

## Analysis of trends based on the results from the risk assessment for agro-products in the EU

*Monique de Nijs, Paulien Adamse, Paul Bikker, Jacob de Jong*  
Workshop on Risk Assessment of Agro-products Safety / EUCTP  
*Beijing, June 6, 2013*



## Presentation lay-out

- Introduction
- National plan monitoring feed
  - Sources
  - Input data
- Conclusions
- Future work

## Presentation lay-out

- Introduction
- National plan monitoring feed
  - Sources
  - Input data
- Conclusions
- Future work



## Introduction – CV Monique de Nijs

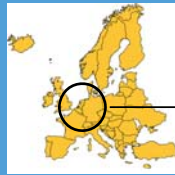


- Education
  - BSc Tropical Animal Husbandry
  - MSc Food Microbiology and Chemistry
  - PhD Wageningen University - Risk assessment of fumonisins for the Netherlands
- Work
  - TNO nutrition – Advisor Food Microbiology
  - FrieslandCampina – Manager Food Safety
  - Arla Foods - Manager FS-QAESH
  - RIKILT - project manager & business developer

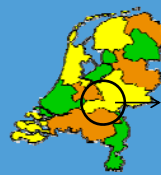


## Introduction - RIKILT

- Research institute within Wageningen UR
- History of 114 years
- >200 employees
- Annual turnover 22 M€



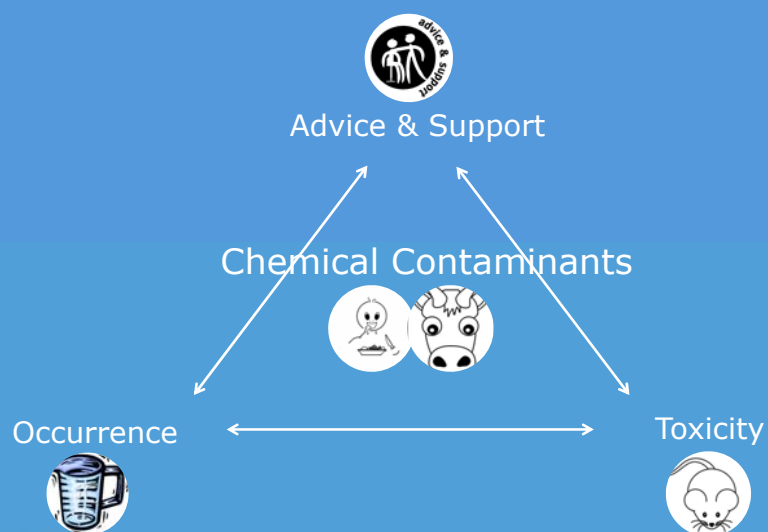
The Netherlands



RIKILT



## Introduction - RIKILT



## Introduction - RIKILT

---

### Main roles:

- Reference Institute
- Official control laboratory
- Analysis & Advice
- Food Safety Research
- Forensic Research
- Training
- 24/7 Incident Service



## Introduction - RIKILT

---

### Themes:

- Chemical contaminants (pesticides / dioxins / heavy metals / melamin etc.)
- Veterinary drugs (antibiotics / illegal drugs etc.)
- GMOs
- Natural toxins (mycotoxins / plant toxins / phycotoxins)
- Authenticity & nutrients
- Novel foods and agri-chains
- New risks (horse meat etc.)

## Introduction - RIKILT

### Cooperation:

- Netherlands Food and Consumer Product Safety Authority
- EFSA panels and working groups
- EU projects
- Private industry: Food & Feed



## Presentation lay-out

- Introduction
- National plan monitoring feed (NP monitoring Feed)
  - Sources
  - Input data
- Conclusions
- Future work

