



COCERAL MYCOTOXINS SURVEY: SYNTHESIS REPORT 2011

**Results of the Mycotoxins survey
carried out among COCERAL's operators**

October 2012

REGULATORY POSITION

Foodstuffs: The Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs has been amended several times related to mycotoxins, on 26 February 2010 as regards Aflatoxins Maximum Limits (Commission Regulation (EC) No 165/2010) and on 5th July 2012 (Commission Regulation (EC) No 594/2012) concerning ochratoxin A limits.

Discussions on T-2 and HT-2 toxins are on-going for several years now. The Commission has decided that a recommendation would be most suitable for those toxins, but the final document is still expected.

Furthermore, it is to be mentioned that the amended Regulation (EC) 1881/2006 stipulates that, for the purpose of the application of maximum levels for deoxynivalenol, zearalenone, T-2 and HT-2 toxin, rice is not included in 'cereals' and rice products are not included in 'cereal products'.

Feedingstuffs: Limits for different mycotoxins in animal feed, feed materials and feedingstuffs are available through Commission Recommendation 2006/576/EC of 17 August 2006 on the presence of deoxynivalenol, zearalenone, ochratoxin A, T-2 and HT-2 and fumonisins in products intended for animal feeding and the Commission Directive 2002/32/EC as amended on undesirable substance in animal feed (regarding Aflatoxin B1 and rye ergot (*Claviceps purpurea*) limits in feed materials).

Following the publication of an EFSA opinion on 19 December 2011 on the risk for animal and public health related to the presence of T-2 and HT-2 toxin in food and feed, the Commission is currently discussing the possibility to set up a new proposal for both food and feed for the sum of T-2 and HT-2 toxin.

The table here below summarizes, respectively, the limits and guidance values for food and feed respectively:

Table 1: Summary of current limits for mycotoxins

Mycotoxins		Foodstuffs Regulated maximum levels	Feedingstuffs Recommended guidance values
STORAGE MYCOTOXINS	Aflatoxins (Sum of B ₁ , B ₂ , G ₁ , and G ₂)	- 4ppb and 2ppb (B1) for Cereals and products derived from cereals (excluded maize, rice and processed cereal products and dietary foods for infants); - 10 ppb and 5 ppb (B1) for Maize and Rice; - 0.1 ppb B1 for Processed cereal-based foods and baby foods for infants and young children.	The Aflatoxin maximum residues limits are 20 ppb (lower limits for other species varying from 5 to 20 ppb)
	OTA (Ochratoxin A)	- 5 ppb for unprocessed cereals; - 3 ppb for all products derived from unprocessed cereals.	250 ppb
FIELD MYCOTOXINS	DON (Deoxynivalenol)	- 1250 ppb for unprocessed cereals other than durum wheat, oats and maize (rice is excluded from "unprocessed cereals"); - 1750 ppb for unprocessed durum wheat and oats; - 1750 ppb for unprocessed maize with the exception of unprocessed maize intended to be	8 000 ppb (12000 ppb for maize by-products)

		processed by wet milling (starch production).	
	ZEA (Zearalenone)	- 100 ppb for unprocessed cereals other than maize; - 350 ppb for unprocessed maize with the exception of unprocessed maize intended to be processed by wet milling (starch production).	2 000 ppb (3000 ppb for maize by-products)
	FUMONISINS B1+B2	- 4000 ppb for unprocessed maize with the exception of unprocessed maize intended to be processed by wet milling (starch production).	60 000 ppb for maize and maize products
	T-2 and HT-2 toxin	Under discussion	Under discussion

INTRODUCTION

This report aims to show the results of a biannual survey carried out by COCERAL members on the management of mycotoxins.

COCERAL is considered as the voice representing the European cereals, rice, feedstuffs, oilseeds, olive oil, oils and fats and agrosupply trade. COCERAL members act in the food and feed supply chain, both at the level of agrosupply distributors and grain traders (Figure 1).

The agrosupply section is composed of specialised technicians who advise farmers all along the production cycle on the choice of seed varieties and the conditions of use of fertilizers and plant protection products taking into account the local conditions (environmental, pedo-climatic, economics, etc.). Agrosupply distributors inform farmers also on the time of intervention on the crop, on the role of meteorological conditions, on the correct dosage for the chosen product.

Grain collectors and International traders intervene after the grain is harvested. Collectors sample and analyze the crops before reception. Then they dry, clean and protect the grain from insect infestations in order to adapt the crops to both the regulatory requirements and the commercial contracts.

Agrosupply distributors and grain trading operators contribute to manage and control mycotoxins in the batches traded within European Member States.

This report will highlight which tools and actions are put in place to manage the risk of mycotoxins by agrosupply distributors and grain traders.



Figure 1 Composition of the food and feed supply chain. COCERAL members act before and after the farmers as agrosupply distributors and grain collectors and International traders.

SURVEY DESIGN

- **Population of concern**
 - European agrosupply distribution and grain trading companies;
 - The Member states that have participated to the survey are the following: Austria, Belgium, France, Germany, Greece, Hungary, Italy, Poland, Sweden, and UK;
 - The operators from the member states who replied to the survey are members of national associations of COCERAL.

- **Inquiry setting**
 - Operators have been consulted via a questionnaire (see Annex 1) sent to them by email;
 - The inquiry has been launched on the 3rd November and closed on 25th November 2011. A second round of inquiry has been launched on the 29th of March and closed on the 13th April 2012;
 - Coceral Secretariat received 34 replies, covering a total volume of traded grains of 41 507 807 tonnes.

The description of the method for processing the replies design can be found in Annex 2.

STARTING DATA

- The survey starting data has been collected through the questionnaire. Each operator was asked to specify the grain traded on a yearly basis and the number of farmers with whom each operator is dealing;
- All data received by operators of the same Member State have been aggregated.

- **Volume of traded grains**
 - The volume of traded grains is composed by the volume collected from European farmers or grains imported into the European Union;
 - Results of parts 2 and 3 of the questionnaire are expressed proportionally to the total volume of grains traded within each member state (source: Eurostat).

