SCIENTIFIC OPINION

Scientific Opinion on the safety and efficacy of tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta-rich, synthetic tocopherol for all animal species[1]

EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

The additive tocopherol-rich extracts of natural origin is a mixture of the active substances alpha, beta, gamma and delta tocopherol. Tocopherol-rich extracts of natural origin / delta-rich is a mixture of the active substances alpha, beta, gamma and delta tocopherol with a high concentration (> 70 %) of delta-tocopherol. Synthetic tocopherol consists of pure all-rac-alpha-tocopherol. In a previous opinion on the safety and efficacy of vitamin E for all animal species, the FEEDAP Panel already assessed the safety of RRR-alpha-tocopherol and the acetate ester of all-rac-alpha-tocopherol for all animal species, the consumer, the user and the environment. The FEEDAP Panel is not aware of any scientific findings in the meantime that would modify its previous conclusions. The FEEDAP Panel extended the conclusions drawn in its opinion on the safety of vitamin E (including RRR-alpha-tocopherol and all-rac-alpha-tocopheryl acetate) to tocopherol-rich extracts and all-rac-alpha-tocopherol. Tocopherol-rich extracts and all-rac-alpha-tocopherol at use levels are safe for all animal species and the consumer. No concern for user safety is expected from the use of tocopherol rich extracts and all-rac-alpha-tocopherol in feed. The use of tocopherol-rich extracts and all-rac-alpha-tocopherol in animal nutrition will not result in a substantial increase in concentration in the environment. Since tocopherol-rich extracts and all-rac-alpha-tocopherol are used as antioxidants in food and their function in feed is essentially the same as that in food, no further demonstration of efficacy is necessary.

KEY WORDS

Synthetic alpha-tocopherol, tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta rich, vitamin E, technological additive, antioxidant, safety, efficacy.

---

[1] On request from the European Commission, Question No EFSA-Q-2011-01234, adopted on 12 June 2012.

[2] Panel members: Gabriele Aquilina, Georges Bories, Andrew Chesson, Pier Sandro Cocconcelli, Joop de Knecht, Noël Albert Dierick, Mikolaj Antoni Gralak, Jürgen Gropp, Ingrid Halle, Christer Hogstrand, Lubomir Leng, Secundino López Puente, Anne-Katrine Lundebye Haldorsen, Alberto Mantovani, Giovanna Martelli, Miklós Mézes, Derek Renshaw, Maria Saarela, Kristen Sejrsen and Johannes Westendorf. Correspondence: FEEDAP@efsa.europa.eu

[3] Acknowledgement: The Panel wishes to thank the members of the Working Group on technological additives including Carlo Nebbia for the preparation of this opinion

Suggested citation: EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) Scientific Opinion on the safety and efficacy of tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta-rich, synthetic tocopherol for all animal species. EFSA Journal 20YY;volume(issue):NNNN. [14 pp.] doi:10.2903/j.efsa.20YY.NNNN. Available online: www.efsa.europa.eu/efsajournal

SUMMARY

Following a request from the European Commission, the Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) was asked to deliver a scientific opinion on the safety and efficacy of tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta-rich, synthetic tocopherol when used as an antioxidant in feed for all animal species.

The additive tocopherol-rich extracts of natural origin is a mixture of the active substances alpha, beta, gamma and delta tocopherol. Tocopherol-rich extracts of natural origin / delta-rich is a mixture of the active substances alpha, beta, gamma and delta tocopherol with a high concentration (> 70 %) of delta-tocopherol. Synthetic tocopherol consists of pure all-rac-alpha-tocopherol. In a previous opinion on the safety and efficacy of vitamin E for all animal species, the FEEDAP Panel has already assessed the safety of RRR-alpha-tocopherol and the acetate ester of all-rac-tocopherol for all animal species, the consumer, the user and the environment. The FEEDAP Panel is not aware of any more recent scientific findings that would modify its previous conclusions.

