1990-1998: EFFICACY OF RESIDUES SURVEILLANCE IN ITALY EVALUATED BY MEANS OF A BAYESIAN ANALYSIS

Weiss C[1], Conte A[1], Giovannini A[1], Podaliri-Vulpiani M[1], Scortichini G[1]

[1] Istituto Zooprofilattico Sperimentale "G. Caporale", Teramo, Italy, 64100

Residues surveillance in the EU is currently implemented according to EU directives 96/23[2] and 97/747, which require the screening of groups of substances both in animals and animal products, animal feeds, drinking water and foods (milk, eggs, honey). The guidelines are the same in all the member countries.
The investigated molecules are classified in two categories: A category substances (mainly hormones) the administering of which is prohibited under Community legislation, B category substances which comprise veterinary drugs (mainly antibiotics and sulfonamides) and environmental contaminants. Molecules, as well as laboratory methods and species, are decided at the EU level; also the sampling scheme, defined as a percentage of the yearly slaughtered populations in each Member State, is specified by the Community legislation.

Materials & methods

The present study analyzes the results of 9 years (1990-1998) of residues surveillance in Italy. The results refer mainly to cattle and pigs, which are the species most heavily investigated and more frequently found positive.
The analysis has been carried out first to identify the trend of three major groups of substances, which are the corner stones of each EU plan (unauthorized, authorized and environmental contaminants). Secondly a set of molecules, resulted more interesting from several point of views (public health, non-compliance, international trade, etc.), has been chosen: hormones in general and trenbolone alone, both of them unauthorized in the EU, and antibacterial substances. All the other molecules have not been found or have occurred at an extremely low level.
Through a Bayesian approach[1] the uncertainty distributions of prevalence have been generated. Previous year results have been used as the "prior" probability; the binomial distribution has been chosen as the likelihood function.
The data referring to the number of the examined/positive samples, subdivided in three groups (authorized and unauthorized substances, environmental contaminants) are shown in Table 1.

Results & Discussion

Study results are shown in Figure 1, whose graphs represent the prevalence levels of the above mentioned molecules, as calculated through the Bayesian analysis. Contamination rates vary from 0.01% (unauthorized substances in 1990) to 2,3% (unauthorized substances in 1991). Particular is the case of environmental contaminants, where the presence of cadmium (searched mainly in horse liver) accounts for more than 90% of the positive findings in this group (up to 97% in 1995): cadmium has therefore been excluded from the analysis, since it has been considered as a bias.

Both the low contamination rates recorded till 1998, together with the high precision of the estimates (Fig.1) do not justify the high number of samples collected each year: indeed a much lower number of samples would be perfectly adequate to monitor risk levels for the consumer. This is still more true in the case of the many substances searched every year and always found negative (i.e.: DES and the stilbenes, organophosphates, and many others), one example of which is represented in Table 2.. These considerations hold also for two of the groups of chemical residues analyzed in the present work (hormones and trenbolone), where the situation remains absolutely the same during the last three years (1996-1998).

These results strongly suggest that the current approach to residues surveillance in the EU is not fully cost effective. The adopted sampling scheme does not appear as the more appropriate tool to guarantee consumer protection. An *a priori* statement of an adequate level of protection for the EU consumer and the adoption of a statistical sampling scheme based on binomial distribution, while would certainly be more cost-effective and comparable results among the member countries. Furthermore EU residues surveillance plans fail to take into consideration the previous years results: each year the planning is made regardless of the molecules searched previously and the relative results. Several alternative measures are possible: for instance, one could eliminate the search for the molecules which yielded negative results during the previous year: in this way it would become possible to allocate resources in a more rational way, i.e. implementing a targeted sampling focused on the substances, animal species and/or livestock classes having presented the highest contamination rates.

		Years									
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**TOTAL**
Veterinary drugs	Examined			25202	23416	21070	29467	22583	12330	18378	152446
	Positive			219	101	82	90	81	114	117	804
Environmental contaminants	Examined			5244	5984	5011	7527	3204	2686	3631	33287
	Positive			99	228	118	754	27	68	26	1320
Unauthorized substances	Examined	13984	16398	41838	28500	29755	54797	42626	34145	43377	305420
	Positive	22	636	838	441	262	113	130	112	66	2620
TOTAL	Examined	13984	16398	72284	57900	55836	91791	68413	49161	65386	491153
	Positive	22	636	1156	770	462	957	238	294	209	4744