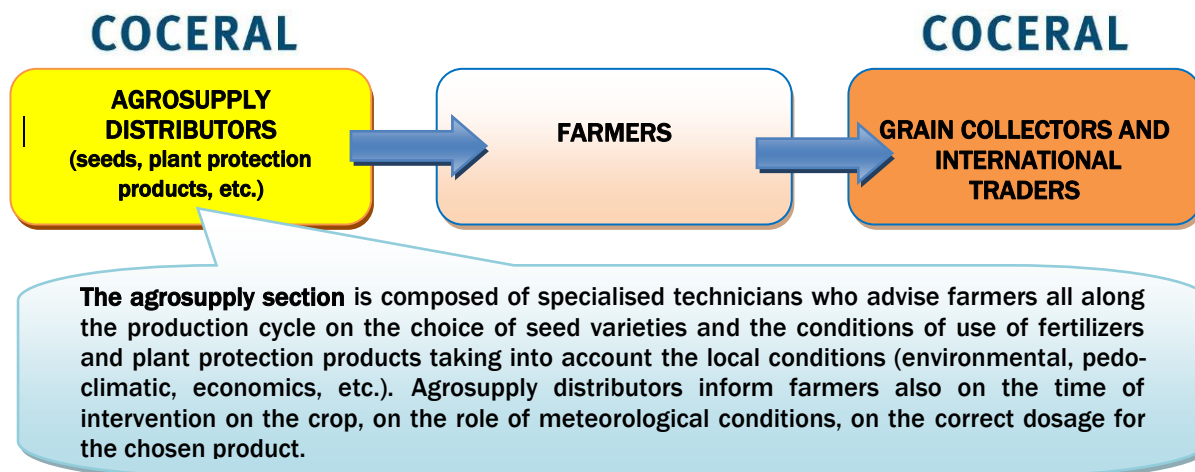
- **Number of farmers**
 - It has been asked to each operator to specify the number of farmers with whom they are dealing with;
 - Results of part 1 of the questionnaire are expressed proportionally to the total number of farmers within each member state (source: Eurostat).

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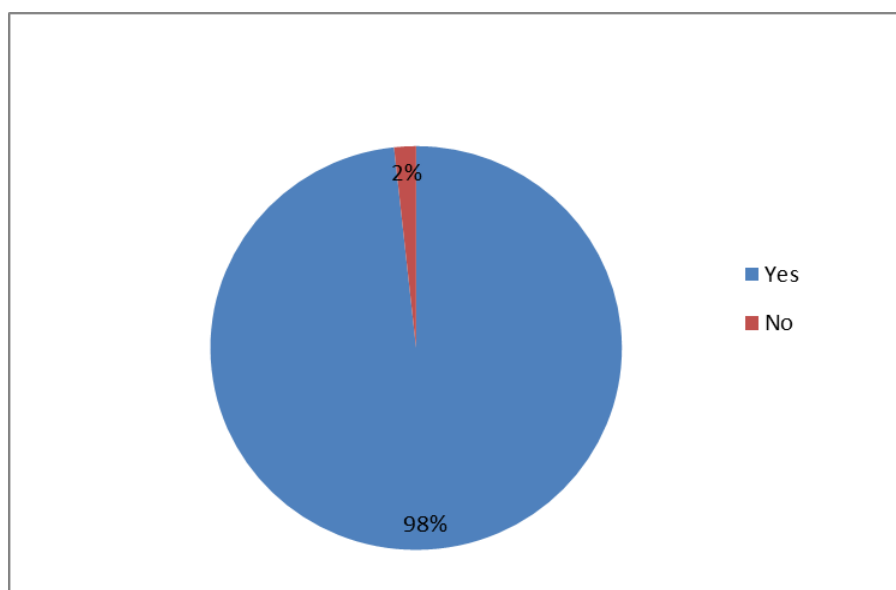
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1 Prevention of mycotoxins risk in field

This section refers to the agrosupply section members of COCERAL.

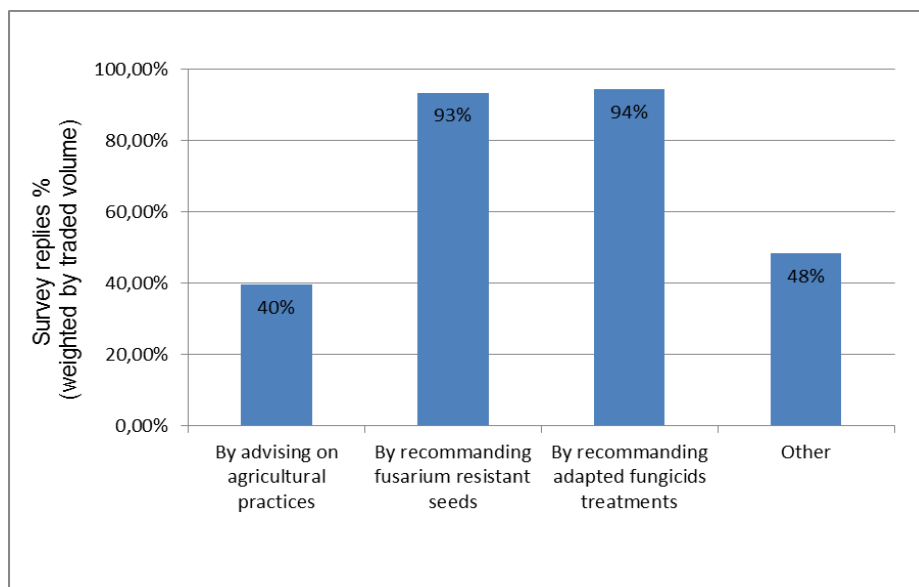


1.1 Do you specifically advise farmers with regard to mycotoxins?



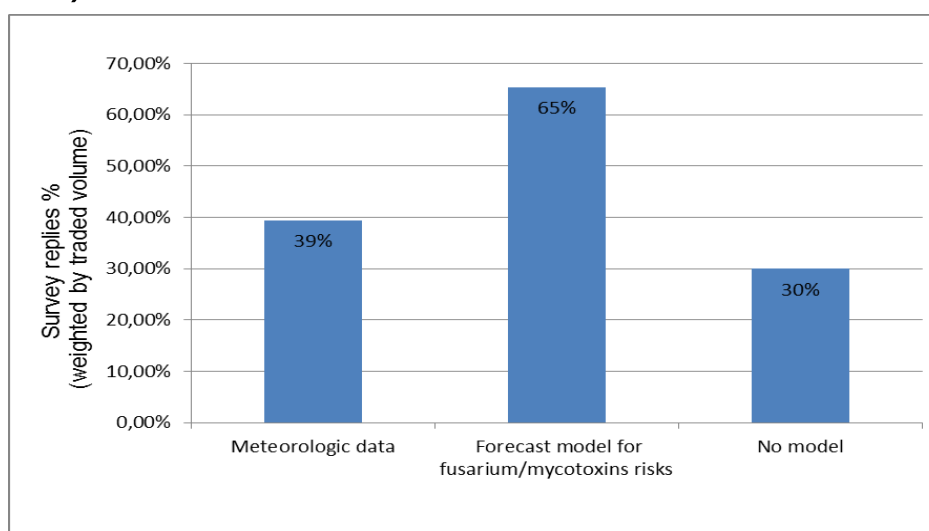
98% of agrosupply distributors do advise farmers on all the practices aimed at minimizing the risk of mycotoxins development on cropland while the other respondents present the advices on Mycotoxins' management as a part of an overall advice. This is a key responsibility that COCERAL members take so to contribute to the management of mycotoxins in field.