The FEEDAP Panel extended the conclusions drawn in its opinion on the safety of vitamin E (including RRR-alpha-tocopherol and all-rac-alpha-tocopheryl acetate) to tocopherol-rich extracts and all-rac-alpha-tocopherol. Tocopherol-rich extracts and all-rac-alpha-tocopherol at use levels are safe for all animal species and the consumer. No concerns for user safety is expected from the use of tocopherol rich extracts and all-rac-alpha-tocopherol in feed. The use of tocopherol rich extracts and all-rac-alpha-tocopherol in animal nutrition will not result in a substantial increase in concentration in the environment.

Since tocopherol rich extract and all-rac-alpha-tocopherol are used as antioxidants in food and their function in feed is essentially the same as that in food, no further demonstration of efficacy is necessary.

.

TABLE OF CONTENTS

BACKGROUND

Regulation (EC) No 1831/2003[4] establishes the rules governing the Community authorisation of additives for use in animal nutrition. In particular, Article 10(2) of that Regulation also specifies that for existing products within the meaning of Article 10(1), an application shall be submitted in accordance with Article 7, at the latest one year before the expiry date of the authorisation given pursuant to Directive 70/524/EEC for additives with a limited authorisation period, and within a maximum of seven years after the entry into force of this Regulation for additives authorised without a time limit or pursuant to Directive 82/471/EEC.

The European Commission received a request from ANTOXIAC EEIG (Antioxidants Authorisation Consortium European Economic Interest Grouping)[5] for re-evaluation of the product synthetic alpha-tocopherol, when used as a feed additive for all animal species (category: technological additive; functional group: antioxidants) under the conditions mentioned in Table 1.

According to Article 7(1) of Regulation (EC) No 1831/2003, the Commission forwarded the application to the European Food Safety Authority (EFSA) as an application under Article 10(2) (re-evaluation of an authorised feed additive). EFSA received directly from the applicant the technical dossier in support of this application.[6] According to Article 8 of that Regulation, EFSA, after verifying the particulars and documents submitted by the applicant, shall undertake an assessment in order to determine whether the feed additive complies with the conditions laid down in Article 5. The particulars and documents in support of the application were considered valid by EFSA as of 16 January 2012.

Synthetic alpha-tocopherol and tocopherol-rich extracts of natural origin have been authorised without a time limit under Council Directive 70/524/EEC[7] for its use as an antioxidant in feed for all animal species.

Synthetic alpha-tocopherol and tocopherol-rich extracts of natural origin (vitamin E) has been authorised under the Commission Regulation (EU) No 26/2011[8] for its use as a nutritional additive for all animal species.

The Scientific Committee on Food issued an opinion on the Tolerable Upper Intake Level of Vitamin E (EC, 2003). EFSA issued an opinion on Tolerable Upper Intake Levels for Vitamins and Minerals (EFSA, 2006), an opinion on mixed tocopherols, tocotrienols tocopherol and tocotrienols as sources for vitamin E added as a nutritional substance in food supplements (EFSA, 2008) and an opinion on the safety and efficacy of vitamin E as a feed additive for all animal species (EFSA, 2010).

TERMS OF REFERENCE

According to Article 8 of Regulation (EC) No 1831/2003, EFSA shall determine whether the feed additive complies with the conditions laid down in Article 5. EFSA shall deliver an opinion on the safety for the target animal(s), consumer, user and the environment and the efficacy of the product tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta-rich, synthetic tocopherol, when used under the conditions described in Table 1a, 1b and 1c.

