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A model for risk based safety control of feed ingredients

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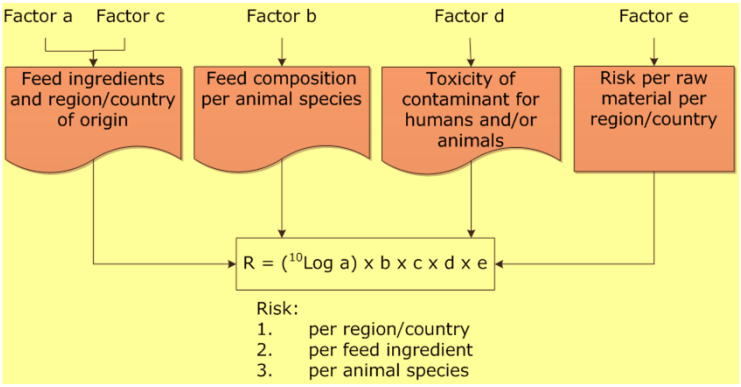
Background

EC regulation 882/2004: quality control of animal feed ingredients must be based on the risk for feed and food safety.

Objective

Development of a spread sheet model to predict the contribution of individual feed ingredients to the risk for human and animal health of specific contaminants, e.g. dioxins, aflatoxin B1 and DON.

Schematic representation of the factors in the model



Model input

- Production of compound feeds for cattle, pigs and poultry (a)
- Use of local imported feed ingredients, volume and country of origin (b)
- Quantitative allocation of feed ingredients to diets for different animal categories (c)
- Toxicity for target animals (d_{animal}) or exposure to humans via consumption of animal products (d_{human})
- Risk of specific contaminants in each ingredient / origin combination (e)

Source

- FEFAC (European Feed industry), statistical databases NL (CBS), experts
- Dutch Product Board for Animal Feed, statistical databases NL (CBS)
- Least cost feed formulation, expert judgement
- Expert judgement
- Trend analysis, expert judgement (geography, climate, processing, etc.), RASFF, incidents

Output

- The relative contribution of each feed ingredient and region/country of origin combination to the risk of specific contaminants in animal feed.
- Detailed information for risks for specific target animals, for exposure of humans via food products, etc.

Results

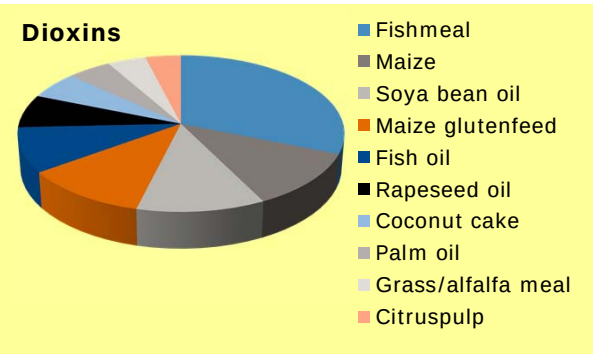
Table 1. Example of input factors and calculation of the risk of dioxin in maize from Brazil consumed by laying hens.

	a, use, kton	b, to layers	c, from Brasil	d, toxicity / exposure	e, risk in Brasil	Risk, $\times 10^3$
Animal	2324	0.26	0.28	0.1	0.1	2.43
Human	2324	0.26	0.28	1	0.1	24.3

Table 2. Example of use of maize and distribution (%) of risk of dioxin and DON for different target animal categories and human food

category	Usage, %	Dioxin		DON	
		Human	Animal	Human	Animal
growing pigs	17	3.7	0.4	0	55.6
sows	6	1.5	0.2	0	18.1
broilers	38	8.3	8.3	0	12.4
laying hens	26	56.0	6.2	0	8.5
dairy cattle	6	11.5	0.1	0	1.9
other	7	3.3	0.3	0	3.5
	100	84.4	15.6	0	100

Advice for official control



Discussion

- Quality of model predictions depends on quality of input
- The model now comprises dioxins, aflatoxin B1 and deoxynivalenol (DON); other toxic components and (new) feed ingredients can be included provided information on their toxicity and risk of contamination in countries of origin is available
- Consequences of new insights and data on relative risks can be quickly predicted

Conclusions

- The model is a helpful tool to optimally allocate resources for safety control of animal feed ingredients and meet EC regulation 882/2004

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