1.2 How do you limit field mycotoxins risks? (multiple answers possible)



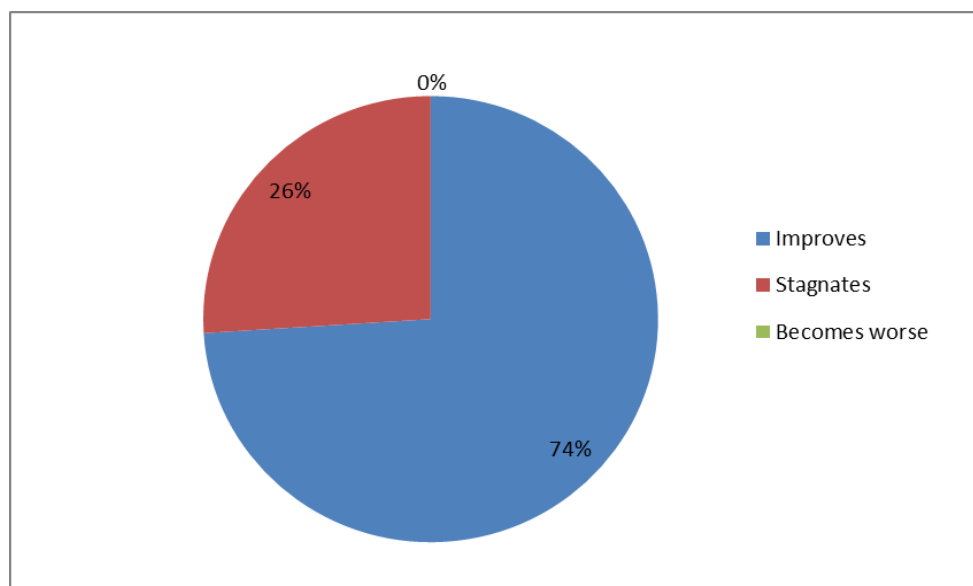
The survey replies are indicating that almost all the participants to the survey recommend *Fusarium* resistant seeds and adapted fungicide treatments to farmers. Therefore, the agrosupply distributors encourage the seed and pesticide industry to improve the exchange of information concerning seed varieties and pesticide treatments developed for preventing mycotoxins risks in field. For instance, the knowledge on the resistance characteristics of seed varieties to *fusariosis* is very important information that agrosupply distributors can pass on to the farmers. When prevention is such a crucial step as in the mycotoxins issue, collaboration between the agricultural input producers, agrosupply distributors and farmers becomes imperative.

1.3 When advising the farmers, which models do you use? (multiple answers possible)



More than a half of the agrosupply distributors that participated to the survey (65%) are relying on the forecast model for *fusarium*/mycotoxins risks when advising the farmers. The development and the accuracy of these models are to gain importance in the future. Therefore the members of the agrosupply chain are encouraging the research in this field since the research is the main source of those models.

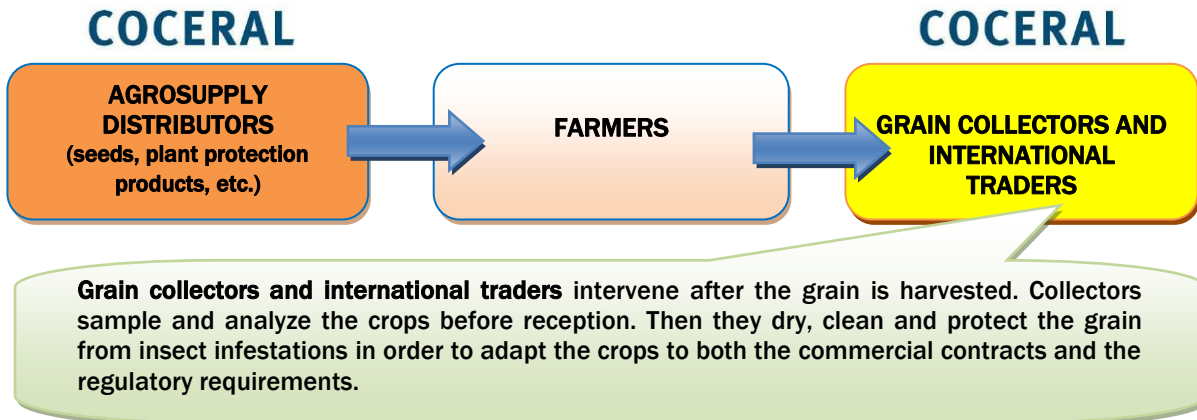
1.4 Further to the advice to farmers the mycotoxins risk management improves, stagnates or becomes worse?



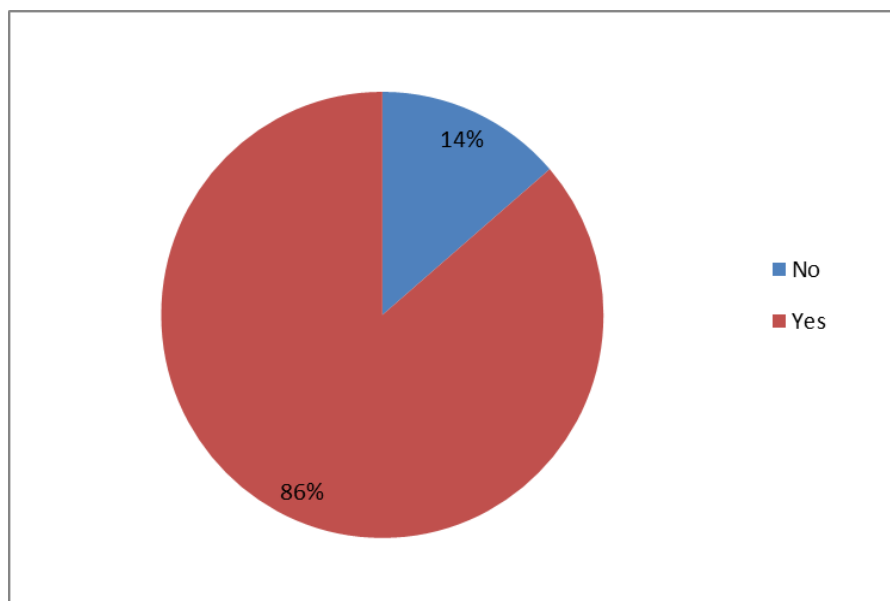
The agrosupply distributors who are advising the farmers on agricultural practices observe in a very large proportion (74%), an improvement of the mycotoxin risk management. However, the distributors are still trying to improve the situation by enhancing the collaboration between the principal actors involved and by gathering more knowledge concerning the mycotoxins and their prevention.

2 Sampling, detection and analysis

This section refers to grain collectors and international traders members of COCERAL.

