



MYCOTOXINS:

A generally satisfactory health situation, but one that needs to be monitored

Above certain levels, mycotoxins, which are natural contaminants of agricultural products, have impacts on the performance of breeding farms, animal health and even human health. Given their potential respective impacts on the dairy and porcine sectors, we will focus on aflatoxin B1 and deoxynivalenol (DON) using the results collected by OQUALIM over 10 years.

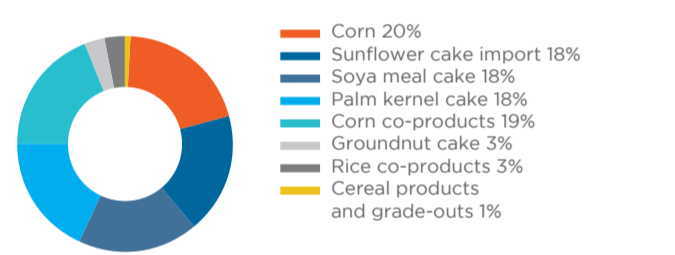
Aflatoxine B1

Aflatoxin B1 ingested by dairy cattle can be found in milk in the form of aflatoxin M1, which is carcinogenic for humans. For this reason, we specifically monitor raw materials at risk of aflatoxin (see illustration) and dairy cattle feed. Following a European alert on the 2013 harvest of corn from Eastern Europe, monitoring was reinforced on corn co-products and dairy cattle feed. At the end of January 2018, OQUALIM had carried out 1,199 Aflatoxin analyses on raw materials and 286 on feed, including 56% on dairy ruminants. Over 10 years, a single rice product result has exceeded the current regulatory thresholds. For dairy cattle feed, the maximum detected value was 2.75 µg/kg of aflatoxin for a current regulatory threshold of 5 µg/kg, confirming the satisfactory management of the aflatoxin risk by French dairy cattle feed manufacturers.

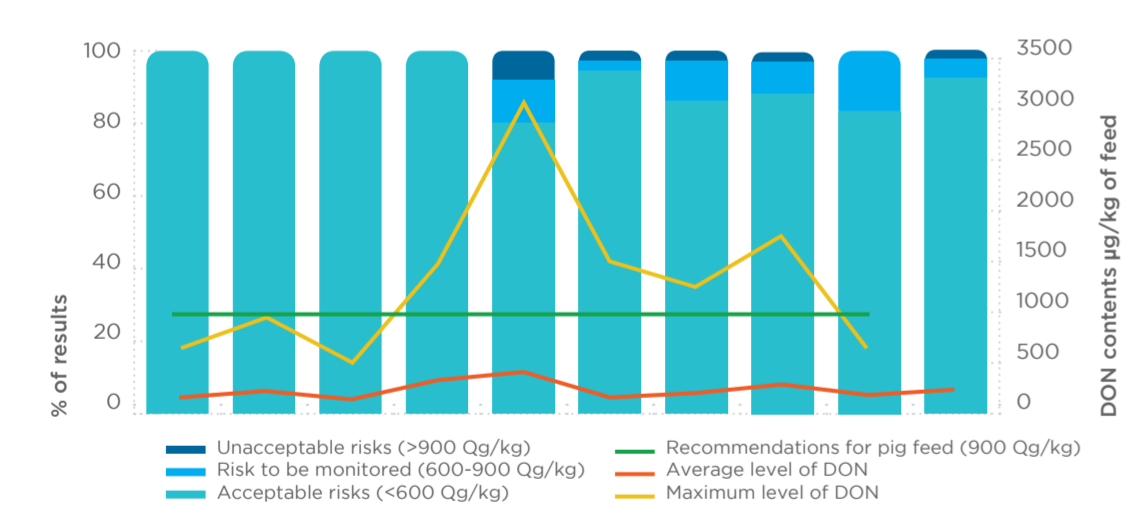
Désoxynivalénol (DON)

DON is highly dependent on the conditions of cereal harvest. In order to ascertain the health quality of the harvest as early as possible, OQUALIM's plan aims to conduct 50% of analyses on cereals from harvest time.

Breakdown of analyses of aflatoxins on raw materials



Results of "feed" plans on the level of DON in pig feed.