Table 1. National Residues Plan: results 1990-1998

		Years									
		1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**TOTAL**
Trenbolone	Examined	1998	1227	2202	2718	2760	2281	1665	747	1112	16710
	positive	0	0	0	0	0	0	0	0	0	0
Stilbenes	Examined	3129	1501	4045	4225	4016	4046	2758	1262	1305	26287
	positive	0	2	0	0	0	0	0	0	0	2

Table 2. Stilbenes and trenbolone: 1990-1998 results

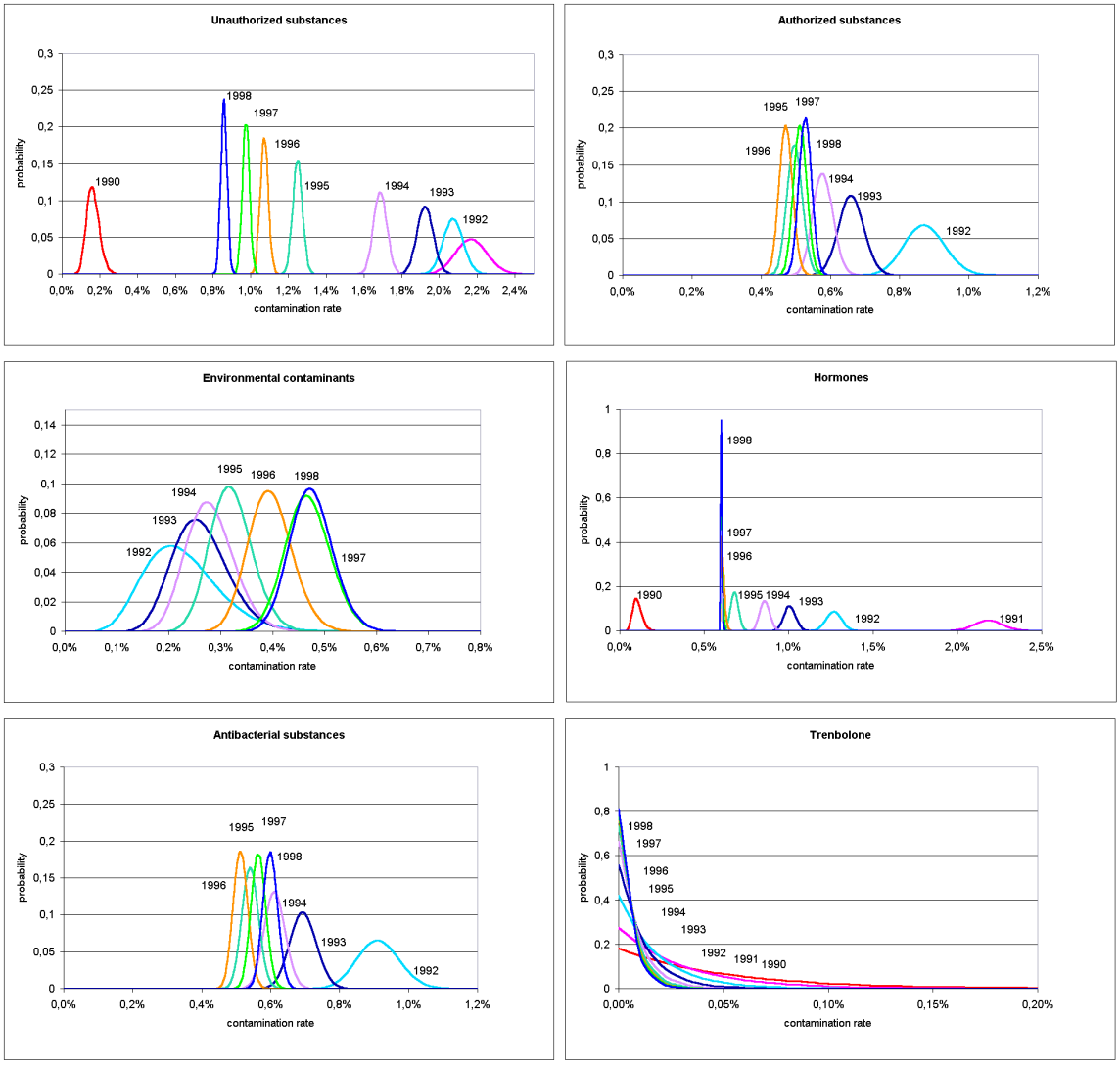

Figure 1

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