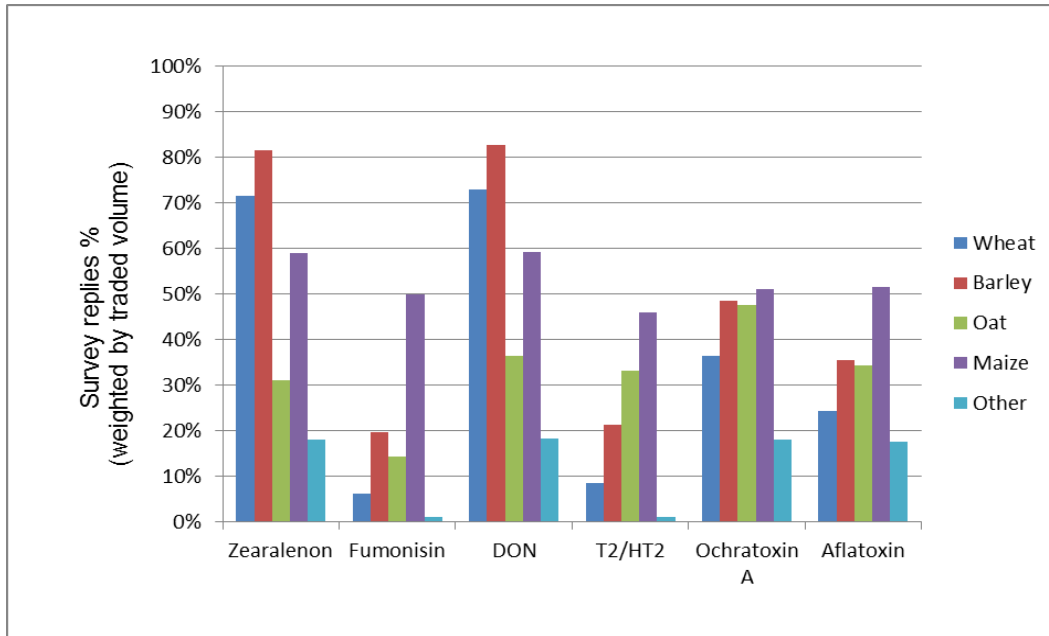


2.1 Do you sample your lots to monitor mycotoxins?



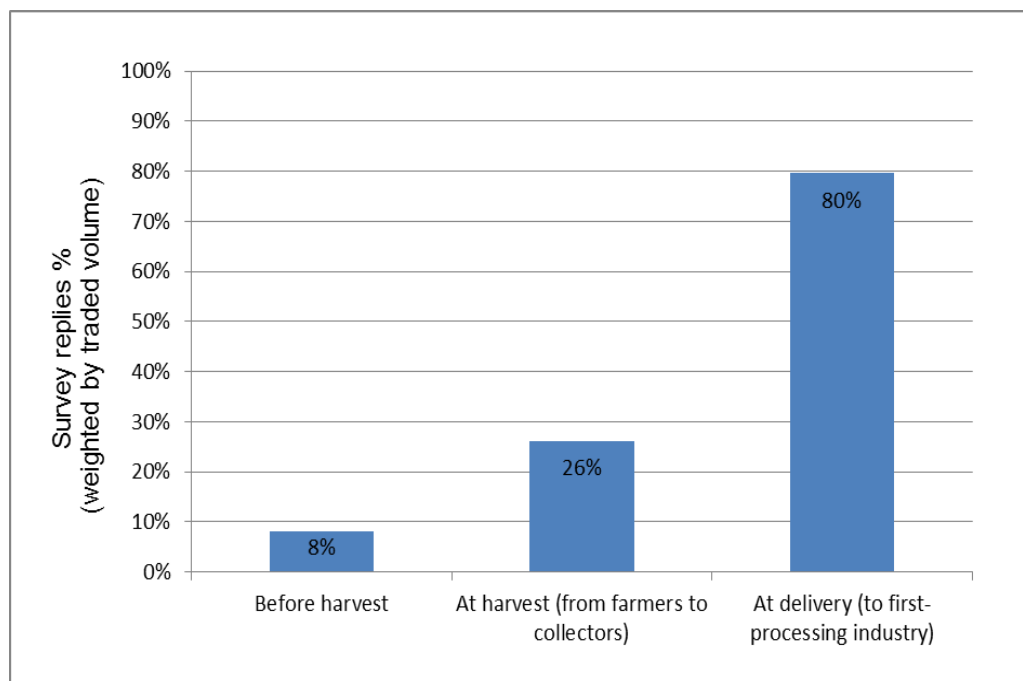
This result highlights the extent of the level of control that operators put in place for mycotoxins detection. However, it is to be mentioned that sampling happens also in other points of the supply chain.

2.1.1 If you sample your lots to monitor mycotoxins, which mycotoxin do you test for? (multiple answers possible)



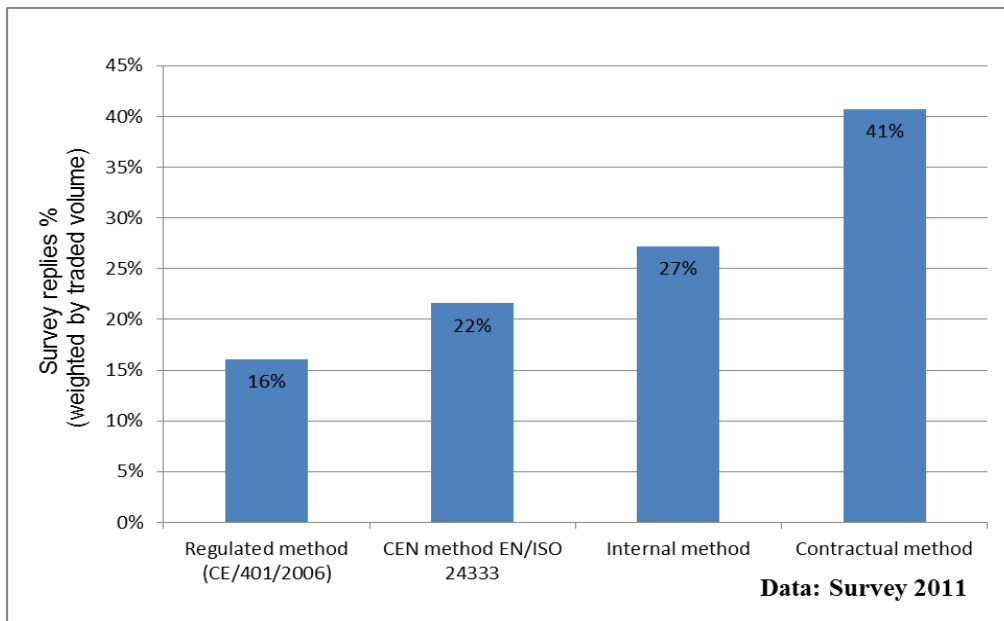
This chart indicates the frequency of analysis for each mycotoxin and by crop put in place by operators in order to monitor the presence of mycotoxins. Therefore, it can be observed that Deoxynivalenol (DON) and zearalenone are the most tested mycotoxins in barley, wheat and maize, while also analysed – in a lower percentage – in oat and other crops. Ochratoxin A is tested for in a proportion of almost 50 % in maize, barley and oats, wheat and other crops being also tested but in lower proportions. Aflatoxin A and Fumonisin are tested most in maize crops, as well as T-2andHT-2 Toxin.

