



GMO - ANALYTICS FOR ANIMAL FEED

Detection of genetically modified crops

When discussing genetically modified organisms (GMOs), it is usually crops that are being referred to. The AGROLAB GROUP and its laboratory, AGROLAB LUFA GmbH, in Kiel uses highly sensitive verification procedures based on real-time PCR technology (PCR = Polymerase Chain Reaction), which can reliably, accurately and inexpensively measure GMO contamination in your feed. LUFA – as a traditional animal feed institute – has many years of experience in GMO analytics.

CULTIVATION OF GENETICALLY MODIFIED CROPS

Genetically modified crops (GM crops) have been cultivated commercially since 1996. Since then, this method of cultivation has grown to cover over 12% of global arable land. The main areas of cultivation are in North America (USA, Canada), South America (Brazil, Argentina) and Asia (India, Pakistan). In the EU (with the exception of Germany, France, Greece, Luxembourg, Austria, Poland, Bulgaria and Hungary) only the cultivation of genetically modified MON810 corn is allowed.*

However, many other GM crops are imported into the EU and placed on the market. The main genetically modified plants, which are also used in animal feed, include soybeans, corn and rapeseed. Even if the feed you use is not primarily made up of or does not contain GM crops, they may still contaminate your feed because of carryover or botanical impurities in the production chain. Information about the legal situation regarding GMOs in animal feed and about the labelling requirement can be found on our homepage or in the following product information "Legal requirements regarding GMOs in feed".

HOW ARE GENETICALLY MODIFIED CROPS DETECTED IN FEED?

Real-time PCR methods are used to detect genetically modified crops – this is a DNA-based detection method.

There are various strategies that can be used to obtain a well-founded and meaningful result. Our customer service team will be happy to discuss these strategies with you in person upon request.

The following procedures have proven to be effective in the detection of genetically modified crops in feeds:

- 1 Screening
- 2 Identification
- 3 Quantification

* <https://www.keine-gentechnik.de/dossiers/anbaustatistiken/#gsc.tab=0>

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What is a genetically modified organism?

With a genetically modified organism (GMO), specific foreign (or native) genes that give the organism certain properties (e.g. herbicide resistance with crops) are introduced into the organisms' genome.

In addition to the relevant genes (e.g. herbicide resistance gene), certain regulatory DNA sequences (e.g. promoters, terminators) must also be stably integrated into the genome of the target crop in order to guarantee their functionality. Often the same regulatory sequence is used in a variety of different genetically modified organisms.



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1 Screening: Detection of regulator sequences / genetic elements