[4] Regulation (EC) No 1831/2003 of the European Parliament and of the Council of 22 September 2003 on additives for use in animal nutrition. OJ L 268, 18.10.2003, p. 29.
[5] ANTOXIAC EEIG (Antioxidants Authorisation Consortium European Economic Interest Grouping), Avenue Louise, 130A - 1050 Brussels - Belgium
[6] EFSA Dossier reference: FAD-2010-0105.
[7] Council Directive 70/524/EEC of 23 November 1970 concerning additives in feeding-stuffs. OJ L 270, 14.12.1970, p. 1
[8] Commission Regulation (EU) No 26/2011 of 14 January 2011 concerning the authorisation of vitamin E as a feed additive for all animal species OJ L 11, 15.1.2011, p. 18

62 **Table 1a:** Description and conditions of use of the additive as proposed by the applicant:

63 Tocopherol-rich extracts of natural origin (E306)

Additive	Tocopherol-rich extracts of natural origin (E306)
Registration number/EC No/No (if appropriate)	E306
Category of additive	1. Technological additives
Functional group(s) of additive	b) antioxidants

Description			
Composition, description	Chemical formula	Purity criteria (if appropriate)	Method of analysis (if appropriate)
Alpha, beta, gamma, delta tocopherol	**Alpha:$C_{29}H_{50}O_2$ Beta and gamma:$C_{28}H_{48}O_2$ Delta:$C_{27}H_{46}O_2$**	**Min 30%**	**JECFA method**

Trade name (if appropriate)	Not appropriate
Name of the holder of authorisation (if appropriate)	Not appropriate

Conditions of use				
Species or category of animal	Maximum Age	Minimum content	Maximum content	Withdrawal period (if appropriate)
		mg or Units of activity or CFU/kg of complete feedingstuffs, supplementary feed (based on end feed) and in water*		
All animal species and categories	No limitation	No limitation	No limitation	Not required

Other provisions and additional requirements for the labelling	
Specific conditions or restrictions for use (if appropriate)	**None**
Specific conditions or restrictions for handling (if appropriate)	**None**
Post market monitoring (if appropriate)	**Not applicable**
Specific conditions for use in complementary feedingstuffs or water (if appropriate)	**None**

Maximum Residue Limit (MRL) (if appropriate)			
Marker residue	Species or category of animal	Target tissue(s) or food products	Maximum content in tissues
Not appropriate	Not appropriate	Not appropriate	Not appropriate

64

65 **Table 1b:** Description and conditions of use of the additive as proposed by the applicant:

66 Tocopherol-rich extracts of natural origin / delta-rich (E306)

Additive	Tocopherol-rich extracts of natural origin / delta rich
Registration number/EC No/No (if appropriate)	E 306
Category of additive	1. Technological additives
Functional group(s) of additive	b) antioxidants

Description			
Composition, description	Chemical formula	Purity criteria (if appropriate)	Method of analysis (if appropriate)
Alpha, beta, gamma, delta tocopherol	**Alpha:$C_{29}H_{50}O_2$ Beta and gamma:$C_{28}H_{48}O_2$ Delta:$C_{27}H_{46}O_2$**	**Min 70% of delta tocopherol Min 80% of total tocopherols**	**JECFA method**

Trade name (if appropriate)	Not appropriate
Name of the holder of authorisation (if appropriate)	Not appropriate

Conditions of use				
Species or category of animal	Maximum Age	Minimum content	Maximum content	Withdrawal period (if appropriate)
		mg or Units of activity or CFU/kg of complete feedingstuffs, supplementary feed (based on end feed) and in water*		
All animal species and categories	No limitation	No limitation	No limitation	Not required

Other provisions and additional requirements for the labelling	
Specific conditions or restrictions for use (if appropriate)	**None**
Specific conditions or restrictions for handling (if appropriate)	**None**
Post market monitoring (if appropriate)	**Not applicable**
Specific conditions for use in complementary feedingstuffs or water (if appropriate)	**None**

Maximum Residue Limit (MRL) (if appropriate)			
Marker residue	Species or category of animal	Target tissue(s) or food products	Maximum content in tissues
Not appropriate	Not appropriate	Not appropriate	Not appropriate

67

68 **Table 1c:** Description and conditions of use of the additive as proposed by the applicant:

69 Synthetic tocopherol (E307)

Additive	Synthetic tocopherol
Registration number/EC No/No (if appropriate)	E 307
Category of additive	1. Technological additives
Functional group(s) of additive	b) antioxidants