2.1.2 When do you test for mycotoxins? (multiple answers possible)

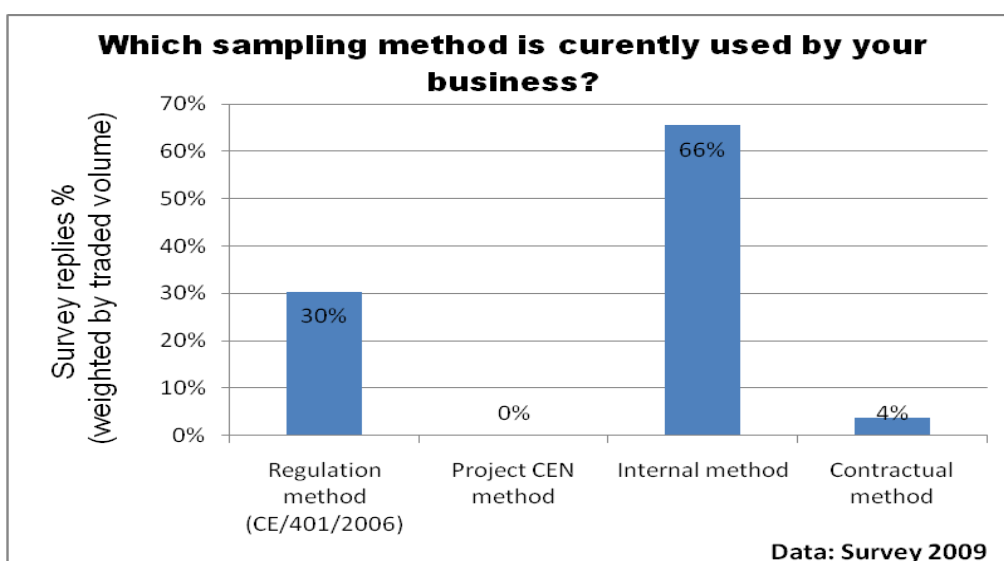


Testing may happen at more than one of the points mentioned above. Therefore it is likely that some lots are tested more than once – although more costs are involved. Traders prefer analysing between reception of goods from farmers and before delivery to the customers, using analysis.

2.2 Which sampling method is currently used by your business for the mycotoxin analysis?

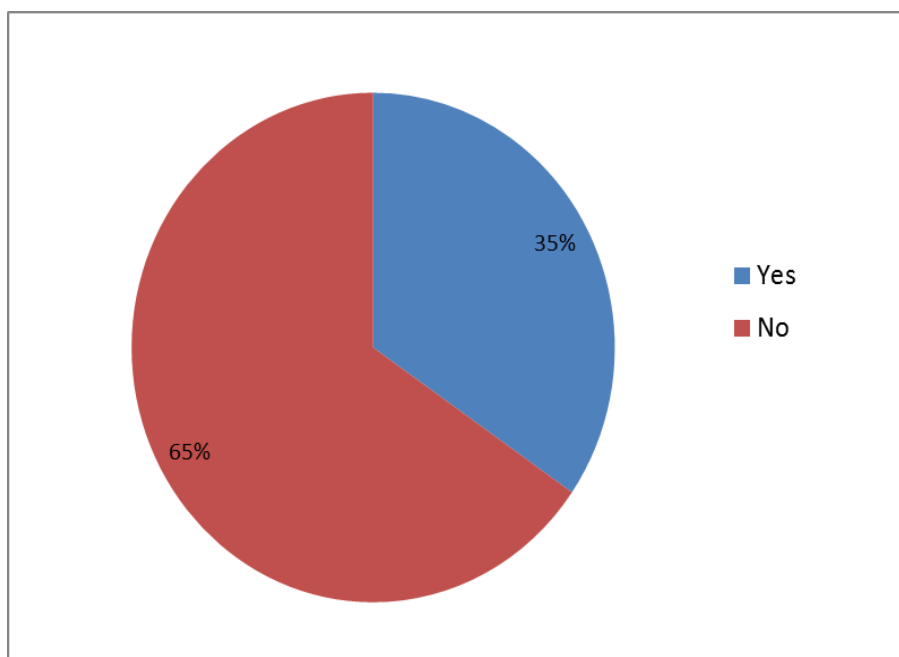


Compared to 2009 we have seen a change in the use of different methods of analysis used by operators. The recently published CEN 24333:2009 sampling standard is now becoming more used by operators: this is expected to bring more homogeneity in the process of sampling and analysis. Operators use a variety of sampling schemes in order to overcome the intrinsic difficulties of applying the official sampling plans as per Regulation 401/2006. Although industry sampling standards are as accurate and able to deliver a representative sample as the official one, this leads to disharmonised situations for sampling, which in turn is a very critical step since the risk of a wrong lot rejection due to unrepresentative samples can have large financial implications.