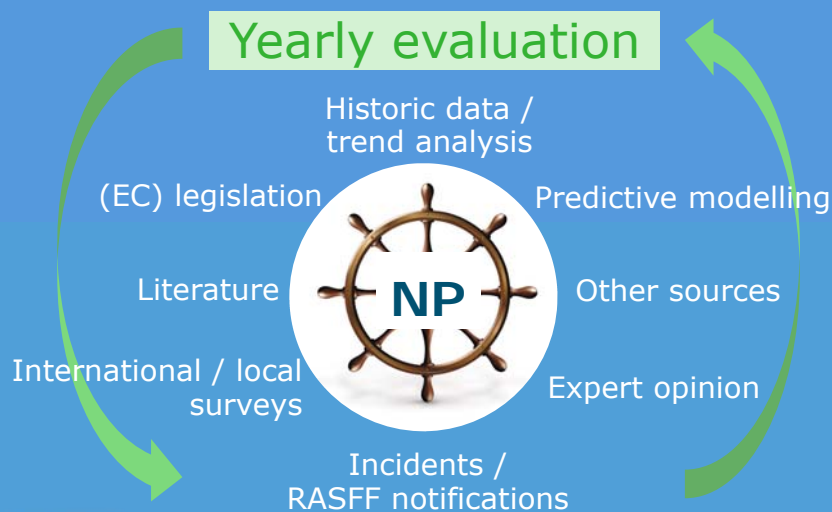
## NP monitoring feed – Legal background

- Legal framework: EC 822/2004 Official Control Regulation Article 3:
 

*Official controls of feed and feed materials by Member States should be carried out regularly, on a risk basis and with appropriate frequency*
- Article 3 a: *taking account of **identified risks** associated with animals, feed or food, feed or food businesses, the use of feed or food or any process, material, substance, activity or operation that may influence feed or food safety, animal health or animal welfare*

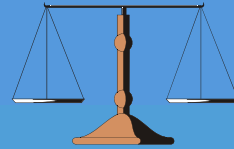


## NP monitoring feed – Sources



## NP monitoring feed – Sources – *(EC) legislation*

- New EC legislation <http://eur-lex.europa.eu/>
- Adapted EC legislation
- Local legislation (new / adapted)
- EFSA opinions <http://www.efsa.europa.eu/>
- EFSA calls for data
- Temporary legislation (*Alternaria*)



## NP monitoring feed – Sources – *Literature*

- Emerging risks – emerging crops
- Geographic regions
- Climate changes
- New or adapted legislation
- More information on toxicity



## NP monitoring feed – Sources – *International / local surveys*

- Results from last years NP

<http://www.google.nl/#sclint=psy->

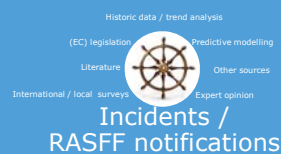
[http://www.google.nl/#sclint=psy-ab&q=nvwa+monitoring+plan&oq=nvwa+monitoring+plan&gs\\_l=hp\\_3...1928\\_7835\\_0\\_8114\\_20\\_20\\_0\\_0\\_0\\_0\\_169\\_1450\\_17j3\\_20\\_0...0\\_0...1c\\_1\\_14\\_psy-ab\\_rrMepIuiAU&pbx=1&bav=on\\_2.or\\_r\\_qf.&bvm=bv.47008514.d.d2k&p=aac54b08d52b341&biw=1205&bih=586](http://www.google.nl/#sclint=psy-ab&q=nvwa+monitoring+plan&oq=nvwa+monitoring+plan&gs_l=hp_3...1928_7835_0_8114_20_20_0_0_0_0_169_1450_17j3_20_0...0_0...1c_1_14_psy-ab_rrMepIuiAU&pbx=1&bav=on_2.or_r_qf.&bvm=bv.47008514.d.d2k&p=aac54b08d52b341&biw=1205&bih=586)

- Surveys reveal information on contamination
- Evaluate own results against results of other surveys
- Possible drawback: often one year / harvest period



