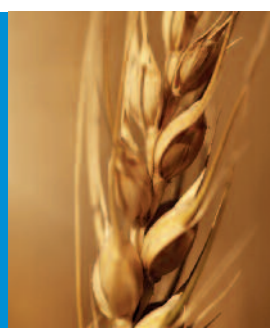
Quality Assurance. **From farm to shop.**

FEED

MONITORING-REPORT

Feed Sector | Edition 2016

Accumulation of mycotoxins Page 2



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FOCUS ON FLOWS OF GOODS ALL OVER THE WORLD

Feed samples from 80 countries evaluated

Brewers' grains from North Korea and corn from the Pitcairn Islands? For the first time an evaluation of the international flows of goods within the QS scheme awaits you in this report along with analyses of various parameters in annual comparison. Other exciting topics you will find in this issue include incidents and crises in 2015, an evaluation of agricultural self-mixes and the question whether contaminants from the raw material accumulate in the processed product. This year's Monitoring Report is based on an impressive data basis of around 2.5 million analysis results from 173,000 feed samples, an increase of 20 % over last year's report. All samples taken between April 2008 and July 2016 were included and form a meaningful data basis.

The results confirm anew that all involved operators are aware of the significance of flawless feed as the basis for safe food, and that they take quality assurance seriously. The number of exceedances among the samples drawn in 2015/2016 lies just under 1 %: the maximum permitted values were exceeded in 244 samples. As in the previous issues of the Monitoring Report, an overview of important facts and figures about contaminants is included on the enclosed poster.

We wish you interesting reading!

The editorial team looks forward to receiving queries and suggestions about the Monitoring Report at **presse@q-s.de.** ■

PART I
FLOWS OF GOODS IN THE QS SCHEME

CORN AND SOY NO. 1 IMPORTED RAW MATERIALS

The 23.7 million tonnes of compound feed produced by the German compound feed industry during the business year 2014/2015* were mainly composed of cereal. Wheat (41 %) and corn (22 %) were the most important types of cereals. As domestic cultivation could not meet the demand for corn, it was preferentially procured from South-eastern Europe, Eastern Europe and South America (chiefly Brazil). Oil expeller and meal, which on average make up around 27 % of all components used by the compound feed industry, were the second most important group of raw materials after cereals. Soy and rapeseed meal were the main protein sources here. Whereas most of the rapeseed products originate from domestic mills, soy in particular was imported. According to the estimates of the feed sector, the share of raw material imports currently lies at 10 % – similar to previous years.

In order to reduce dependency on overseas imports, great efforts are now being made to expand the cultivation of soy, in particular in climatically favourable regions of Europe. Nevertheless, they will not be able to fully meet the protein demand of the European market in the foreseeable future. Internationally dominated flows of goods in many different directions are part of the nature of the feed sector. The cooperation of QS with other standard owners in the sector allows a comparable high level of feed safety – beyond the borders of Germany and Europe. ■

PART II

We have summarised for you in a separate publication which raw materials are procured from which countries in the QS scheme, and what was detected by means of analysis. You will find the evaluation here: **www.q-s.de/press-and-newsroom/feed-monitoring-report-1.html**

*(Source: BMEL: Struktur der Mischfutterhersteller 2013-2015)

Raw materials from all over the world within the QS feed monitoring

A total of 104,405 samples of raw materials from over 80 different countries have been drawn to date in the QS scheme. A summary of the most frequently examined raw materials is listed below along with the most common countries of origin entered in the QS database:

Top 10 raw materials	number of samples
1. Corn/maize plants	22,342
2. Wheat/wheat bran	15,650
3. Barley	7,966
4. Rapeseed meal/expeller	7,282
5. Brewers' grains/yeast	5,139
6. Soybean meal	3,959
7. Rye	2,444
8. Growing crops from permanent grassland	2,116
9. Triticale	2,094
10. Vegetable oil/fat	2,074

Top 10 countries of origin	number of samples
1. Germany	81,335
2. Italy	7,821
3. Austria	3,658
4. Hungary	1,812
5. Poland	1,754
6. Ukraine	919
7. France	836
8. Brazil	584
9. Russia	527
10. Netherlands	502

Exotic origins

Some raw materials originate from exotic countries. The TOP 5 unusual places for the sector are listed here:

1. Pitcairn Islands (South Pacific): corn
2. Dominica (Caribbean): wheat
3. Republic of Congo: barley
4. North Korea: brewers' grains
5. Egypt: sugar beet molasses

Period: April 2008 to July 2016

GATE-KEEPING REGULATION – LINKED TO HIGH EXIGENCIES

The QS scheme is distinguished by a supply chain that is entirely certified across all stages. However, constantly changing markets and current harvest situations also require flexible and dynamic regulations. The Gate-Keeping Regulation integrated into the QS scheme offers a practicable solution for this situation.