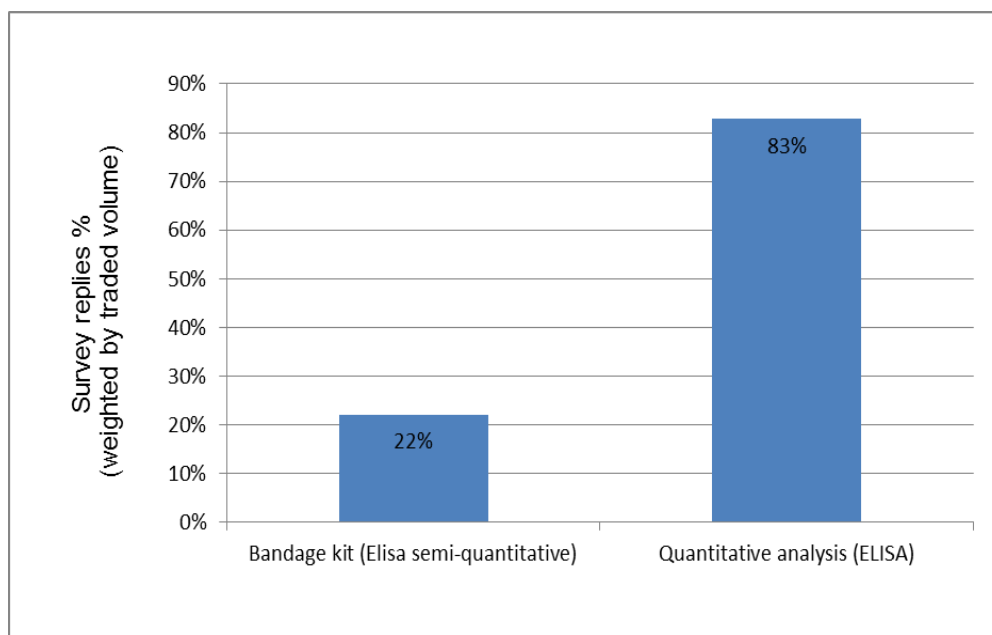


2.3 Internal analysis

2.3.1 Do you carry out mycotoxins analysis internally?

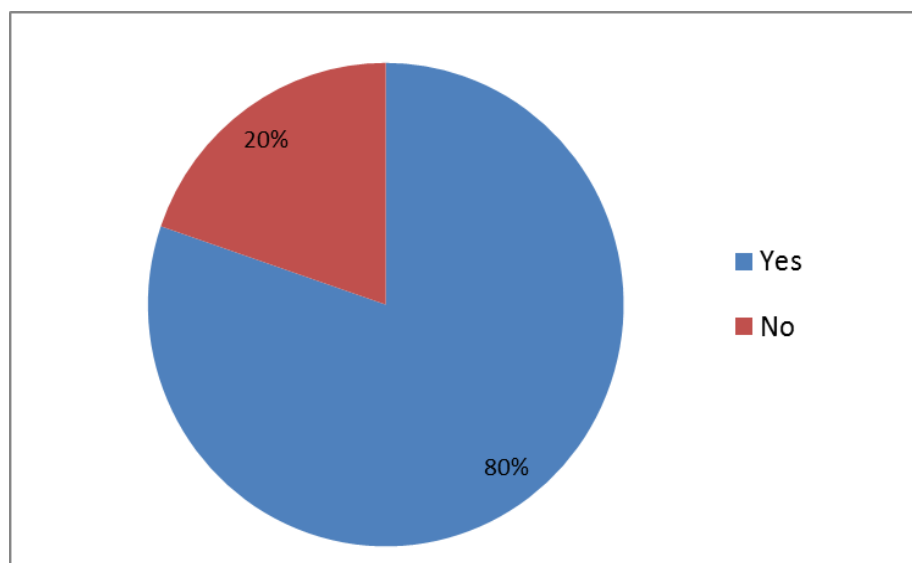


2.3.1.1 If you carry out mycotoxin analysis internally, which kind of method of analysis do you use? (multiple answers possible)



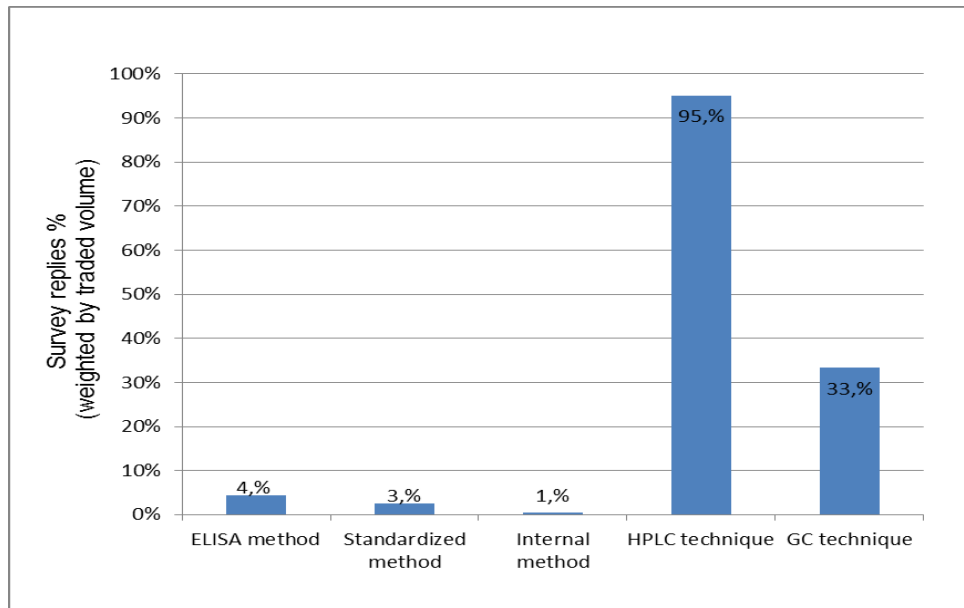
2.4 Analysis carried out externally

2.4.1 Do you carry out external analysis for the mycotoxin monitoring?



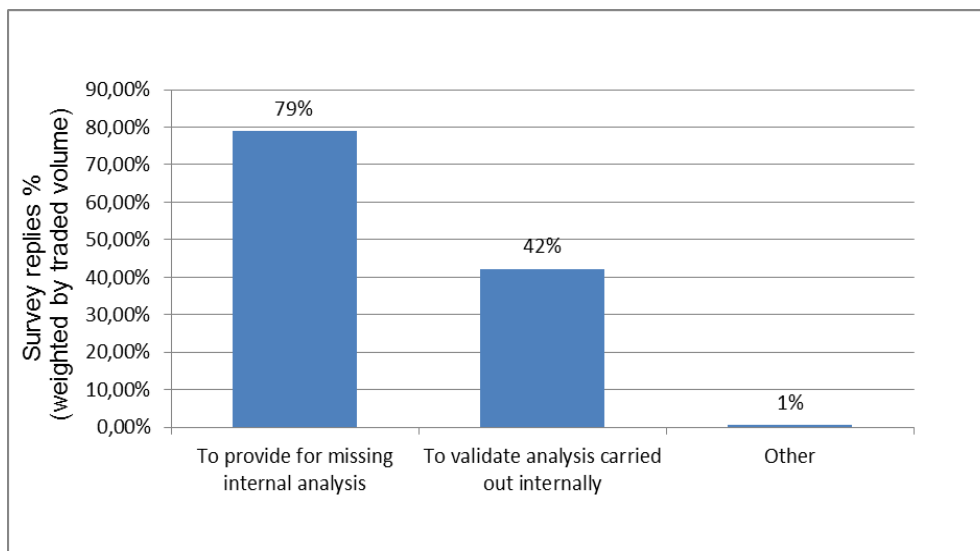
Rapid analyses are required from collectors and traders when a lot is received at a silo or warehouse and therefore rapid test to support on-site decisions of lot acceptance are frequently used. However, external analyses are also used by traders (80% of cases) to confirm the results of the rapid test kits and/or to provide for missing data (see point 2.4.1.2). Operators need reliable analysis results to decide if lots respect food and/or feed requirements.

