



## Editorial news and events

### Book review

#### Animal Nutrition with Transgenic Plants

edited by Gerhard Flachowsky in CABI Biotechnology Series, 1; CAB International, CABI Nosworthy Way, Wallingford, Oxfordshire OX10 8DE, UK, 2013, pp. 234; Hardcover; £ 85, US\$ 160; € 110, ISBN 978-1-78064-176-8

Increase in food and feedstuffs demand had a considerable influence on plant and animal production, which became more intensive. It was done decades earlier and was predominantly due to broadly introduced chemicalization of production. Constant growth of human population and changes in approved standard of living showed food production not to be sufficient. Consequently, development of new methods such as genetic engineering to produce plants has become of special importance.

*'Apart from protection against insects and various chemicals such as herbicides and insecticides, genetically engineered plants are also able to use naturally limited resources such as water, minerals, fuel, etc., more efficiently and to change their composition and their nutritive value in the desired directions'* – you can read in the Preface to this book.

Plant breeding initiates improvement of food chain, not only by increase in nutritional value of feed materials through higher level of nutrients but also decrease in antinutritional compounds. Yield stability in plants, regulated by molecular mechanisms, is highly correlated with their resistance to biotic and abiotic stressors.

Since plant genetic engineering was started, there has been a lot of research carried out to evaluate influence of new feed materials on animals and assess their safety for humans.

The Editor – professor Gerhard Flachowsky, is a distinguished scientist, involved in research on nutritional physiology, professor at the Institute of Animal Nutrition, Friedrich-Loeffler-Institute

(FLI), Federal Research Institute for Animal Health, Brunswick, Germany.

Twenty six coauthors of the chapters from Belgium (3), China (2), Denmark (1), Finland (1), France (5), Germany (3), Italy (5), Netherland (2), Spain (3), United Kingdom (1) contributed to the book.

The chapters deal with different topics, as follows:

- Introduction and background – challenges and limitations of GM plants for animal nutrition (13 pages),
- Fundamentals of plant biotechnology (16 pages),
- Guidance documents for nutritional and safety assessment of feeds from GM plants (20 pages),
- Compositional analysis for nutritional assessment of feeds from GM plants (9 pages),
- Types of feeding studies for nutritional and safety assessment of feeds from GM plants (13 pages),
- Feeding studies with first-generation GM plants (input traits) with food-producing animals (22 pages),
- Feeding studies with second-generation GM-plants (output traits) with food-producing animals (18 pages),
- Long-term and multi-generational animal feeding studies (18 pages),
- The fate of transgenic DNA and newly expressed proteins (10 pages),
- Influence of feeds from GM plants on composition/quality of food of animal origin (16 pages),
- Feed additives produced by GM microorganisms (GMMs) (10 pages),

- The pipeline of GM crops for improved animal feed: challenges for commercial use (27 pages),
- Cultivation and developments in the field of GM plants in Asia (19 pages),
- Socio-economic aspects of growing GM crops (13 pages),
- Public acceptance of GM plants (8 pages).

The first chapter introduces the world food situation. Then it presents the food chain from field to animal production, in connection with environmental pollution caused by feedstuff production.

The second chapter is an introduction to plant biotechnology including description of GMO technology in relation to plant breeding. The barriers that limit transgenesis development have been presented. The author provides description of gene isolation and analysis, transgene construction, transfer of transgenom construct to the target plant. Finally, the necessity of identification of transformants as well as comparison of such plants with the original ones have been pointed out. The chapter closes with perspectives for future and listing the most popular GMOs applied in practice.

The third chapter presents legislative organizations and documents, primarily in Europe but also in Asia, Australia, North and South America and Africa. The EFSA guidance for risk assessment of genetically modified plants used for food and feed as well as assessment of environmental risk of these plants are described. Attention is drawn to possible toxicity, allergenicity as well as to important nutritional value of GMO food or feeds.