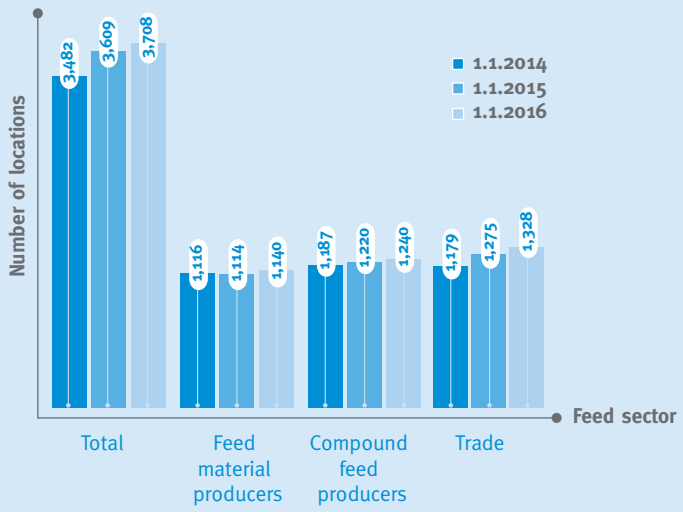
The Gate-Keeping Regulation enables feed companies to procure goods from non-certified suppliers under certain circumstances and still market them as QS products. The exigencies linked with this (e. g. additional monitoring) are significantly higher, the Gate-Keeping Regulation is only worthwhile for companies in exceptional circumstances. You can read more about the Gatekeeper Regulation at **https://www.q-s.de/documentcenter/dc-feed-sector.html**.

NUMBER OF PARTICIPANTS IN QS FEED MONITORING IS RISING

STRONGEST GROWTH IN FEED TRADE

The number of feed companies participating in the QS feed monitoring keeps on rising. Starting off from a high level, another 226 companies have been added in the last three years. The reason for this is still the increasing demand from agriculture. ■

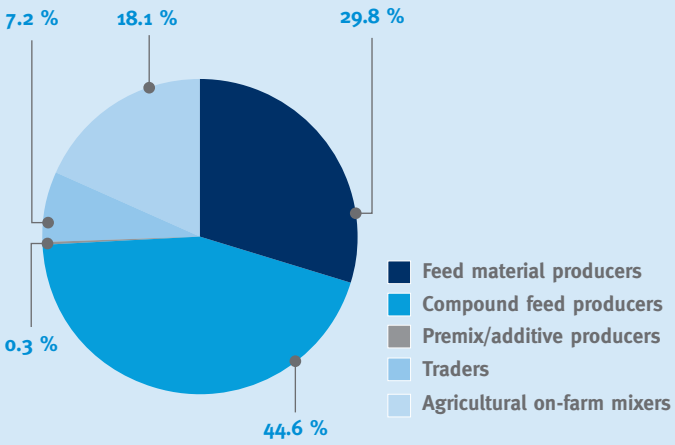
Number of participants in the QS Feed Monitoring: Growth in the last three years



SAMPLING: COMPOUND FEED PRODUCERS EXAMINE MOST OF THE SAMPLES

With a share of 44.6 % compound feed producers continue to examine most of the samples. Feed material producers accounted for 29.8 % of the samples. With 18.1 % the number of samples examined in agricultural businesses makes up the third biggest share. Traders examined 7.2 % of all samples with premix and additive producers accounting for 0.3 % of the samples. ■

Samples drown by each sector:



Status: July 2016

ACCUMULATION OF MYCOTOXINS: INCREASED RISK IN THE PROCESSED PRODUCT?

The question arises with various parameters as to whether it makes more sense to check the unprocessed agricultural primary product or the processed product (feed material). This is particularly the case of the mycotoxins, as they often accumulate in precisely those parts of the plant which are used as animal feed (e. g. husks and glumes instead of the endosperm). The evaluations of the monitoring data show how the mycotoxin levels of unprocessed primary products (wheat and corn) actually vary from those of their processed products (e. g. wheat bran or corn gluten).