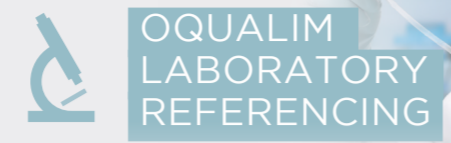
THE "ORGANIC" MONITORING PLAN

A collective tool developed to support the organic sectors

In addition to health risks, the pooled "organic" self-monitoring plan includes the risks of declassification of organic animal feed. For pesticide thresholds, for example, the decision was made to take as a benchmark the values established in 2001 by the Bundesverband Naturkost Naturwaren (BNN). The plan has been regularly reinforced since its creation in 2011 with notably increased analytical pressure on mycotoxins to monitor the impact of the different organic agriculture calendar compared to conventional practices.

■ Sébastien Tauty

- 2017 in figures
- 17 participating companies
- 270 000 tonnes of feed production
- 15 categories of organic plant raw materials
- 614 analyses, i.e. 1 analysis for 500 tonnes



45 referenced laboratories for 41 research types

Reliability and homogeneity of pooled analysis results are essential for robust plans. To achieve this, 3 key factors:

1 Referencing of Laboratories

Laboratory referencing is studied for a matrix/contaminant pair according to defined methods. The OQUALIM Laboratory Working Group validates referencing according to several criteria: Cofrac accreditations or equivalent, participation in Interlaboratory Comparison Tests (ILC), use of validated and/or standardised methods.

For certain contaminants, the Laboratory Working Group studies additional elements required for referencing in animal feed (specific method defined by animal feed regulations - Directive 2002/35/EC updated, standardised method or AFNOR validated alternative, etc).

2 Laboratory Service Agreement

A Laboratory Service Agreement is signed between OQUALIM and the laboratory. The agreement includes specifications on requirements such as:

- Sample Management (identification and recording, conservation and analysis report)
- Analysis conditions (methods defined with LOQ, application of analysis methods defined by Directive 2002/32/CE updated for heavy metals and by EURL recommendations for dioxins and PCBs). Integration of regulatory changes within 6 months after their publication in the European Union Official Journal.
- Delivery of results (expression, analytical time period and entering of results into the OQUALIM database).

3 Research accuracy

Example of pesticide analysis - change in referencing to a positive list. In order to homogenise the list of pesticides detected within OQUALIM plans, a positive list was prepared based on current regulations, plan history, our monitoring and laboratory feedback. This minimum shared detection base includes around one hundred molecules for systematic research. This minimum list is then completed by the laboratories according to their COFRAC validated and accredited methods.

■ Olivier Magat

List of referenced laboratories on the site www.oqualim.fr

What is OQUALIM?

OQUALIM is an association whose aim is to provide solutions to help meet health security and animal feed quality challenges.

The association coordinates the collective approach by the French animal nutrition sector in terms of quality and health security of animal feed. It has two main objectives: health security and compliance with both public and private specifications. To achieve these objectives, it has constructed two tools: pooled self-monitoring plans and the certification of animal feed plants with the RCNA (Animal Nutrition Certification Reference).

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Journal

Monitoring Report

April 2018



French manufacturers of complete and supplementary feed products have chosen to pool their control results by family to reinforce the health safety of their production. OQUALIM is the structure that houses this initiative.

It is mandatory to set up adequate self-monitoring plans, however, it is difficult to show that a plan is adequate at a company level. Collective experience can help. Pooling increases the effectiveness of research, as shown by Canon and Roe's statistical laws.

To construct an effective and strengthened safety net, OQUALIM participants contribute in a complementary way to conduct analyses for optimum coverage of feed materials. The results are then shared.

« The strength of our pooled plan is to check more feed materials across a larger number of criteria, in order to collectively guarantee food safety »

summarised Jean-Louis Zwick during his chairmanship.

In addition to being a collective response to a regulatory requirement, by monitoring the health status of animal feed in real time, OQUALIM offers a reactive alert tool that contributes to safeguarding the animal production sector.

The choice has been made to check the feed product mainly through the raw feed materials from which it is made, based on the finding that feed materials are the source of most contaminants. The rule is not to substitute for suppliers' primary duty to place only products fit for purpose on the market. Pooled plans are second-level checks.

The plans focus on contaminants concerned by regulations, undesirable substances, salmonella on feed materials and on contaminants for which the regulatory thresholds differ between Feed Materials and Finished Products such as mycotoxins, contaminants linked to or sensitive to the process: microbiological or coccidiostatic agents.