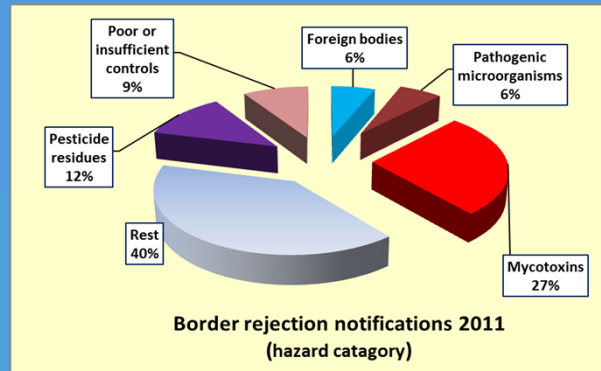
## NP monitoring feed – Sources – *Incidents / RASFF notifications (1/2)*

- Incidents occurring in the last year
- RASFF [http://ec.europa.eu/food/food/rapidalert/rasff\\_portal\\_database\\_en.htm](http://ec.europa.eu/food/food/rapidalert/rasff_portal_database_en.htm)
  - EC Border rejections
  - Incidents member states

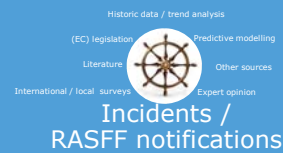




## NP monitoring feed – Sources – *Incidents / RASFF notifications (2/2)*



*Kind donation of Gijs Kleter*



## NP monitoring feed – Sources – *Expert opinion*

- Recurrent meetings with researchers on feed
- Recurrent meetings with expert colleagues from other member states
- Recurrent meetings with feed industry
  - Discuss emerging issues
  - Evaluate results of monitoring



## NP monitoring feed – Sources – *Other sources*

- ERDSS (Emerging Risk Detection Support System)
  - World wide
  - Food Safety and Quality
- Participate in meetings and conferences
- Information on changes in processing of feed



## NP monitoring feed – Sources – *Predictive modelling (1/5)*

Model for risk-based monitoring:

$$R_{\text{human}} = (10 \log a) * b * c * d_{\text{human}} * e$$

$$R_{\text{animal}} = (10 \log a) * b * c * d_{\text{animal}} * e$$

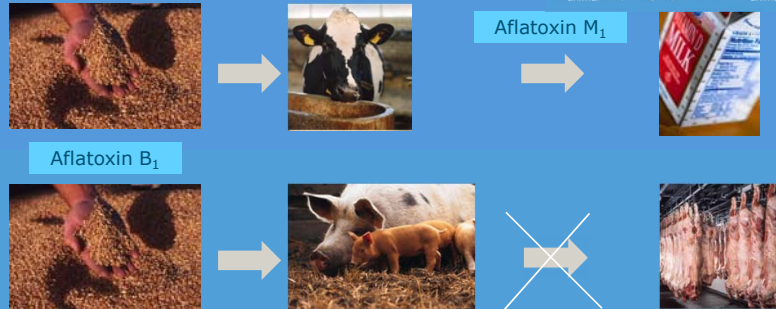
The risk scores  $R_{\text{human}}$  and  $R_{\text{animal}}$  give a total risk score for a selected contaminant in a selected feed ingredient



## NP monitoring feed – Sources – *Predictive modelling (2/5)*

$$R_{\text{human}} = (10^{\log a}) * b * c * d_{\text{human}} * e$$

$$R_{\text{animal}} = (10^{\log a}) * b * c * d_{\text{animal}} * e$$



## NP monitoring feed – Sources – *Predictive modelling (3/5)*

$$R_{\text{human}} = (10^{\log a}) * b * c * d_{\text{human}} * e$$

$$R_{\text{animal}} = (10^{\log a}) * b * c * d_{\text{animal}} * e$$

Factors in the model:

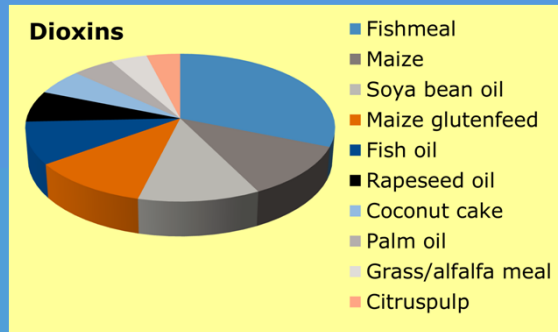
- volume of a feed ingredient included in Netherlands feed (in 1000 tons) in <sup>10</sup>log-transformation
- share of the feed ingredient in a feed for a selected animal species (0-1)
- share of the country of origin of the feed ingredient (0-1)
- exposure of humans through consumption of animal products (0-1)
- risk factor for each country of origin (0-1)