Overall, mycotoxins levels are low in both primary and processed products. For primary products in 16 instances and for processed products (of corn) in two instances (DON and Aflatoxin B1) a limit value was exceeded.

Mycotoxin levels of primary products and their processed products in comparison

Wheat

Mycotoxins	No. of analyses	Detected value (in %)	Average value detected (mg/kg)	No. of excee-dances
DON	5,560	49.8 %	1.8	1
ZEA	4,942	14.7 %	0.1	0
Aflatoxin B1	1,617	0.7 %	0.001	0
Total	**12,119**	**26.0 %**	–	**1**

Processed wheat products

Mycotoxins	No. of analyses	Detected value (in %)	Average value detected (mg/kg)	No. of excee-dances
DON	2,899	72.4 %	2.2	0
ZEA	2,668	32.2 %	0.08	0
Aflatoxin B1	597	0.8 %	0.001	0
Total	**6,164**	**45.2 %**	–	**0**

Corn

Mycotoxins	No. of analyses	Detected value (in %)	Average value detected (mg/kg)	No. of excee-dances
DON	4,852	74.7 %	1.3	6
ZEA	4,607	69.9 %	1.1	6
Aflatoxin B1	12,493	11.2 %	0.003	3
Total	**21,952**	**36.8 %**	–	**15**

Processed corn products

Mycotoxins	No. of analyses	Detected value (in %)	Average value detected (mg/kg)	No. of excee-dances
DON	405	84.7 %	1.7	1
ZEA	343	81.0 %	0.8	0
Aflatoxin B1	763	22.8 %	0.003	1
Total	**1,511**	**51.8 %**	–	**2**

Period: April 2008 to July 2016

The evaluations for **DON** show that the average measured value in the processed product is higher than in the unprocessed product. An upwards trend is observed in the case of this mycotoxin. The opposite occurs to the mycotoxin **ZEA**, where the mean value is lower in the processed product than in the unprocessed product. According to the results, the mean values for **Aflatoxin B1** do not vary in the raw and processed products.

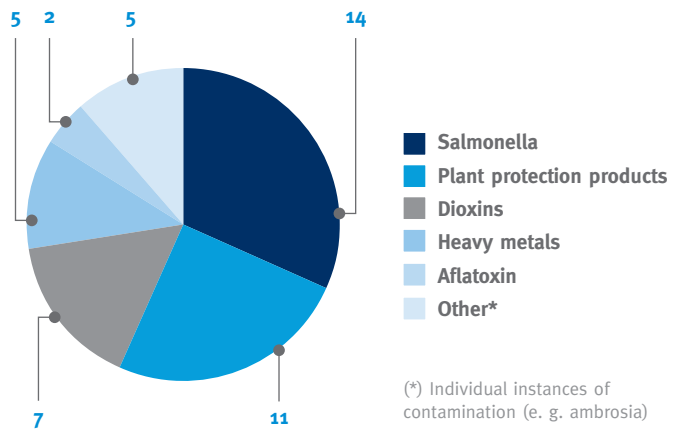
It can be seen that the levels in raw and processed products vary depending on the mycotoxins and should be analysed accordingly. The results of each individual supplier evaluation, possible preexaminations and the origin of the goods should also be taken into consideration when deciding on whether to make raw material or final product checks. It is also essential to observe during the decision the aspect of attempting not to process any contaminated batches in the factory, if possible. ■

INCIDENT AND CRISIS MANAGEMENT TAKING HOLD

Crisis management does not only mean deflecting damage from one's own company, but also protecting everyone involved in the supply chain. Even though quality assurance is the best form of crisis prevention, incidents and even crises can still occur. In the QS incident and crisis management every case is meticulously investigated. The QS crisis team clarifies the facts of the matter and offers assistance to the affected scheme participant.

A total of 83 notifications were processed in the incident and crisis management system of the QS scheme in 2015. These were submitted to the QS head office by scheme participants, third parties and the media. 44 cases concerned the feed sector. All incidents could be classified as routine cases and were immediately rectified. Occurrences which pose no risk to humans, animals or the environment, because for example the goods were immediatly blocked and not fed, are defined as routine cases in the QS scheme. ■

Incidents and Crises in the Feed Sector 2015



(*) Individual instances of contamination (e. g. ambrosia)

COMPLIANCE OFFICER

YOUR MESSAGE – BOUND TO CONFIDENTIALITY

Within the QS scheme trust in the performance and reliability of everyone involved is lived. Decisive for this is the knowledge and commitment of the companies, employees, auditors or laboratories, who put the QS scheme into practice.

