ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

Fifth ACAF Meeting  27 June 2000 – Agenda Item 3

ADVICE CONCERNING THE ADVENTITIOUS PRESENCE OF GLYPHOSATE TOLERANT OILSEED RAPE IN SEED STOCK

Action required: The Committee is asked to discuss and agree the attached draft advice to be sent to Sir John Krebs, Baroness Hayman, Michael Meacher and the relevant Ministers in Scotland, Northern Ireland and Wales.

Secretariat  June 2000
ADVICE CONCERNING THE ADVENTITIOUS PRESENCE OF GLYPHOSATE TOLERANT OILSEED RAPE IN SEED STOCK

Purpose

1. The attached annex summarises the comments received from ACAF members concerning of the adventitious presence of GM oilseed rape in seed stocks, focusing particularly on the implications of feeding the GM variety to farm livestock, both for human and animal health. It takes the form of draft advice to be issued to the Food Standards Agency Chairman and relevant Ministers.

Background

2. On 12 May the Committee was asked for urgent advice on the implications for the use of oilseed rape and its by-products for animal feed, given that seed containing 1% or less of a glyphosate tolerant variety (GT73) had been imported for use in this country. The Committee considered the summary information provided (ACAF/00/21) and, on 26 May, issued a letter containing preliminary advice to Sir John Krebs, Baroness Hayman and the relevant Ministers in Scotland, Northern Ireland and Wales. This letter stated that, on the information provided, ACAF saw no reason to disagree with the views of the Advisory Committee on Releases to the Environment (ACRE) and the Food Standards Agency that the presence of the GM variety did not pose a risk to the environment or human health.

3. Ministers then asked ACAF for a more definitive review of the relevant technical dossier and so this more detailed information was sent to certain scientific members for their views. The attached advice summarises their views and incorporates the views of other ACAF members on wider issues surrounding the discovery of the adventitious presence of GM oilseed rape in seed stocks.

Action

4. The Committee is asked to discuss and agree the attached draft advice to be sent to Sir John Krebs, Baroness Hayman, Michael Meacher and the relevant Ministers in Scotland, Northern Ireland and Wales.

Animal Feed Division
Food Standards Agency
June 2000
ADVISORY COMMITTEE ON ANIMAL FEEDINGSTUFFS

DRAFT ADVICE CONCERNING THE ADVENTITIOUS PRESENCE OF GLYPHOSATE TOLERANT OILSEED RAPE IN SEED STOCK

Background

1. On 12 May the Committee was asked for urgent advice on the implications for the use of oilseed rape and its by-products for animal feed, given that seed containing 1% or less of a glyphosate tolerant variety (GT73) had been imported for use in this country. In particular we were asked:
   (a) whether, focusing on science-based safety considerations, the situation posed a threat to human health and the environment?; and
   (b) given that any response must be proportionate and measured relative to the risk, were there any (realistic) risk management measures that should be taken?

Similar questions had been asked of the Advisory Committee on Releases to the Environment (ACRE). We were asked to concentrate on the animal feed aspects.

2. In view of the urgency, ACAF members were sent summary information, on the basis of which, we saw no reason to disagree with the views of the ACRE and the Food Standards Agency that the presence of the GM variety did not pose a risk to the environment or human health. However, unlike the ACRE and the Advisory Committee on Novel Foods and Processes (ACNFP), ACAF had not had the opportunity to study a full technical dossier on the GT73 product. Since
at that time (late May), the oilseed rape in question was not due to be harvested for some weeks, Ministers agreed that time should be taken by the Committee to examine the more detailed information. On 31 May, the dossier in question, plus certain references, was sent to Professor Phillip Thomas, Dr Ian Brown, Dr Andrew Chesson and Dr John Heritage for their observations.

3. The advice which follows not only reflects their comments but also those of other members before 26 May.

Feeding of oilseed rape and its by-products

4. The main use by the feed industry is of extracted rapeseed meal which is a by-product of crushing the seed for oil production. The processing involved is believed to severely disrupt DNA. There is less stringent processing which results in expelled meal, where there is varied fragmentation of DNA. DNA would be fully intact where there is no processing.

5. We understand that full fat oilseed rape is increasingly used in feed for broiler chickens, and some is used in ruminant feeding. This involves heating the whole seed, which deactivates anti-nutritional factors (secondary plant metabolites) and thus improves the nutritive value.