## NP monitoring feed – Sources – *Predictive modelling (4/5)*

Yearly advice for official control

Feed with highest risk for dioxins –  
*not necessarily most incidents*



## NP monitoring feed – Sources – *Predictive modelling (5/5)*

$$R_{\text{human}} = (10^{\log a}) * b * c * d_{\text{human}} * e$$

$$R_{\text{animal}} = (10^{\log a}) * b * c * d_{\text{animal}} * e$$

General conclusions on predictive modelling of contaminants in feed:

- The model contributes to an objective and quantified risk-based sampling strategy
- The model can be used for official control and for feed sector control



## NP monitoring feed – Sources – *Historic data / trend analysis (1/13)*

- Detection of trends in the levels (or occurrence) of contaminants in feed and feed ingredients
- Get insight into the levels of contaminants in feed in relation to maximum levels in legislation (in most cases Directive (EC) 2002/32)
- Combine / compare results from national plan with results from industry



### Historic data / trend analysis



## NP monitoring feed – Sources – *Historic data / trend analysis (2/13)*

Quality of the analytical data is crucial:

- Quality of the methods of analysis: validation / accreditation; suitability of the method; trueness; LOQ; LOD; etc.
- Random sampling to prevent biases
- Identification of samples:
  - Category of sample (EFSA)
  - Country of origin must be (correctly) specified

### Historic data / trend analysis



## NP monitoring feed – Sources – *Historic data / trend analysis (3/13)*

- EFSA -> FoodEx2, food classification and description system for collection and evaluation of data on levels of chemical occurrence
- EU -> COMMISSION REGULATION (EU) No 575/2011, Catalogue of feed materials (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:159:0025:0065:EN:PDF>)

COMMISSION REGULATION (EU) No 575/2011  
of 16 June 2011  
on the Catalogue of feed materials  
(Text with EEA relevance)

### Historic data / trend analysis



## NP monitoring feed – Sources – *Historic data / trend analysis (4/13)*

- EFSA -> FoodEx2, food classification and description system for collection and evaluation of data on levels of chemical occurrence
- EU -> COMMISSION REGULATION (EU) No 575/2011, Catalogue of feed materials

(<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:159:0025:0065:EN:PDF>)

### Historic data / trend analysis



## NP monitoring feed – Sources – Historic data / trend analysis (5/13)

Feed materials - well organised:

Name	FOODEX2 code	EU_575_2011
Cereal grains and products derived thereof	A0BBA	1.1
Barley	A000P	1.1.1
Barley solubles	A0BBH	1.1.10

Compound feeds - less organised:

Name	FOODEX2 code	EU_575_2011
Compound feed	A0BT0	-
Complete feed	A0BT1	-
Complete feed for pigs	A0BT7	-
Complete feed for piglets < 12 wk	-	-

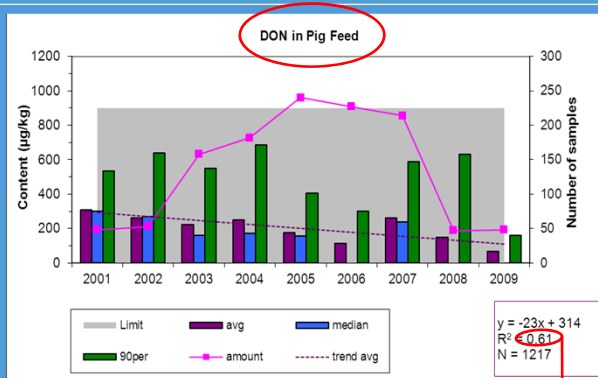


International / local surveys  
Expert opinion  
Incidents / RASFF notifications

## NP monitoring feed – Sources – Historic data / trend analysis (6/13)

Descriptive analysis

- average
- median (N>5)
- 90<sup>th</sup> percentile (N>10)
- linear regression (--- trend line)
- number of samples (■)
- official limit or guideline