« The existence of pooled plans has enabled progress to be made in contaminant analysis practices both at manufacturers and their suppliers. »

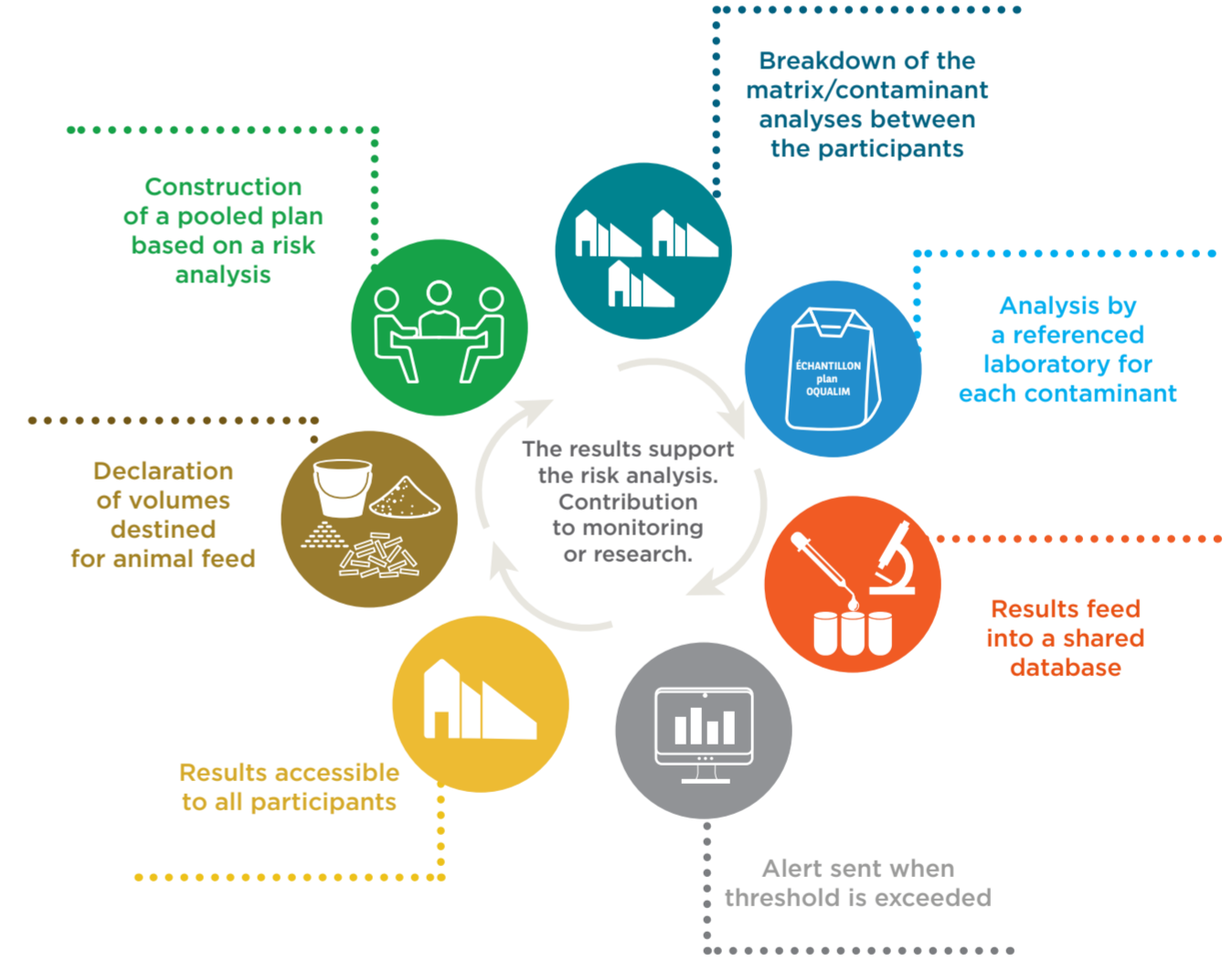
explains Michel Layus, Vice-Chairman of OQUALIM.

The results of the pooled self-monitoring plans feed into an annual risk analysis. This professional risk analysis is reproduced in the Guide of Best Practices in Animal Nutrition, to which the certification reference refers.

This type of approach is quoted in the ANSES Tool sheet - Dangers associated with Animal Feed.

■ Céline Ravel

Operation of a pooled monitoring plan



Number of samples analysed within conventional "feed" and "supplements" monitoring plans since 2009.

