Contamination > 5 µg/kg – ppb (No.)	21
Range of contamination (min–max, µg/kg – ppb)	0.6–24.0	> 10 µg/kg – ppb (No.)	20
Contamination > 5 µg/kg – ppb (No.)	14	Countries of origin	No. of products
> 10 µg/kg – ppb (No.)	4	Brazil	16
Countries of origin	No. of products	The Netherlands	1
Bangladesh	15	Thailand	20
India	9	Wild caught crustaceans and products thereof – (obsolete)	
Thailand	2	Number of notified analyses	17
Vietnam	1	Range of contamination (min–max, µg/kg – ppb)	0.4–19.3
Fish and products thereof		Contamination > 5 µg/kg – ppb (No.)	4
Number of notified analyses	8	> 10 µg/kg – ppb (No.)	3
Range of contamination (min–max, µg/kg – ppb)	1.0–122.0	Countries of origin	No. of products
Contamination > 5 µg/kg – ppb (No.)	3	Bangladesh	1
> 10 µg/kg – ppb (No.)	1	India	2
Countries of origin	No. of products	China	7
Bangladesh	1	Thailand	7
China	2	Wild caught fish and products thereof (other than crustaceans and molluscs) – (obsolete)	
Peru	3	Number of notified analyses	1
Thailand	1	Range of contamination (min–max, µg/kg – ppb)	0.3
Vietnam	1	Countries of origin	No. of products
		Thailand	1

REFERENCES

- Barnabas S., Miklos S. (2005): Semicarbazide-residue formed in foods, as non-specific marker of the prohibited nitrofurazone. *Magyar Allatorvosok Lapja*, 127, 178–183.
- Becalski A., Lau B.P.Y., Lewis D., Seaman S.W. (2004): Semicarbazide formation in azodicarbonamide-treated flour: A model study. *Journal of Agricultural and Food Chemistry*, 52, 5730–5734.
- Becalski A., Lau B.P.Y., Lewis D., Seaman S. (2006): Semicarbazide in Canadian bakery products. *Food Additives and Contaminants*, 23, 107–109.
- Bendall J.G. (2009): Semicarbazide is non-specific as a marker metabolite to reveal nitrofurazone abuse as it can form under Hofmann conditions. *Food Additives and Contaminants Part A – Chemistry Analysis Control Exposure & Risk Assessment*, 26, 47–56.
- Cooper K.A., Samsonova J.V., Plumpton L., Elliott C.T., Kennedy D.G. (2007): Enzyme immunoassay for semicarbazide – The nitrofurazone metabolite and food contaminant. *Analytica Chimica Acta*, 592, 64–71.
- European Commission (2009): Rapid Alert System for Food and Feed Database Portal. <https://webgate.ec.europa.eu/rasff-window/portal/>
- Hoenicke K., Gatermann R., Hartig L., Mandix M., Otte S. (2004): Formation of semicarbazide (SEM) in food by hypochlorite treatment: is SEM a specific marker for nitrofurazone abuse? *Food Additives and Contaminants*, 21, 526–537.
- Hollo-Szabone P.O., Apjok A., Buza L. (2008): National and international experiences in 2006 of the operation of Rapid Alert System for Food and Feed (RASFF). *Magyar Allatorvosok Lapja*, 130, 57–62.
- Szeitz-Szabo M., Szabo E. (2007): Presence of mycotoxins in food: Can we use the data from the EU rapid alert system for quantitative risk assessment? *Acta Alimentaria*, 36, 127–138.
- Vass M., Hruska K., Franek M. (2008): Nitrofurazone antibiotics: a review on the application, prohibition and residual analysis. *Veterinarni Medicina*, 53, 469–500. <http://old.vri.cz/docs/vetmed/53-9-469.pdf>

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Corresponding Author:

Prof. MVDr. Karel Hruska, CSc., Veterinary Research Institute, Hudcova 70, 621 00 Brno, Czech Republic
Tel. +420 533 332 014, E-mail: hruska@vri.cz
