Opinion of the Scientific Panel on Additives and Products or Substances used in Animal Feed on a request from the Commission on the safety of the “Chelated forms of iron, copper, manganese and zinc with synthetic feed grade glycine”

(Question N° EFSA-Q-2004-155)

Adopted on 29 November 2005

SUMMARY

The European Food Safety Authority (EFSA) received a request from the Commission to evaluate the safety of chelated forms of Fe, Cu, Mn and Zn with synthetic feed grade glycine to the target animals, the consumer, the user and the environment.

FEEDAP Panel does not see any safety concerns arising from the use of glycine in chelates of trace elements provided the glycine meets food grade specifications. The Panel also considers that these preparations will not introduce additional safety concerns for consumers, users or the environment which are not already covered by the safety aspects of the individual constituents. As no specifications exist for glycine used for feed purposes, more information on the purity would be required where glycine does not comply with food grade specifications.

Keywords: chelated trace elements, iron, copper, manganese, zinc, glycine, safety
BACKGROUND

Regulation (EC) No 1831/2003\(^1\) establishes rules governing the Community authorisation of additives for animal nutrition and in particular defines the conditions that a substance/product should meet to be granted authorisation. This Regulation replaces Council Directive 70/524/EEC\(^2\). The Regulation foresees transition procedures for handling applications submitted under the earlier directive in its Article 25.

The company, Albion Laboratories Inc. is seeking an authorisation of “Chelated forms of Fe, Cu, Mn and Zn with synthetic feed grade glycine”. Currently, there is an authorisation under Directive 70/524/EEC for the chelated forms of Fe, Cu, Mn and Zn with amino acids derived from hydrolysed soya protein (molecular weight not exceeding 1500), which was requested by the same company. The wording of this description does not correspond with the product for which the company is requesting an authorisation, therefore although no major differences are expected, the applicant has submitted a new request for authorisation.

This product belongs to the category “Trace elements”. It is common practice to supplement diets of animals to ensure that the required trace elements are available. The use of trace elements in their chelated forms may overcome some of the problems of absorption that occur when inorganic forms are used.

The proposed Annex entry reads as follows (Table 1, the changes proposed by the company are underlined).

TERMS OF REFERENCE

In view of the above, the Commission asks the European Food Safety Authority to issue an opinion on the safety of chelated forms of Fe, Cu, Mn and Zn with synthetic feed grade glycine for the target animals, the worker, the user, the consumer and the environment when used under the conditions set out in Table 1 below, taking into account the background and the information submitted by the applicant in the dossier.

\(^1\) OJ L 268, 18.10.2003, p.29.
Table 1. Annex entry proposed by the Applicant.

<table>
<thead>
<tr>
<th>EEC No</th>
<th>Element</th>
<th>Additive</th>
<th>Chemical formula and description</th>
<th>Maximum content of the element in mg kg(^{-1}) of the complete feedingstuff</th>
<th>Other provisions</th>
<th>End of period of authorisation</th>
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</thead>
</table>
| E1     | Iron-Fe | Ferrous chelate of amino acids, hydrate | Fe\((x)_{1.3} \cdot nH_2O\) \((x=anion\ of\ any\ amino\ acid\ derived\ from\ hydrolysed\ soya\ protein\ or\ synthetic\ feed\ grade\ glycine)\) Molecular weight not exceeding 1500 | Ovine: 500 (total) mg kg\(^{-1}\) of the complete feedingstuff  
Pet animals: 1250 (total) mg kg\(^{-1}\) of the complete feedingstuff  
Pigs:  
- piglets up to one week before weaning: 250 mg day\(^{-1}\)  
- other pigs: 750 (total) mg kg\(^{-1}\) of the complete feedingstuff  
Other species: 750 (total) mg kg\(^{-1}\) of the complete feedingstuff. |                              | Without time limit |
| E4     | Copper-Cu | Cupric chelate of amino acids hydrate | Cu \((x)_{1.3} \cdot nH_2O\) \((x=anion\ of\ any\ amino\ acid\ derived\ from\ hydrolysed\ soya\ protein\ or\ synthetic\ feed\ grade\ glycine)\) Molecular weight not exceeding 1500. | Pigs:  
- piglets up to 12 weeks: 170 (total)  
- other pigs: 25 (total)  
Bovine  
1- bovine before the start of rumination:  
- milk replacers: 15 (total)  
- other complete feedingstuffs: 15 (total).  
2 - other bovine: 35 (total).  
Ovine: 15 (total)  
Fish: 25 (total)  
Crustaceans: 50 (total)  
Other species: 25 (total)  
The following declarations shall be inserted in the labelling and accompanying documents:  
- For sheep: Where the level of copper in feedingstuffs exceed 10 mg kg\(^{-1}\): “the level of copper in this feedingstuff may cause poisoning in certain breeds sheep”  
- For bovines after the start of rumination: Where the level of copper in feedingstuffs is less than 20 mg kg\(^{-1}\): “the level of copper in this feedingstuff may cause copper deficiencies in cattle grazing pastures with high contents of molybdenum or sulphur”. |                              | Without time limit |
| E5     | Manganese-Mn | Manganese chelate of amino acids hydrate | Mn \((x)_{1.3} \cdot nH_2O\) \((x=anion\ of\ any\ amino\ acid\ derived\ from\ hydrolysed\ soya\ protein\ or\ synthetic\ feed\ grade\ glycine)\) Molecular | Fish: 100 (total)  
Other species: 150 (total) |                              | Without time limit |
| E 6 | Zinc-Zn | Zinc chelate of amino acids hydrate | Zn \((\text{x})_{13} \cdot n\text{H}_2\text{O}\) \((\text{x}=\text{anion of any amino acid derived from hydrolysed soya protein or synthetic feed grade glycine})\) | Molecular weight not exceeding 1500. | Pet animals: 250 (total) | Fish: 200 (total) | Milk replacers: 200 (total) | Other species: 150 (total) | Without a time limit |
ASSESSMENT