Deoxynivalenol in pig feed  
Significant decrease

Significant when > 0.3

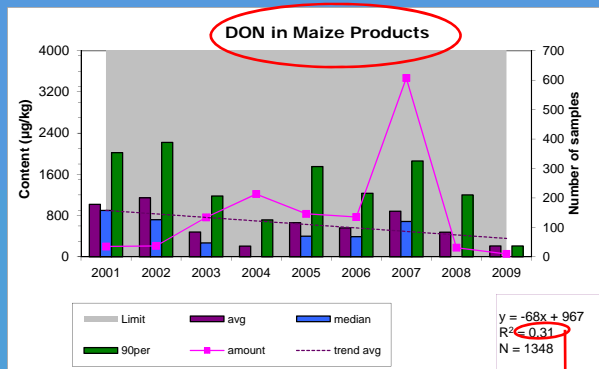


International / local surveys  
Expert opinion  
Incidents / RASFF notifications

## NP monitoring feed – Sources – Historic data / trend analysis (7/13)

### Descriptive analysis

- average
- median (N>5)
- 90<sup>th</sup> percentile (N>10)
- linear regression (--- trend line)
- number of samples (■)
- official limit or guideline



Deoxynivalenol in maize products  
Significant decrease

Historic data / trend analysis

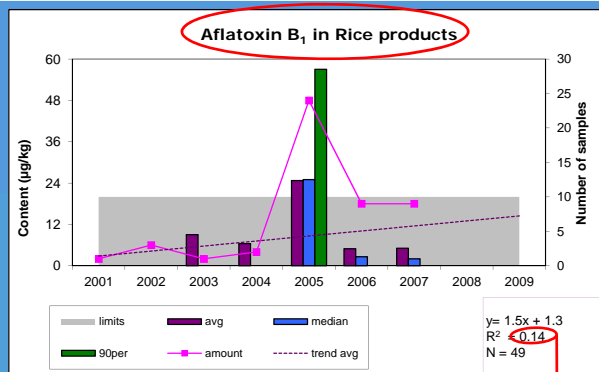
Significant when > 0.3



## NP monitoring feed – Sources – Historic data / trend analysis (8/13)

### Descriptive analysis

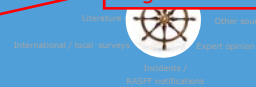
- average
- median (N>5)
- 90<sup>th</sup> percentile (N>10)
- linear regression (--- trend line)
- number of samples (■)
- official limit or guideline



Aflatoxin B1 in rice products  
Non-significant increase

Historic data / trend analysis

Significant when > 0.3





## NP monitoring feed – Sources – Historic data / trend analysis (9/13)

Conclusions on trend analysis of *mycotoxins* in feed:

- Levels are generally well below regulatory limits and significant trends in occurrence have been observed
- For some products the frequency of sampling has been drastically reduced despite of the fact that a significant part of the samples was non-compliant in former years

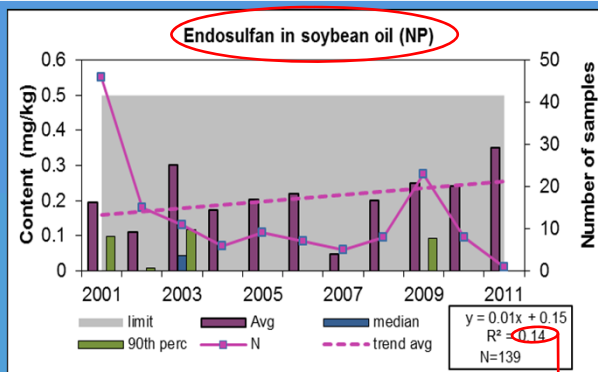
Historic data / trend analysis



## NP monitoring feed – Sources – Historic data / trend analysis (10/13)

Descriptive analysis

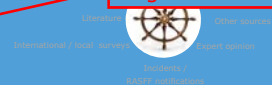
- average
- median (N>5)
- 90<sup>th</sup> percentile (N>10)
- linear regression (--- trend line)
- number of samples (■)
- official limit or guideline