However, this does not entirely prevent events and incidents. When irregularities occur, rapid clarification and correction are our top priority. If you are aware of any nonconformities, you can contact QS at any time (e.g. via the paper of incident at **https://www.q-s.de/documentcenter/dc-paper-incident.html** or crisis telephone number **+49 (0) 228 35068-288**). You can also anonymously contact our Compliance Officer without the need to provide your personal details. He will treat your information with confidentiality and investigate the situation. You will find the contact form sheet designed for this purpose at **https://www.q-s.de/qs-company/anonymous-contact-form.html**.

AGRICULTURAL ON-FARM MIXERS

DIFFERENT PARAMETERS ARE NOTICEABLE

Not only feed producers and traders participate at the QS scheme. Agricultural companies which produce their feed mixes by themselves (agricultural on-farm mixers) also participate. The number of analyses is defined according to the quantity of feed produced. In contrast to the feed companies, the complete QS feed monitoring including planning and sampling at the agricultural companies is organised by the respective coordinator.

In this report, we show the evaluations of the agricultural cattle and pig farming businesses subdivided by the type of self-mix and with the corresponding exceedances of parameters. This data can be used for the risk assessment of the companies. The quality of the self-produced feed is good. In relation to the total number of analyses for the presented parameters, there were very few abnormalities. ■

Results and abnormalities

Pig fattening feed

Parameter	Number of analyses	Value detecded (number)	Value detected (percentage)	Number of excee-dances
DON	704	266	37.8 %	14
ZEA	461	162	35.1 %	1
Aflatoxin B1	24	0	0.0 %	
Dioxins	221	195	88.2 %	
dl PCBs	123	98	79.7 %	
ndl PCBs	104	28	26.9 %	
Arsenic	311	80	25.7 %	
Lead	314	174	55.4 %	
Cadmium	314	223	71.0 %	
Mercury	311	14	4.5 %	
Salmonella	1,573	6	0.4 %	6
Pesticides	7,242	47	0.6 %	
Antibiotic active substances	1,086	17	1.6 %	17
Animal components	52	0	0.0 %	
Total	**12,840**	**1,310**	**10.2 %**	**38**

Cattle fattening feed

Parameter	Number of analyses	Value detecded (number)	Value detected (percentage)	Number of excee-dances
DON	178	97	54.5 %	
ZEA	171	71	41.5 %	1
Aflatoxin B1	272	23	8.5 %	
Dioxins	72	66	91.7 %	
dl PCBs	50	41	82.0 %	
ndl PCBs	36	22	61.1 %	
Arsenic	131	29	22.1 %	
Lead	131	78	59.5 %	
Cadmium	131	103	78.6 %	
Mercury	131	11	8.4 %	
Salmonella	132	1	0.8 %	1
Pesticides	2,603	17	0.7 %	
Antibiotic active substances	890	3	0.3 %	3
Animal components	694	0	0.0 %	
Total	**5,622**	**562**	**10.0 %**	**5**

Sow feed

Parameter	Number of analyses	Value detecded (number)	Value detected (percentage)	Number of excee-dances
DON	228	86	37.7 %	1
ZEA	162	56	34.6 %	
Dioxins	28	26	92.9 %	
dl PCBs	28	24	85.7 %	
ndl PCBs	17	9	52.9 %	
Arsenic	99	42	42.4 %	
Lead	99	65	65.7 %	
Cadmium	99	84	84.8 %	
Mercury	99	1	1.0 %	
Salmonella	397	0	0.0 %	
Pesticides	1,337	9	0.7 %	
Antibiotic active substances	155	2	1.3 %	2
Animal components	16	0	0.0 %	
Total	**2,764**	**404**	**14.6 %**	**3**

Dairy cattle feed

Parameter	Number of analyses	Value detecded (number)	Value detected (percentage)	Number of excee-dances
DON	93	54	58.1 %	
ZEA	87	40	46.0 %	
Aflatoxin B1	183	14	7.7 %	1
Dioxins	33	32	97.0 %	
dl PCBs	28	17	60.7 %	
ndl PCBs	17	7	41.2 %	
Arsenic	108	64	59.3 %	
Lead	108	76	70.4 %	
Cadmium	108	98	90.7 %	
Mercury	108	18	16.7 %	
Salmonella	50	1	2.0 %	1
Pesticides	1,959	2	0.1 %	
Antibiotic active substances	348	1	0.3 %	1
Animal components	382	0	0.0 %	
Total	**3,612**	**424**	**11.7 %**	**3**