2.4.1.1 If you carry out external analysis for the mycotoxin monitoring, what is the kind and methodology used by the lab? (multiple answers possible)

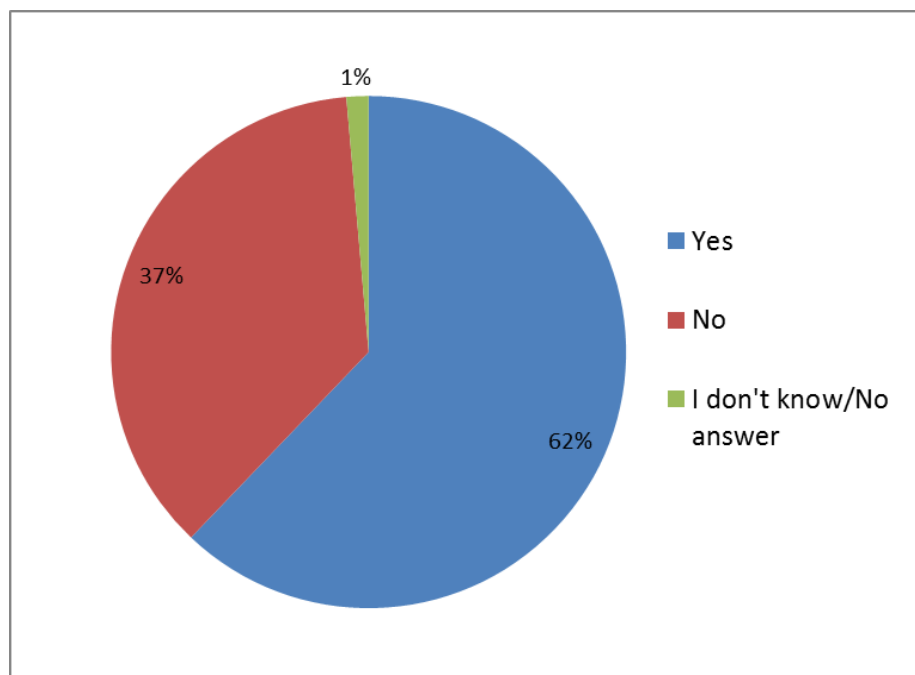


Compared to the 2007 and the 2009 surveys, the use of ELISA methodology in external labs has significantly decreased since these Elisa test kits are becoming cheaper and cheaper, thus allowing operators to use this method when performing analysis internally. This comparison also reflects the tendency that HPLC is the most used technique for external analysis.

2.4.1.2 If you carry out external analysis for the mycotoxin monitoring, what is the purpose? (multiple answers possible)



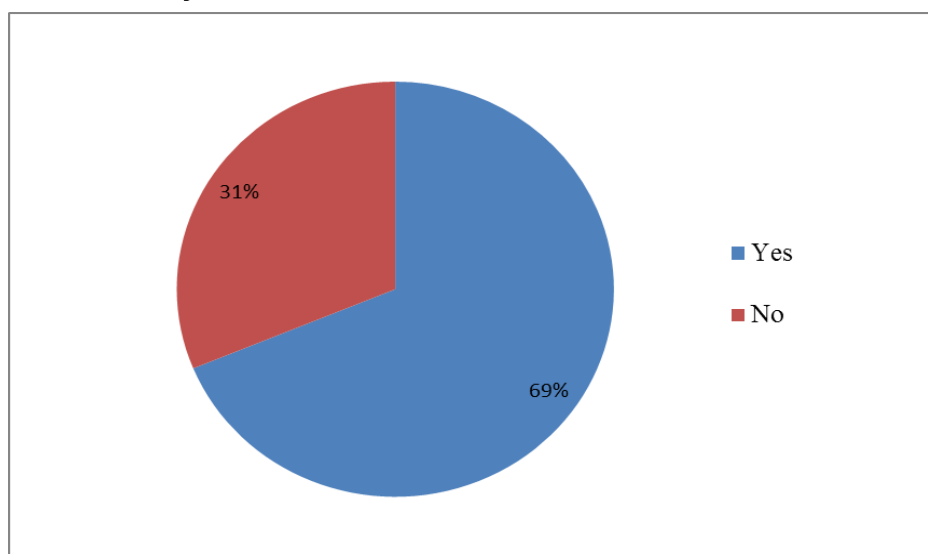
2.4.2 Is your laboratory accredited to EN17025?



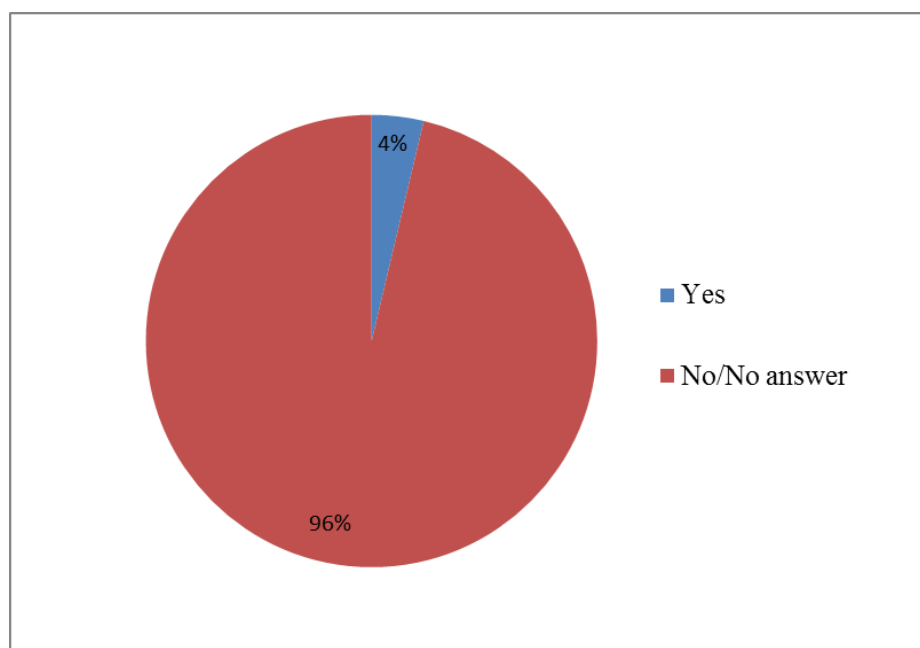
In 2007 only 15% of the laboratory were accredited EN17025. The dramatic increase in the last two years (up to almost 50%) is positive sign also thank to the fact that accredited laboratories must publish the level of uncertainty linked to the analysis they perform. This enhances the level of transparency and the comparability of analysis results.