	2009	2010	2011	2012**	2013	2014	2015	2016	2017	2018 ⁽¹⁾
Coccidiostatics	-	73	74	78	79	62	82	87	89	100
Dioxins DL and non DL PCBs & PAH	65	78	104	332	340	396	394	422	431	420
Heavy Metals, Fluorine & Nickel*	246	245	264	871	969	1215	1232	1222	1311	1166
Microbiology	1547	4394	4264	4515	4145	4603	5184	5183	5353	5425
Mycotoxins	1832	2106	2129	2173	2028	2335	2147	2420	2434	2506
Pesticides	265	352	365	368	370	362	395	433	423	436
Other***	67	60	87	120	129	137	204	217	209	227
Total	4022	7308	7287	8457	8060	9110	9638	9984	10250	9894

* Estimate of the number of samples based on the number of analyses conducted
** Integration of the pooled "supplements" monitoring plan into OQUALIM
*** Hydrocyanic acid, ragweed and datura, ergot, volatile mustard oil, inhibiting substances, theobromine

(1) Forecast.



MANAGING THE "SALMONELLA" RISK

demonstrated by a high number of analyses

Salmonella form a proteobacteria genus belonging to the enterobacteriaceae family. They are the cause of salmonellosis in humans, and in this respect, are subject to specific monitoring in food products in general and animal-sourced food products in particular.

In this respect, Regulation (EC) No. 2160/2003 of 17 November 2003 on the control of salmonella and other specified food-borne zoonotic agents aims to ensure that proper and effective measures are taken to detect and to control salmonella at all relevant stages of production, processing and distribution, particularly at the level of primary production, including in feed, with a view to reducing their prevalence and the risk they pose to public health. The text focuses more specifically on the 5 serotypes most frequently involved in collective food toxicoinfections (CFTI) (*Enteritidis*, *Typhimurium*, *Infantis*, *Hadar*, *Virchow*).

The emergence of Salmolla Kentucky salmonellosis over the last few years, along with the multi-resistance of certain stains of this serotype, led the Authorities to regulate this 6th serotype for breeding farms. Along with the 5 others, it is now considered to be a "regulated"

serotype. Salmonella are likely to be found in raw materials (MP) and in complete animal feed (AC). Feed may be a source of introduction of salmonella into breeding farms. Salmonella are thus subject to specific monitoring in animal feed.

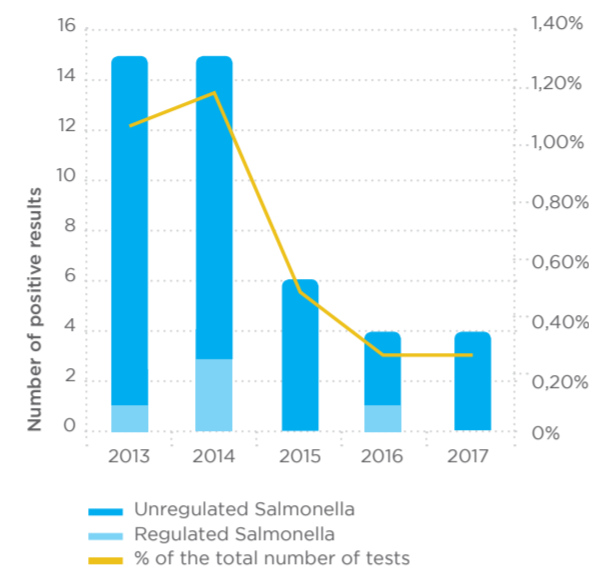
Since 1989, the animal feed sector has pooled its monitoring data, including for salmonella, on raw materials and since 2004, on composite animal feed. The Salmonella criteria has been an integral part of OQUALIM's national monitoring plans since 2009. On average, 1,300 salmonella analyses on raw materials and 3,300 on composite feed are compiled annually as part of OQUALIM's plans, with specific attention paid to poultry feed. According to the data for the 2010 - 2017 period, extracted from OQUALIM's "feed" monitoring plan database, the serotypes most often found are non-regulated serotypes: *Mbandaka*, *Seftenberg*, *Montevideo*, *Livingstone*.