The next chapter (4) deals with principles and methodology of assessing safety of feeds from genetically modified plants. GM crops should be analysed very carefully before being introduced to the market.

Chapters 5, 6, and 7 focus on research on nutritional value and safety of GM plant use in feeding experimental animals. These chapters present types of feeding trials on laboratory and finally target animals including poultry, pigs and ruminants. The analysis should concern not only the first but also, the second generation of GM plants. Moreover, research should involve nutrient bioavailability, their digestibility, influence of increased amount of enzymes or prebiotics on the above traits, the surplus effect or the sensory properties. The interesting part of Chapter 6 is the list of studies – not complete, which is understandable – summarizing experiments with maize, sugar beets, soyabeans, canola, cottonseed, wheat, rice and potatoes.

Chapter 8 deals with experiments on animals and focuses on long term as well as multi-generation

animal feeding studies. The authors stress the importance of such research to find out a complete diet or a single feed material and to evaluate the risk of potential toxicity of any compound of the plant. The chapter also contains a critical analysis of different experimental models and presents comments on the recently published results.

Chapter 9 is devoted to transgenic DNA and proteins fate due to their modified expression. The fate of transgenic DNA is a topic of intense discussion on assessment of safety use of GM materials in animal feeds. Although recombinant DNA was sporadically shown to transfer to animal tissue it is clearly stated that there is no evidence that native plant DNA and transgenic DNA differ in their degradation parameters during feed processing and digestion in animals.

Aspects of potential influence of genetically modified plants on the composition and quality of animal origin food are discussed in Chapter 10. Studies comparing animal origin products from animals fed conventionally or on GM plants do not indicate differences in quality of milk, beef, pork and chicken meat. However, feeds from the second generation GM plants may affect fatty acid profile, mineral composition and vitamin content in animal tissues, milk and eggs.

The next chapter (11) characterizes some feed additives commonly used in animal diets like probiotics, microbial enzymes, amino acids, microbial biomasses. The author provides the background and then assesses use of such additives obtained from genetically modified microorganisms. They may be used for production of enzymes, amino acids and some medically important proteins.

The subsequent chapter (12) describes the pipeline of events improving certain traits of plants related to animal nutrition and finally their production. It presents the development in low-phytate crops. The GM maize produced by a Chinese biotechnological company is listed as the first event. Difference in phytase activity in this plant is worth stressing, it may markedly decrease use of phosphorus added to the diets. The chapter also deals with the sequence of events associated with crops enriched in essential amino acids, fatty acids profile and lignin.

Chapter 13 is devoted to development of GM plant production in Asia. It presents current situation in production as well as research into GM plants in Asian countries. Modification of rice, wheat, maize and cotton arouse great interest. The list of GM plants being in focus of researchers is longer and includes: potato, tomato, soyabean, groundnut, grape, banana, castor, mustard, sorghum and papaya.

In Chapter 14 the socio-economic aspect of GMO production is analysed. The important fact is that the cultivating area of GM plants grew from 1.7 mln hectares in 1996 up to 170 mln hectares in 2012. This increase in GM production is followed by the public debate about safety of this production for the environment and humans.

The book finishes with characteristic of public acceptance of GM plants. Definition of public has been discussed at the beginning of the last (15) chapter. It is important since it has to be understood that public means not only consumers but also voters and opinion poll participants, farmers and food companies. There is also a group of people 'who

seek to influence agricultural and food policies directly (...) and indirectly'.

All chapters are closed with a long list of up to date references, which shows that the data come from different research centres and the analyses are made very accurately and with necessary distance.

The book is the first from the CABI Biotechnology series. It may be addressed to researchers, upper-level students, food and feed producers and also to legislators with all of their doubts.

In my opinion this book is a should-read for people dealing with GM plants and their use in animal production and food safety, however, anybody may greatly benefit from it.

Jacek Skomial

The Kielanowski Institute  
of Animal Physiology and Nutrition PAS  
05-110 Jabłonna, Poland