Organochlorine compounds  
Non-significant increase

Historic data / trend analysis

Significant when > 0.3



## NP monitoring feed – Sources – *Historic data / trend analysis (11/13)*

Conclusions on trend analysis of *organochlorine compounds* in feed:

- OC's are detected on an incidental base in various categories of animal feed
- Most detected is endosulfan in soybean oil
- No significant in- or decrease of OC's
- Feed products with high fat content have the highest risk for OC contamination

Historic data / trend analysis



## NP monitoring feed – Sources – *Historic data / trend analysis (12/13)*

General conclusions on trend analysis of contaminants in feed:

- Based on the results of the trend analysis, the Netherlands National Control Plan for Feed has already been optimized for several contaminants
- Quality input → Quality output
- Uniform registration of feed categories and country of origin

Historic data / trend analysis

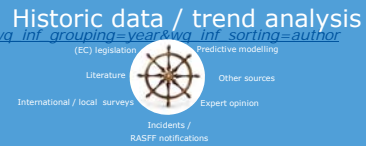


## NP monitoring feed – Sources – *Historic data / trend analysis (13/13)*

Trend analysis has been performed for:

- Mycotoxins: aflatoxin B<sub>1</sub>, DON, ochratoxin A, zearalenone, fumonisins B<sub>1</sub> and B<sub>2</sub>, T-2 and HT-2-toxins
- Dioxins and dioxin-like PCB's
- Heavy metals: mercury, cadmium and lead
- Copper and zinc
- Animal proteins
- Organochlorine compounds

[http://library.wur.nl/WebQuery/wurpubs/wizard?A700=RIKILT&wg\\_inf\\_grouping=year&wg\\_inf\\_sorting=author](http://library.wur.nl/WebQuery/wurpubs/wizard?A700=RIKILT&wg_inf_grouping=year&wg_inf_sorting=author)

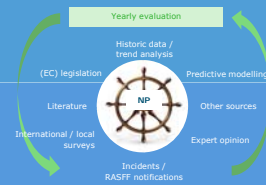


## Presentation lay-out

- Introduction
- National plan monitoring feed
  - Sources
  - Input data
- Conclusions
- Future work



## Conclusions



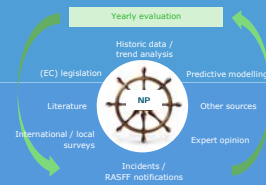
### Design of national plan (NP):

- The Netherlands National Control Plan for Feed has already been optimized for several contaminants based on predictive modelling and trend analysis
- The use of input data from private monitoring programs from industry is considered
- Quality input → Quality output

## Presentation lay-out

- Introduction
- National plan monitoring feed
  - Sources
  - Input data
- Conclusions
- Future work

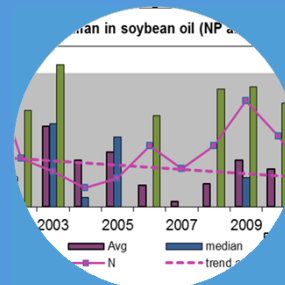
## Future work



- Apply new developments in statistical analysis in the trend analysis
- Uniform registration of feed categories and country of origin
- Record the considerations and decisions for the new national plan each year in a uniform and unique way – to be used next year as starting point

Thank you for  
your attention

Questions ?



[Monique.denijs@wur.nl](mailto:Monique.denijs@wur.nl)

[Paulien.adamse@wur.nl](mailto:Paulien.adamse@wur.nl)

[Jacob.dejong@wur.nl](mailto:Jacob.dejong@wur.nl)



10-12 november 2014 VIENNA

