

## Supply of non-GM feed in consumer-driven animal production chains

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### Abstract

We studied the economic effects, the risks and the practical bottlenecks of the supply of non-GM feed for animal production in 4 different scenarios. To this purpose, we formed a project team with experts on plant sciences, genetic modification, analytical techniques, animal nutrition, chain management, and agro-economics. Design and progress of the project was evaluated with stakeholders in policy making, consumer organisations and feed and food producers. The scenarios were production of organic feed, and of feed with threshold levels of unintended GMO content at < 0.9%, <0.5% and 0.0%, respectively. Results were compared to those of conventional feed manufacture. The estimated extra costs per metric tonne of raw material ranged from €36 (<0.9% GM) to €2.50 (almost 0.0% GM and organic), adding 41-92% to the market value of maize (€95.40/metric tonne). The global increase of cultivation of GM crops that are not yet approved in the EU was considered to be a major risk in all scenarios, including that of conventional feed manufacture. In all non-GMO scenarios, unintentional mixing with GM materials during cultivation, transport and processing is an important risk. For crop production aiming at 0% GMO (including organic farming), insufficient protection of the crop against dispersion of seeds and pollen may add to these risks. In all scenarios, practical bottlenecks included: 1) the availability of appropriate sampling strategies and adequate techniques for detection and analysis of GMOs; 2) uncertainties with regard to liability in case of contamination of non-GM feed; and 3) implementation of standards. These issues have to be solved in national implementation programmes, but also require international consensus and further interactive and interdisciplinary research.

### Introduction

Food products derived from animals kept on rations containing genetically modified (GM) crops, are not considered GM under the European Regulation for GM Foods and Feed (EC 1829/2003) and, therefore, do not require labelling. However, consumers may demand products from animals raised and maintained on non-GM feed. Examples are found in organic production chains (EEC 2092/1991), and in some conventional production chains for consumers in NW-Europe, especially the UK, Norway and Germany (van Vliet, 2004). This trend may be expected to grow in Europe (Halman *et al.*, 2005).

The area of GM-based agriculture is increasing world-wide (James, 2003), based on a growing number of different GM crops and varieties, many of which are not yet approved, or known, in the EU. Moreover, the cultivation of GM-crops in the EU is increasing, in line with the implementation of the co-existence regulation. Due to these developments, the production of non-GM based animal feeds will be facing extra costs due to growing scarcity of raw materials, to necessary adaptations in chain management, guarantees, and testing protocols for

the maintenance of the non-GM status. The increase in GM varieties also poses new risks to non-GM feed and food production chains. Further the practical implementation of co-existence imposes specific bottlenecks with regard to non-GM animal feed production. The aim of this study was to assess the risks and bottlenecks associated with the production of non-GM animal feeds under current EU legislation and to estimate the extra costs thereof. .

## Approach

### *Project design*

A project group was formed consisting of experts on plant sciences, genetic modification, analytical techniques, animal nutrition, chain management, and agro-economics. The project design included a steering group with policy makers from the Dutch Ministry of Agriculture, Nature and Food Quality, business and R&D managers from the feed and food industry, and spokesmen from non-governmental organisations. The latter group consisted of, amongst others: Platform Biologica, the Dutch Organisation for the Certification of Organic Agricultural products (SKAL), the Commodity Board of the Feed Industry (PDV), and the Dutch Association of Feed Producers (NEVEDI). The steering group was consulted in the definition phase of the project and for advice and suggestions during the finalisation of the report. The results of the study were reported to the principal, the Dutch Ministry of Agriculture, Nature and Food Quality (Kok *et al.*, 2004) and to all stakeholders in a workshop.

### *Scenarios*

Four scenarios were chosen, to cover the full range of current legal and potential consumer demands. Organic farming was included because it represents current consumer demands for a minor but growing part of the market and because it has its own requirements for quality assurance and the maintenance of the organic status. Three (non-organic) non-GM feed scenarios were added, one at the level of <0.9% unintended inclusion, in line with current legislation, one at 0.0% GM inclusion as a parallel to organic farming, and one intermediate scenario (<0.5%). The latter was considered a possible scenario for the future, where producers, in a competitive market, would accept new criteria for non-GM feed production, providing sufficient consumer demand. Conventional feed production was added to these non-GM scenario's, for comparison.