In 2017, Salmonella analyses represent 30% of analysis on raw materials and 83% of analysis on finished products. The results show a net decrease in the prevalence of salmonella on raw materials and finished products over the last 5 years. This low prevalence

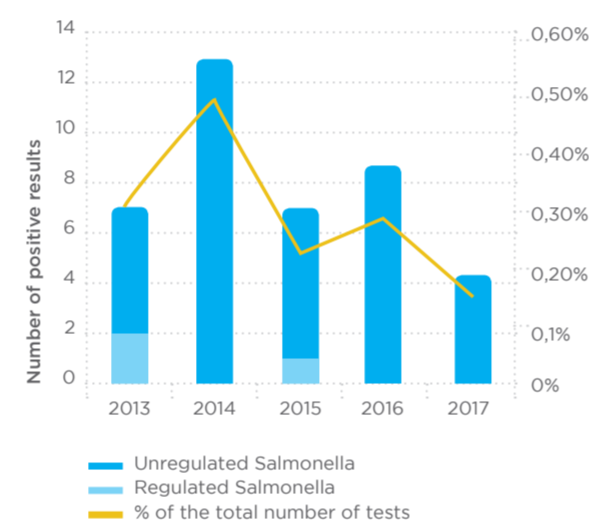
confirms the good level of management. No regulated salmonella was detected on finished products over the last 2 years.

■ *Céline Lorquin and Blandine Markwitz*

Salmonella results on feed materials over the last 5 years



Salmonella results on compound feed over the last 5 years



Main serotypes of salmonella detected (nb of positive results) - 2010-2017

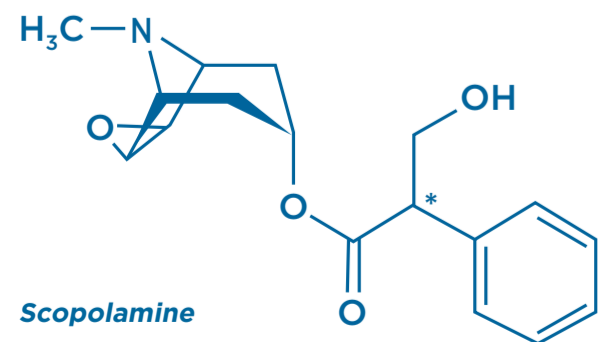
	MP	AC
<i>Infantis</i>	2	2
<i>Typhimurium</i>	3	4
<i>Enteritidis</i>	1	0
<i>Hadar</i>	0	2
<i>Virchow</i>	0	1
<i>Kentucky</i>	0	0
<i>Mbandaka</i>	12	18
<i>Seftenberg</i>	8	9
<i>Montevideo</i>	7	7
<i>Agona</i>	6	2
<i>Livingstone</i>	6	6
<i>Anatum</i>	2	4
Other serotypes	35	38

In blue the regulated serotypes



DATURA AND ASSOCIATED ALKALOIDS

Datura (*Datura stramonium L.*) is a plant whose fruit releases several hundreds of seeds when it ripens at the end of August. Each datura plant can hold up to a hundred fruit. Datura has a number of evocative names, including devil's weed and devil's trumpet.



Datura stramonium seeds are botanical impurities considered as contaminants due to the alkaloids (hyoscyamine, atropine, scopolamine) that they contain, and which have toxic effects on most animal species (Efsa,2008). The entire plant is toxic, as the stems and leaves also contain alkaloids.

The datura adapts very well to the cultivation conditions for sunflowers, and it is also a weed in corn crops. Over the last century, the plant's zone of presence has extended. Grazing animals are unlikely to consume the fresh plant due to its taste and odour. However, cases of intoxication may occur if the animals ingest dry feed contaminated by the entire plant or seeds, as they are unable to detect these impurities. Tropane alkaloids affect the heart rate and the central nervous system.

Even at very low levels of contamination, they have an impact on race horses, making them positive for anti-doping controls. The Directive 2002/32 defines the maximum regulatory levels for Datura at 1,000 mg/kg. Detection of datura was included in OQUALIM's monitoring plan from its creation on corn, sorghum, sunflower and their co-products.

A result exceeding 1,000 mg/kg was detected in 2012 on cereal products, then in 2014 on sorghum. Since 2015, all results have been compliant. In addition to these analyses, detection of atropine and scopolamine was added on an exploratory basis in 2013 on sunflower and buckwheat co-products such as cake, where it is not possible to detect whole Datura

seeds. Due to its low use, few results are available for buckwheat hulls.