Piglet feed

Parameter	Number of analyses	Value detecded (number)	Value detected (percentage)	Number of excee-dances
DON	118	48	40.7 %	2
ZEA	95	41	43.2 %	
Dioxins	19	14	73.7 %	
dl PCBs	13	11	84.6 %	
Arsenic	41	14	34.1 %	
Lead	41	24	58.5 %	
Cadmium	41	34	82.9 %	
Mercury	41	1	2.4 %	
Salmonella	230	0	0.0 %	
Pesticides	849	8	0.9 %	
Antibiotic active substances	93	2	2.2 %	2
Animal components	18	0	0.0 %	
Total	**1,599**	**197**	**12.3 %**	**4**

Period: April 2008 to July 2016

Number of livestock owners who participate in the monitoring

Livestock owners	Number of participants	Share in live-stock owners in total
Cattle farmers	32,010	94.7%
Pig farmers	19,133	50.4%
Poultry farmers	1,905	36.7%
Total	**53,048**	–

Status: July 2016

ABNORMALITIES IN DETAIL:

Self-mixes of the cattle and pig farming companies had multiple abnormalities with regard to Antibiotic active substances: overall, there were 25 positive findings (thereof 17 in pig fattening), the majority of which involved the carry-over of medicine treated feed found in trough samples.

The data also show that a high background contamination with dioxins and cadmium exist. The term “background contamination” is used when the detected percentage of an undesired substance is very high in relation to the number of analyses (› 70 %). There can be many different reasons for this, but are mostly caused by the natural occurrence of several heavy metals and dioxins in the soil. Attention should be paid on these parameters in particular, as permanent contamination can also lead quickly to the exceedance of limit values.

With the exception of sow and piglet-farming companies, Salmonella was detected at least once in the various feed. Exceedances of the parameter DON are also noticeable, with the most exceedances being detected in the self-mixes of pig production companies (14 samples; piglet self-mix: 2 samples, sow self-mix: 1 sample). In addition to this, the maximum level for Aflatoxin B1 was exceeded once in a self-mix for dairy cattle and the guidance value for ZEA in pig fattening and calf feed. ■

BREWER’S YEAST – THE CLASSIFICATION IS DECISIVE

Brewer’s yeast may only be marketed and fed as a QS feed material once the living cells have been mortified, because only yeast products with mortified cultures comply with the requirements of the positive list (**https://www.q-s.de/documentcenter/dc-feed-sector.html**). Although brewer’s yeasts with living yeast cultures are not permitted as feed materials in the QS scheme, the use of products with living yeast cultures which are registered as feed additives is allowed. ■

PARAMETERS IN ANNUAL COMPARISON: SALMONELLA CONTAMINATION ON THE RISE

Every feed company makes efforts and is also obliged by EU legislation, to minimise the introduction of undesired substances. To support this measures, we have evaluated in what direction the trend among the individual parameters is leading. Where is contamination on the decline and where could it be possibly rising? The following table gives information on selected undesired substances.

Trends among parameters in an annual comparison

Parameter	2013 Number of analyses	2013 Value detected (percentage)	2014 Number of analyses	2014 Value detected (percentage)	2015 Number of analyses	2015 Value detected (percentage)	Trend
Dioxins	4,554	84.9 %	4,738	84.9 %	4,579	87.5 %	↗
dl PCBs	4,379	79.5 %	4,520	82.1 %	4,387	85.8 %	↗
Sum of dioxins and dl PCBs	2,269	80.4 %	2,160	86.3 %	1,993	89.8 %	↗
ndl PCBs	3,654	63.3 %	3,851	62.4 %	3,852	65.1 %	↗
Arsenic	5,673	31.0 %	5,858	33.9 %	5,841	31.3 %	→
Lead	5,803	41.7 %	5,976	45.0 %	5,924	46.2 %	↗
Cadmium	5,804	62.2 %	5,978	64.0 %	5,924	63.5 %	→
Mercury	5,672	11.7 %	5,871	9.6 %	5,851	6.1 %	↘
Salmonella	9,910	0.09 %	10,010	0.08 %	10,405	0.13 %	↗
Antibiotic active substances	946	1.3 %	979	0.4 %	906	0.2 %	↘
Pirimiphos-methyl (Pesticide)	4,737	15.1 %	4,831	11.2 %	4,844	12.1 %	→
Chlorpirifos-methyl (Pesticide)	4,737	2.8 %	4,832	2.6 %	4,845	2.7 %	→

Period: 1st January 2013 – 31st December 2015

An increase can be recognised in **Dioxin analysis** (Dioxins, dl PCBs, ndl PCBs) over the last three years. With regard to the 2015 analyses, a value was determined more frequently for the listed parameters than in the previous years. A heterogeneous trend can be observed in the case of the heavy metals: **Arsenic** and **Cadmium** were each detected with consistent frequency in the samples, whereas a decreasing tendency could be seen for **Mercury** and an increasing tendency for **Lead**.