3 Regulation enforcement and controls

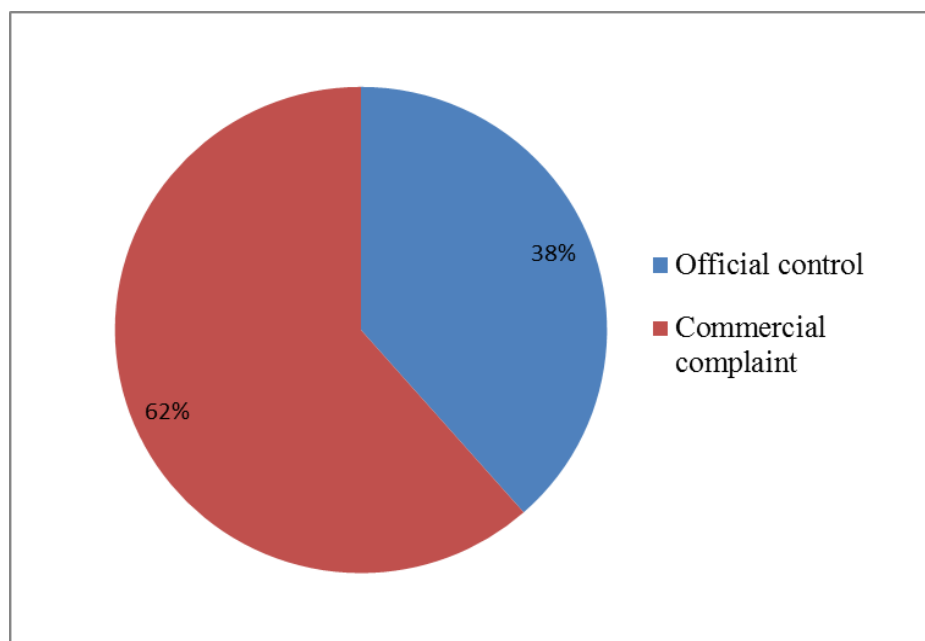
3.1 Have you been already controlled within the framework of the official regulation on mycotoxins?



3.2 Further to exceeded regulatory limits, did you have to recall a lot?



3.2.1 If you had to recall a lot, was it a consequence of an official control or of a commercial complaint?



Annex 1: QUESTIONNAIRE "MYCOTOXIN MANAGEMENT" 2011

YOUR COMPANY (several possibilities)

- Advises and sells seeds and Plant Protection Product (PPP) (see Part 1)**
↳ To how many farmers:
- Collects from farmers (see Parts 2 and 3)**
↳ Collected volume (2009/2010): tons
- Traded volumes in the EU (see Parts 2 and 3)**
↳ Volumes purchased from collectors (2009/2010): tons
- Imports grains into the EU (see Parts 2 and 3)**
↳ Imported volume (2009/2010): tons

1. PREVENTION OF FIELDS MYCOTOXINS RISKS

1.1 Do you specifically advise farmers with regard to mycotoxins?

- YES
 NO (if no, please go to part 2)

1.2 How do you limit field mycotoxins risks?

- By advising on agriculture practices (till, former crops...)
 By recommending Fusarium resistant seeds
 By recommending adapted fungicides treatments
 Other (please specify):

1.3 Do you sell the recommended seeds or fungicides?

- Yes
 No

1.4 When advising, do you use:

- Meteorologic data
 A forecast models for Fusarium or mycotoxins risk
 No model

1.4.1 If you use the Forecast Model, by who is proposed?

- Plant protection companies
 Seed breeders
 Technical institutes
 Public authorities
 No model

1.5 Further to the advice to the farmers the Mycotoxin risk management:

- Improves
- Stagnates
- Becomes worse

2 SAMPLING, DETECTION AND ANALYSIS

2.1. Do you sample your lots in order to monitor mycotoxins?

- NO: please go to part 3
- YES:

2.1.1 If Yes, which ones? Please tick the cells of the table below for each crop/toxins combination

	Wheat	Barley	Oat	Maize	Other (please specify)
Zearalenon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fumonisin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T2/HT2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ochratoxin A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aflatoxin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.2. When do you test?

- Before harvest
- At harvest (from farmers to collectors)
- At delivery (to first-processing industry)

2.3. Which sampling method is currently used by your business?

- Regulated method (EU Reg. n.401/2006 laying down the methods of sampling and analysis for the official control of the levels of mycotoxins in foodstuffs)
- CEN method EN/ISO 24333
- Internal method*
- Contractual method*

*Please, give a short description (or send a full description)

2.4 Do you carry out visual tests?

- Yes, as the only system
- Yes, as a support to rapid test systems
- No

2.5 Do you carry out analysis internally in your own company?

- Yes
 No

2.5.1 If YES, which kind of method of analysis do you use in your company?

- Bandage kit (Elisa semi-quantitative)
 Quantitative analysis (Elisa)

2.5.2 Who is/are your supplier(s)?

	Bandage kit (Elisa semi-quantitative)	Elisa (quantitative)
Charm	<input type="checkbox"/>	<input type="checkbox"/>
Neogen	<input type="checkbox"/>	<input type="checkbox"/>
R-Biopharm	<input type="checkbox"/>	<input type="checkbox"/>
Other (please indicate)	<input type="checkbox"/>	<input type="checkbox"/>

2.6 Do you carry out analysis externally?

- Yes
 No

2.6.1 If YES, what is the purpose of the external analysis?

- To provide for missing internal analysis
 To validate analysis carried out internally

2.6.2 If YES, what is the kind and methodology used by the lab?

- Elisa method
 Standardized method (please specify):
 Internal method (please specify):
 HPLC technique
 GC technique

2.7 Is your laboratory accredited EN 17025 for the mycotoxins you tested for?

- Yes
 No
 I don't know

3. REGULATION ENFORCEMENT AND CONTROLS

3.1. Have you been already controlled within the framework of the official regulation on mycotoxins?

- Yes
 No

3.2.1 If YES, by whom? (Please, indicate by which public service)

3.2. Further to exceeded regulatory limits, did you have to recall a lot?

- Yes
 No

3.3 If yes, was it a consequence of an official control or of a commercial complaint?

- Official control
 Commercial complaint

Other comments on mycotoxin management

ANNEX 2: METHOD DESIGN

- **Method design**

- The replies sent by the operators are assumed to be representative for the whole country they represent
- Each participant specified the volume of cereals traded, the total volumes mentioned representing 18% of the total volume of cereals traded in those countries

- **Calculation steps and formula**

- The reply to each question was weighted by the total contributions received for that country thus returning the country's-dependent mean reply: R_C (%)
- The volume of grains traded within each country was divided by the volume of grains traded within all the countries participating in the survey, thus obtaining W_C .
- The overall result, R (%), was obtained as the average of all member states-dependant mean (R_C) weighted by W_{MS} (weight of the member state).

$$R = \sum_{MST} R_C * W_C$$

Where R (%) = overall result

R_C = mean reply for member state (%)

$W_C = \frac{V_C}{V_{All}}$; where V_C = Volume traded in the participant country

V_{All} = Total volume of countries participating to the survey