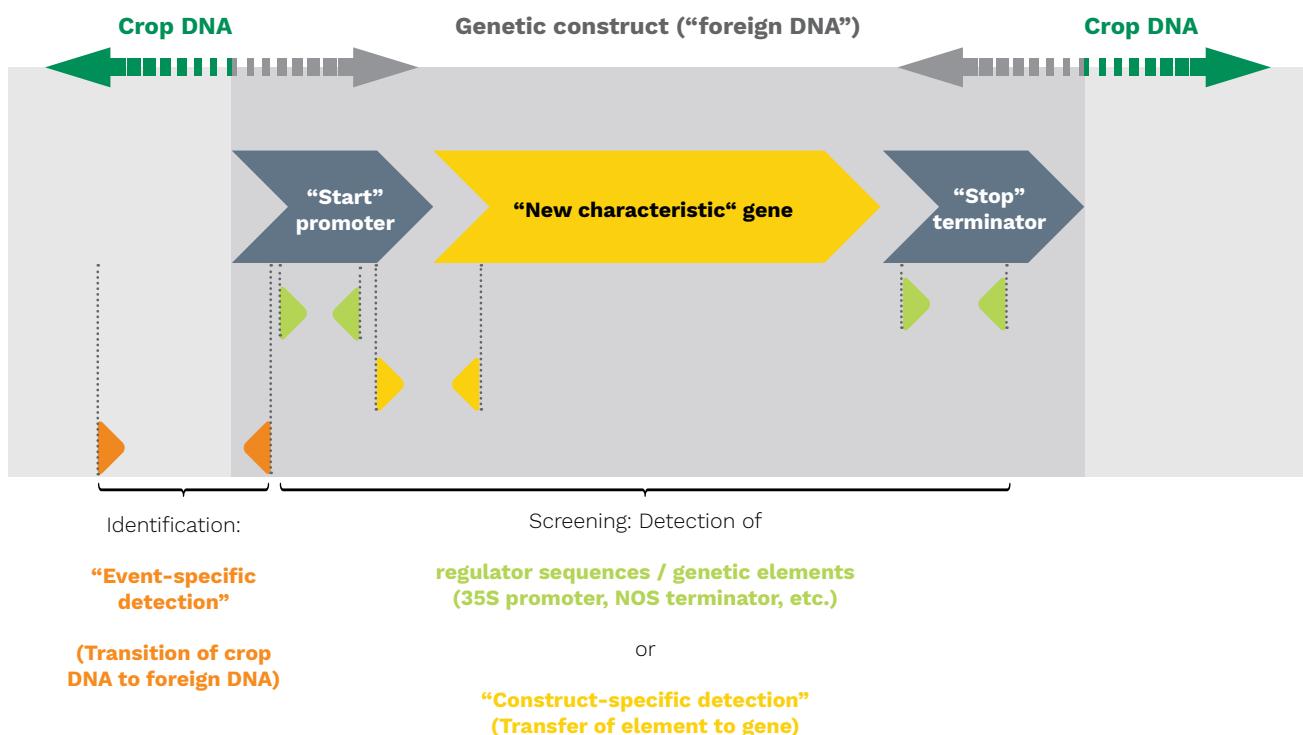
During the screening, a feed sample will first be checked for any GMO components. GM crops that are allowed in the EU and GM crops that are cultivated around the world contain similar regulators. As the same sequences are often used in different genetically modified crops, a positive screening result indicates that there has been a genetic modification, although the corresponding GM crop cannot be precisely identified.

2 Identification: Detection of types of GMO (GMO events)

In order to detect a genetically modified crop variety, a so-called transformation event (GMO event), the transition zone between the introduced gene construct (foreign DNA) and the crop's native DNA must be detected. These gene segments are individual and allow for an immediate, definite identification of the GM crop. This detection is required if the previous screening result was positive but the type of crop is unclear. If the type can be identified relatively easily with the screening signals obtained, the quantification can be started immediately (see step 3).

3 Quantification: Determination of the quantity share of the previously identified GMO events

With GMO types that are allowed in the EU, a content determination (quantification) of the GM crops identified in the feed may be necessary due to the labelling requirement. With types not allowed in the EU, e.g. BT63 Rice and CDC Triffid Flax, just an identification is sufficient as there is zero tolerance for these types of GMO. With a quantification, the determination of the type of GMO is done in relation to the content of the crop type that the GMO comes from. If the type of crop is not an ingredient in the product (which then means that it has been introduced through a carryover / impurity), the content of the carryover can be quantitatively determined and the content of the type of GMO, with regard to the entire sample, can be calculated.



WILL I BE INFORMED IF THE RESULT FROM THE SCREENING IS POSITIVE?

General

If there are no special requirements applicable to the analysis of your samples (standards from quality assurance systems), your customer advisor will contact you if the findings from a screening are positive and will closely coordinate further analyses with you.

Analytics for VLOG / GMP + (or equivalent standards)

The procedure, including the necessary subsequent analyses after a positive screening result, is described more precisely in the VLOG Standard / GMP + Standard (or equivalent standards). Consequently, our customer advisors arrange all necessary subsequent analyses following a positive screening result automatically and without further consultation: Identification and / or quantification of the stipulated GM crops. These subsequent analyses are costly and can be significantly more expensive than the commissioned screening package. You can request an overview of the VLOG / GMP+ guidelines in the form of a flow chart from your sales representative.

HOW CAN I COMMISSION AGROLAB TO PERFORM A GMO ANALYSIS?