1. Introduction
Current legislation permits Fe, Cu, Mn and Zn chelates from soya protein hydrolysate as trace element sources to animal feed within the same range of dietary additions as other permitted sources of Fe, Cu, Mn and Zn. The petitioner seeks authorisation for the amino acid source of Fe, Cu, Mn and Zn chelates to be extended to chelates prepared with synthetic feed grade glycine.

The petitioner provided information on Fe, Cu, Mn and Zn chelates with synthetic glycine in order to demonstrate the general safety of these compounds with respect to the safety of target animal, consumer, user and environment.

1.1. Production and properties of chelated trace elements
The petitioner states that the production process for Fe, Cu, Mn and Zn chelates is the same for amino acids derived from soya protein hydrolysis or from synthetic glycine. The glycine solution is mixed with the respective metal sulfates, heated, mixed with an approved diluent (silicate) and preservatives (0.1% sodium propionate and 0.1% sodium benzoate), dried and packed. The glycine used for the production of the metallo chelates meets the specifications laid down for food grade glycine (Commission Directive 2000/63/EC of 5 October 2000 amending Directive 96/177/EC laying down specific purity criteria on food additives other than colours and sweeteners).

The physical and chemical properties of the respective Fe, Cu, Mn and Zn chelates derived from soya hydrolysate and synthetic glycine are stated to be quite similar. The powders produced are brown (Fe), green (Cu), or light yellow-brown (Mn, Zn) colour, with a metal content around 10% and a density of about 0.5 to 0.9 g mL\(^{-1}\). Contents of arsenic, cadmium and lead are stated to be below 2, 5, and 20 mg kg\(^{-1}\) feedingstuff although confirming data was not provided. Solubility in water and decomposition temperatures range between about 60 and 70%, and 140 and 200°C, respectively. No further information on physical, chemical and microbiological properties are presented in the dossier.

1.2. Studies on target animals
The dossier includes reports on the effect of Fe, Cu, Mn and Zn chelates prepared with glycine on production performance and fertility in dairy cows (two studies), fattening steers (one study), piglets (three studies), sows (five studies), laying hens (two studies), rainbow trout (one study), and one palatability study with humans. Although some data consist only of short abstracts of internal non-published study reports, the totality of the data provided supports the wholeness of the product.

2. Safety assessment
2.1. Safety for the target animals
Dietary inclusion of the product(s) is limited by the maximum permitted content of these trace elements in feedingstuffs. Utilizing the margins for all of these trace elements simultaneously, the total addition of glycine in the form of Fe, Cu, Mn and Zn chelates might exceed 10 g kg\(^{-1}\) feedingstuff. This may affect total protein content of the diet, but is considered to be without metabolic significance.

FEEDAP Panel does not see any safety concerns arising from the use of glycine meeting the food grade specification as part of the chelated trace elements.

2.2. Safety for the consumer, user and the environment

The use of these chelates in animal nutrition is not expected to cause additional safety concerns to the consumer, user and environment, which are not covered already by the safety aspects of the single components.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

FEEDAP Panel considers the use of Fe, Cu, Mn and Zn chelates prepared with synthetic glycine to be safe to the target animals provided the glycine used meets food grade specifications. It is also considered that these preparations will not introduce additional safety concerns for consumers, users or the environment which are not already covered by the safety aspects of the individual constituents. As no specifications exist for glycine used for feed purposes, more information on the purity would be required where the glycine used does not comply with food grade specifications.

RECOMMENDATION

Glycine chelates of trace elements (Fe, Cu, Mn and Zn) should have a separate entry in the register of feed additives.

DOCUMENTATION PROVIDED TO EFSA

1. Proposal to amend the definition of Albion® Iron; Copper; Manganese and Zinc Chelates of Amino Acid Hydrate. May 2004. Submitted by Albion Laboratories Inc.

2. CD with responses to the questions of France and the Czech Republic regarding the Chelated Trace Elements dossier, dated February 2005. Submitted by Albion Laboratories Inc.


4. Response regarding EFSA’s query as to whether glycine within metal amino acid chelates should be provided as a protein source. June 2005. Submitted by Albion Laboratories Inc.

SCIENTIFIC PANEL MEMBERS