### *Economic effects*

The economic effects were related to the costs of the required quality assurance systems, costs of associated analysis protocols, and necessary management adjustments to guarantee the non-gmo status. Quality assurance systems included were:

- 1) nonrecurrent declaration of non-GM: Per metric tonne of maize or soya these costs were considered to be negligible;
- 2) declaration of origin: As in latter case, the costs were also considered negligible;
- 3) non-GM declaration with associated analysis certificate: Costs for analysis (PCR) were based on €320, for each GM 'event' (Bock *et al.*, 2002), conducted every year for each lot, and estimated €3 per metric ton (including sampling costs of €0.50);
- 4) supply chain certificate and identity preservation: The costs for monitoring systems in arable crop farms were based on a study of Bock *et al.* (2002). The monitoring costs in other parts of the production chain were considered to be much lower.

Necessary adaptations in chain management, in order to achieve the level of unintended inclusion of GM material, were estimated for the subsequent production phases of seed

cultivation (Colon and Dolstra, 2003), arable farming (Bock et al., 2002), trade, storage and processing (Coppola, 2002), and transport (Wolf et al., 2003). Changes in market prices for raw materials, due to the separation of the total market in a GMO and a non-GMO market were not taken into account, nor were substitution of specific raw materials in feeds by other non-GM crops.

#### *Risks and practical bottlenecks*

The results with regard to the risks and practical bottlenecks were obtained by a desk study, complemented by interviewing feed producers and in an interactive workshop with stakeholders. The desk study summarized developments in EU regulations up to 1830/2003, and the implementation thereof in the Netherlands. Further, production of gmo-products, supply and processing of feedstuffs in the Netherlands was summarized, specifically for maize and soy beans. Potential risks of co-existence were analyzed and precautionary measures were presented where possible. Also, developments of different quality systems in the feed industry were described, including the control and management of non-GM feedstuffs. The results were partially, obtained by interviewing 12 feed manufacturers, and evaluated in a workshop with feed manufacturers, policy makers and ngo's.

### **Results**

The estimated extra costs per metric tonne of raw material ranged from €36 (<0.9% GM) to €2.50 (0.0% GM and organic), adding 41-92% to the market value of maize (€95.40/metric tonne). These extra costs were mainly associated with necessary management changes (31-77%), further with quality guarantees (3.8 – 9.4%) and testing (6.3%). The global increase of cultivation of GM crops that are not yet approved in the EU was considered to be a major risk in all scenarios, including that of conventional feed manufacture. In all non-GMO scenarios, unintentional mixing with GM materials during cultivation, transport and processing is an important risk. For crop production aiming at 0% GMO (including organic farming), insufficient protection in the case of co-existence of the crop against dispersion of seeds and pollen may add to these risks. In all scenarios, practical bottlenecks included: 1) the availability of appropriate sampling strategies and adequate techniques for detection and analysis of GMOs; 2) uncertainties with regard to liability in case of contamination of non-GM feed; and 3) implementation of standards.

### **Perspectives**

The results of our study show that the production of non-GM feed for animal production may have a large impact on the price. Together with the increase of GM-based arable farming in the world this may hamper the co-existence of conventional feed and non-GM feed. Under the current EU legislation a market for non-GM feed can only develop from a sound and substantial demand from consumers. Better information for consumers may stimulate this. We used an estimate of €20, for the cost of PCR analysis per event. Although this price may decrease in the future, the number of events to be tested will increase. Furthermore, this study revealed risks and practical bottlenecks, associated to non-GM feed production, which can not be tackled by the free market or feed industry alone. Amongst these are the risks associated to the rise of GM crops in the world and to unintended contamination of crops by dispersion of seeds and pollen. The practical bottlenecks

mentioned in above paragraph have to be solved in national implementation programmes, but, also, require international consensus and further interactive and interdisciplinary research.

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