In the absence of a regulatory threshold and faced with the considerable variability in the results for sunflower cake, a professional vigilance threshold was defined at 15 mg/kg. This threshold was evaluated based on a maximum incorporation rate of 10% of sunflower cake in swine feed. According to the EFSA summary, porcine species are amongst the most sensitive. For this animal, the minimum dose with an observed adverse effect is estimated at 1,500 µg of alkaloids per kg of ingested feed stuff.

Since 2013, 6% of sunflower cake samples analysed have a level of atrophine + scopolamine exceeding this value. The threshold applicable to race horses is lower.

■ *Anne Paul*

Datura stramonium fruit contain between 500 and 600 seeds

Sources : Anses, Arvalis, INPN, Terre Univia



THE "MILK REPLACEMENT" PLAN

A recent plan for specific raw materials

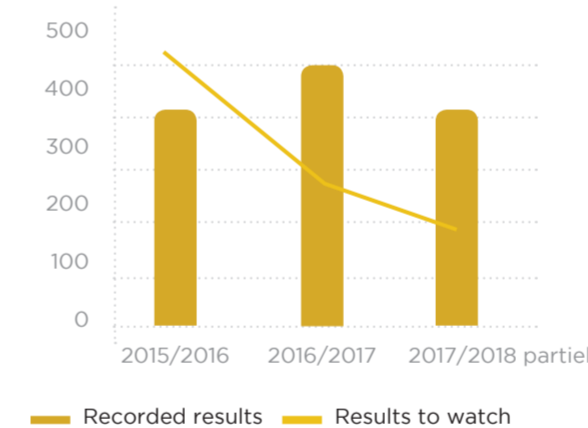
After becoming part of OQUALIM in 2014, the main French manufacturers of milk replacer feed set up a pooled self-monitoring plan. They pooled a maximum number of analyses to monitor chemical (PCB dioxins, HAP pesticides...) and bacterial (salmonella, ASR, Clostridium, E. coli...) contaminants. The latter represents 62% of the total analyses. The analyses cover both raw materials and finished products. Amongst raw materials, we naturally find dairy products, such as skimmed milk powder and whey powder, and also vegetable and animal fats, minerals, trace elements, plant products and vitamin and mineral supplements.

In general, no results have exceeded the maximum thresholds since the launch of the plans. Results "to be monitored", i.e. approaching the regulatory limit - or exceeding the internal plan thresholds in the absence of regulations - have been recorded. These enable adjustments to the analytical pressure on the monitored raw materials

Formerly accustomed to conducting monitoring controls separately, the French milk replacer manufacturers are satisfied with the results of the first years of the plan. They confirm the relevance of the model. All the companies participate fully and actively in the plan, with a 99% plan achievement rate (analyses conducted/analyses programmed during the year).

■ *Carine Freulon and Olivier van Ingelgem*

Samples analysed in milk replacers pooled monitoring plan



METALLIC TRACE ELEMENTS (Lead, Arsenic, Cadmium, Mercury and Fluorine)

A major concern for the Supplements Plan

As constituents in the Earth's crust, for the majority, metallic trace elements (heavy metals and other metalloids elements) are naturally present in the environment, but can also come from certain industrial activities.

They have variable toxicity, but all have undesirable effects on humans and animals, and tend to accumulate in the food chain. These five metallic trace elements come under the list of regulated undesirable substances in human and animal nutrition (directive 2002/32). In animal nutrition, mineral products, raw materials (phosphates, magnesia, carbonates) and additives (trace elements, clays) are amongst the most at risk from these contaminants. As significant users of mineral origin products, from 2002, supplement manufacturers (pre-mixtures, mineral feed and other supplements) implemented a pooled self-monitoring plan specifically focused on these contaminant/product pairs, in order to improve their monitoring level.

For certain supplement/metallic trace element pairs, whilst no maximum regulatory level is set by Directive 2002/32, recommendations of maximum levels have been established by the profession in order to improve