As in the previous years, an increase in **Salmonella** detections can be perceived in 2015. Contrary to this, there has been a pleasing decline in the number of positive findings of **Antibiotic active substances**.

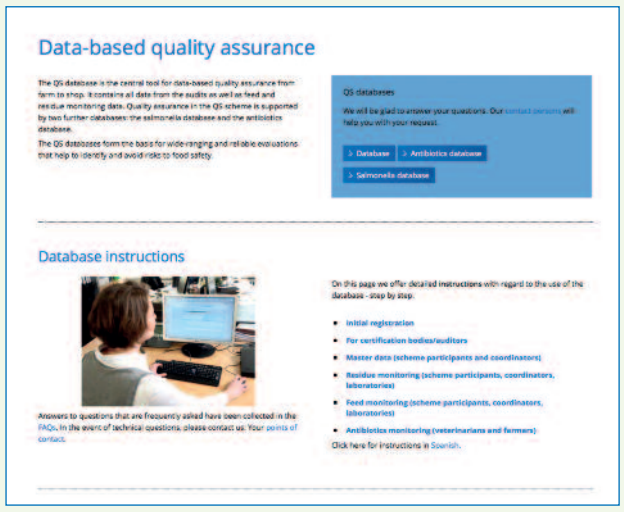
As active substances in plant protection products **Pirimiphos-methyl** and **Chlorpirifos-methyl** are listed here because their residues are most frequently determined. The percentages of residues have remained at roughly the same level in recent years. ■

OUTLOOK 2017: AD-HOC PLAN RENAMED “ADDITIONAL CONTROL PLAN FOR AFLATOXIN B1”

The previous Ad-hoc monitoring plan will be included in the next revision on 01.01.2017 as an annex of the Guideline Feed Monitoring. It will also be renamed “Additional Control Plan for Aflatoxin B1”.

An Ad-hoc plan allows to respond spontaneously, at short notice and for a limited period to certain occurrences. The Additional Control Plan for Aflatoxin B1 will be integrated as a permanent instrument due to the persistent aflatoxin contamination in corn and corn products. In addition to the usual sampling within the scope of QS feed monitoring, additional analyses must therefore continue to be commissioned.

OUR SERVICE: SUPPORT AREA OF THE QS DATABASE



You will find the instructions for the QS database under the following link, where you can also read all about the essentials of entering feed monitoring data, such as explanations on the creation of sample-related data and commissioning the laboratory: **https://www.q-s.de/qs-scheme/scheme-participant-database.html**

CSV UPLOAD FACILITATES THE ENTRY OF SAMPLE-RELATED DATA AND ANALYSIS RESULTS

A large number of samples can be entered into the QS software platform all at once with the help of the csv upload, thus saving a lot of time. The use of this upload function is worthwhile starting from approx. 20 data records. One illustrative guide, which describes in detail how the format template should be filled properly, serve you as an aid.

Laboratories can also benefit from the upload function, as they also enter large amounts of analysis results into the QS software platform and can save a huge amount of time using the format template.

You will find more information on this under the following link along with the format template and instructions on how to use it: **https://www.q-s.de/qs-scheme/scheme-participant-database.html**

THE EDITOR: WHO IS QS?

QS has been ensuring food safety since 2001 – from the farm to the shop counter. 95 percent of the pork and poultry meat from German production today comes from QS-certified businesses and the equivalent figure is roughly 70 percent for beef. Approximately 77,000 livestock farmers participate directly in the QS scheme and 10,900 livestock farmers participate by using mutual recognitions with other standard owners. The joint objective is consistent self-assessments and comprehensive assurance of processes and origins. Producers of fresh fruit vegetables and potatoes are also involved. Within the QS scheme, they produce safe foods in line with clearly defined criteria with the support of all upstream and downstream stages of the process.

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QS. Ihr Prüfsystem für Lebensmittel.

As of September 2016