6. Oilseed rape itself, unprocessed other than by cracking or grinding, is used by farm mixers of feed, notably at up to 10% of pig rations. Such use of the whole seed is an increasing animal feed option, based on current value, but no figures are available for levels of use. This is thought to be relatively small, compared with around 570,000 tonnes of rape seed meal used by feed manufacturers in the UK. The remains of the plant are ploughed back into the soil or used as bedding.
Safety Assessment

7. There are four main issues of importance to the use of oilseed from the GT73 line; the last three relate to its use in animal nutrition:

- Absence of male sterility;
- GOX actively contributing to herbicide tolerance (GOX is an enzyme produced by the gox gene in the GT73 line that catalyses the breakdown of the herbicide glyphosate);
- Absence of compositional data on the herbicide-treated crop;
- Glucosinolate composition (this relates to a group of secondary plant metabolites and anti-nutritional factors regarded as undesirable in animal feeds).

Male sterility

8. Contrary to information initially provided by the company, it would appear that this line is fertile and would cross with other Brassica rape and related plants.

GOX activity

9. It is likely that GOX is produced in this strain at concentrations that imply that it actively contributes to herbicide resistance. No information was provided for levels of GOX or EPSPS in green tissue where the greatest concentration of chloroplasts are found; levels have been estimated by extrapolating from seed data where levels for both should be much lower. Most of the Monsanto GM plant strains having
tolerance to glyphosate appear to rely on an *epsps* gene of bacterial origin (which produces a form of the enzyme EPSPS that is resistant to the effects of glyphosate) rather than the *gox* gene.

10. If *gox* is active in this strain, then this raises the question of residues that result from the breakdown of the herbicide. GOX catalyses the formation of the glyphosate breakdown products aminomethyl phosphonic acid (AMPA) and glyoxylate. Any safety assessment requires toxicological data on the survival of the herbicide and its marker metabolite(s) and the consequences for humans and animals of the ingestion of the parent compound and its metabolites. Such data is part of the safety assessment made when any herbicide is first authorised for use.

**Herbicide-treated rape**

11. Compositional comparisons between the GM line and the parent grown under exactly the same conditions are best for the detection of unintended effects. Unfortunately, it is not possible to make this comparison between glyphosate treated GT73 and non-GM crops. Line GT73 is intended for use with glyphosate (RoundUp) herbicide. Application of a herbicide induces stresses within the plant, which the introduced protective mechanism is designed to reverse or to reduce to the point where growth is not unduly affected. However, herbicide application can alter levels of (possibly toxic) secondary metabolites in tolerant plants, as part of a normal stress response. For this reason it is desirable to include compositional data from the herbicide-treated GM line in addition to the non-treated GM line. Ideally, animal “wholesomeness” trials (includes an assessment of levels of the GOX and EPSPS proteins) should have been made using herbicide-treated GM plants. Such studies using glyphosate-treated GM plant material do
not appear to have been included in the dossier, although it is likely that GOX or EPSPS would not be of concern as allergens or toxins.

**Glucosinolates**

12. Analysis of glucosinolates would have required the identification and quantification of the compounds contributing to the total level of glucosinolates. It would appear to be reasonable to condense these data and to provide information on indole glucosinolates, which includes glucobrassicin, and the alkyl glucosinolates. Glucosinolates are comparatively unstable in the plant material with a half-life of less than two days. Thus levels of individual metabolites can vary significantly, making comparisons of glucosinolate profiles of very limited value.

13. Although alkyl glucosinolates consistently are found in higher amounts in the GM line compared to the control (~11 and 8 μmole/g defatted meal respectively) this is not a safety issue since concentrations fall well within a range shown by existing cultivated strains which are accepted as safe.

14. Higher levels of alkyl glucosinolates were observed in the GM strain compared to the (non-GM) parental line. This might be evidence of an unintended modification to GT73. The effect is small, falls well within the normal levels found in oilseed rape and might be due to an artefact of cultivation.
Other issues

15. It is believed that the gene conferring resistance to a group of antibiotics called aminoglycosides (e.g. streptomycin and spectinomycin), used as a marker gene during the development of the GM stain, is not present in GT73. The dossier demonstrates this with data from a single PCR experiment.

Summary

16. There is nothing in the data provided to suggest an issue of safety for the feeding of the glyphosate-tolerant oilseed rape line GT73, or for a direction for further investigation. [This Conclusion takes account of the use of whole oilseed rape in pig and other animal diets.]

Wider Issues

17. Members commented that the problem of adventitious mixing, which has now been subject to widespread publicity, is more than a scientific matter. There was recognition that those people who did not wish to consume GM crops or products derived from them would be very concerned; so too would organic food producers. It is important therefore to contain the problems which have arisen with the oilseed rape and to avoid future such contamination of seed stocks. The authenticity of seed sold to farmers should be ensured by introducing or increasing surveillance.