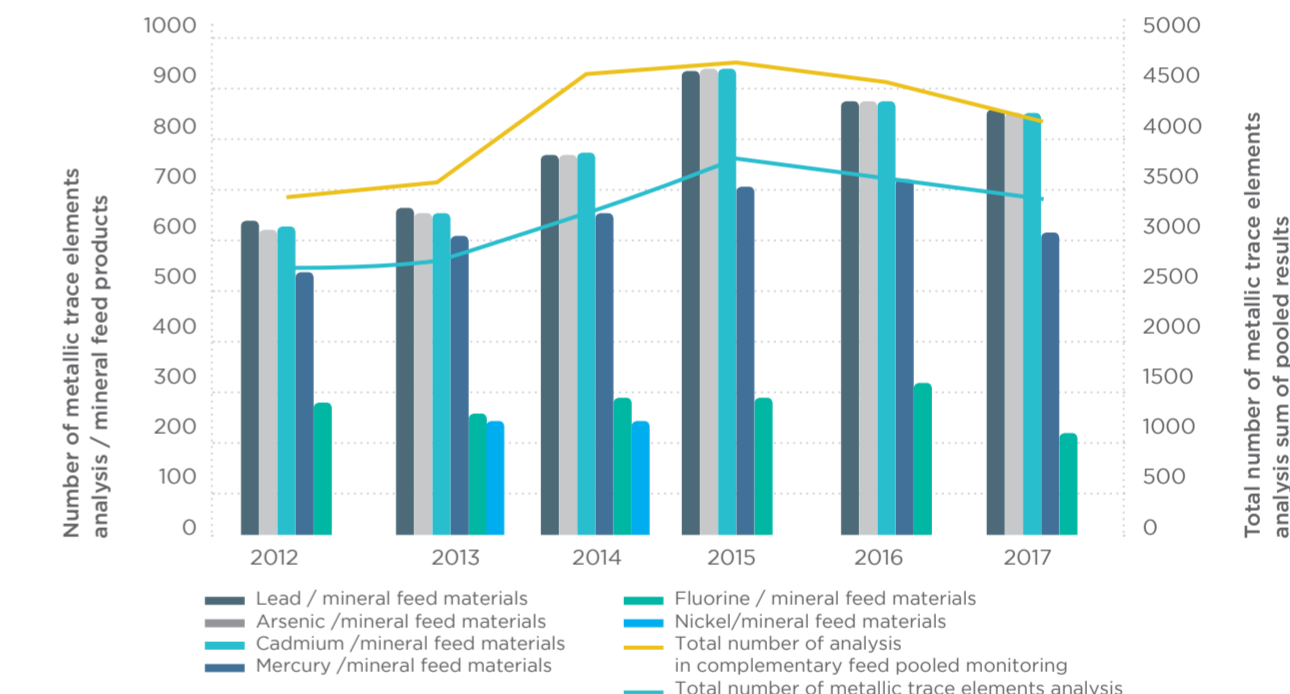
product quality and safeguard the entire food chain. These recommendations were set based on the natural levels observed in these supplements over the thousands of analyses conducted since 2002, and also taking into account the maximum levels in compound feed.

Since 2012, on average 3,160 analyses of metallic trace elements in mineral products have been pooled each year, i.e. 80% of the total number of analyses conducted as part of the supplement monitoring plan. Of these 3,160 analyses, one case of non-compliance is generally detected each year.

As nickel compounds are classified carcinogenic, but are not regulated in animal feed, exploratory analyses on nickel were conducted in 2015 and 2016 with 445 pooled analyses. These enabled data on nickel levels in mineral origin materials to be collected, should there be future regulations on this contaminant. Moreover, detection of nickel has been included on an exploratory basis in the "feed" monitoring plan since 2017.

■ *Géraldine Chanu*

Complementary feed pooled monitoring on metallic trace elements



2018, 3RD EDITION OF THE "GMO" MONITORING PLAN

The plan has two aims:

- ✓ Support the factories committed to a "GMO-free feed" approach, to show their effective monitoring of the GMO risk through a pooled plan that they can build on;
- ✓ Enable the profession to better collectively assess the pressure of GMOs on sensitive raw materials (MPS) and at-risk raw materials (MPR) using GMOs, in order to adapt accordingly.

The plan is elaborated based on a risk analysis associated with the presence of GMOs, that is regularly updated to take into account changes in the supply context and genetic events authorised for sale in the European Union. Work to interpret the analysis results on new genetically modified hybrid varieties, combining the insertion of several genes of interest has mobilised professionals.

In conclusion, in the 2017 "GMO" plan, no non-compliant results were recorded; one corn sample and 18 soya samples were subject to a detection of GMOs this year, but in quantities lower than the regulatory threshold of 0.9%

■ *Sébastien Tauty and Bruno Toussaint*

2017 in figures

- 90 production sites
- Over 200 analyses conducted
- On the 3 raw materials
- at risk: colza, soya, corn

Breakdown of analyses between raw materials for GMO qualification