You can download the corresponding order form, which contains a detailed list of our analysis packages, from our website (www.agrolab.de) by going to the Downloads section in the Service area.

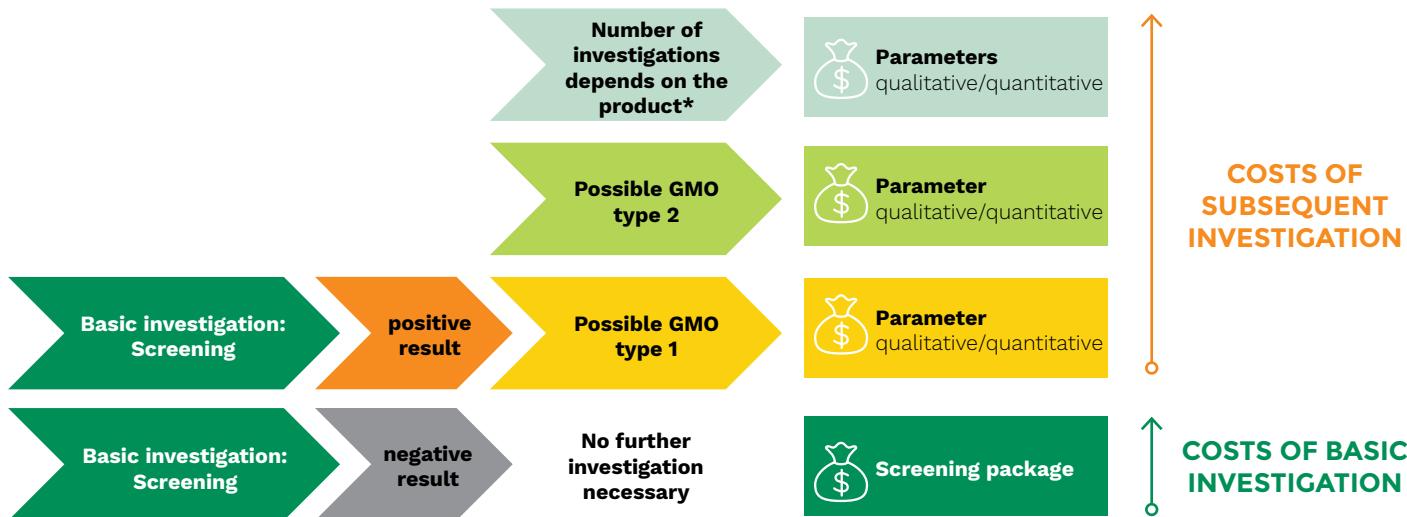
Should you be unclear about anything, e.g. procedure in the laboratory, or have any questions about the legal situation regarding your order, please don't hesitate to get in touch with our customer care experts.

WHAT DO I NEED TO BEAR IN MIND WHEN SENDING IN A SAMPLE?

An efficient GMO analytics and evaluation is dependent on many different factors (e.g. type and composition of the sample, customer's production methods, etc.). The more information about your feed that you can provide the laboratory with, the easier it will be to identify the GMO type if the screening result comes back positive. With mixed feeds, it's particularly essential that you attach information about the composition of the sample (delivery note / declaration). If possible, each type of feed that is included in the mixed feed should be sent in an individual sample.

WHAT COSTS CAN I EXPECT?

Past investigations have shown that there are traces of GMO in feed in many cases. As such, a simple screening is not enough and the source / extent of the GMO contamination must be determined. The costs arising from this will be added to the costs for the screening. Please use the information about prices provided by your sales representative to find the price of the recommended screening package, as well as for any subsequent analyses that may be required (type-specific individual parameters).



* The laboratory shall endeavour to keep the scope of the investigation, and therefore the associated costs for you, as low as possible.

The number of possible subsequent investigations can vary widely.

With analyses in line with VLOG / GMP+ standards, etc. the GMO types that need to be investigated in each screening result are stated beforehand and the results are then analysed and calculated by the laboratory correspondingly!