Description			
Composition, description	Chemical formula	Purity criteria (if appropriate)	Method of analysis (if appropriate)
All-rac alpha tocopherol	**$C_{29}H_{50}O_2$**	**Min 96%**	**Eur.Ph. 6.0**

Trade name (if appropriate)	Not appropriate
Name of the holder of authorisation (if appropriate)	Not appropriate

Conditions of use				
Species or category of animal	Maximum Age	Minimum content	Maximum content	Withdrawal period (if appropriate)
		mg or Units of activity or CFU/kg of complete feedingstuffs, supplementary feed (based on end feed) and in water*		
All animal species and categories	No limitation	No limitation	No limitation	Not required

Other provisions and additional requirements for the labelling	
Specific conditions or restrictions for use (if appropriate)	**None**
Specific conditions or restrictions for handling (if appropriate)	**None**
Post market monitoring (if appropriate)	**Not applicable**
Specific conditions for use in complementary feedingstuffs or water (if appropriate)	**None**

Maximum Residue Limit (MRL) (if appropriate)			
Marker residue	Species or category of animal	Target tissue(s) or food products	Maximum content in tissues
Not appropriate	Not appropriate	Not appropriate	Not appropriate

70

71

ASSESSMENT

This opinion is based in part on data provided by a consortium of companies involved in the production/distribution of the active substance. It should be recognised that this data covers only a fraction of existing additives containing the active substance. The composition of the additives is not subject of the application. The FEEDAP Panel has sought to use the data provided together with data from other sources to deliver an opinion.

1. Introduction

Synthetic-alpha-tocopherol ester, all-rac-alpha-tocopheryl acetate, and RRR-alpha-tocopherol are authorised as vitamin E under Commission Regulation (EU) No 26/2011 for their use as nutritional additives for all animal species. In both cases, no maximum total levels in feeds are established in the European Union. The applicant is seeking the re-evaluation of the use of synthetic-alpha-tocopherol and tocopherol-rich extracts of natural origin (including the delta-rich form) as technological additives (functional group: antioxidants) in feed for all animal species.

Alpha-tocopherol (all-rac-alpha-tocopherol, E 307) and tocopherol-rich extracts of natural origin (E 306) are approved as a food additives[9] for use as antioxidant in non-emulsified oils and fats with no limitation (*quantum satis*), in refined olive oil (only alpha-tocopherol, maximum permitted level: 200 mg/L), in infant formulae and in follow-on formula for infants in good health (maximum level: 10 mg (individually or in combination with other tocopherols)/L) and in weaning foods for infants and young children in good health at a maximum level of 100 mg (individually or with other tocopherols)/kg fat-containing cereals, biscuits, rusks and baby foods.

All-rac-alpha-tocopherol is also authorised as vitamin which may be added to food (Regulation (EC) No 1925/2006)[10] and to food supplements (Directive 2002/46/EC).[11] It is also listed as a pharmacologically active substance in veterinary medicinal products (Commission Regulation (EC) No 37/2010),[12] and it is not subject to maximum residue limits when used in food-producing animals. All-rac alpha tocopherol is described in the European Pharmacopoeia (PhEur) (2010).

2. Characterisation

The additives are tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta rich and synthetic tocopherol.

2.1. Characterisation of the product

2.1.1. Tocopherol-rich extracts

The additive tocopherol-rich extracts of natural origin is a mixture of the active substances alpha- (CAS number 59-02-9; EINECS number 200-412-2; chemical formula $C_{29}H_{50}O_2$), beta- (CAS number 490-23-3; EINECS number 205-708-5; chemical formula $C_{28}H_{48}O_2$), gamma- (CAS number 54-28-4; EINECS number 231-523-4; chemical formula $C_{28}H_{48}O_2$) and delta- (CAS number 119-13-1; EINECS number 204-299-0; chemical formula $C_{27}H_{46}O_2$) tocopherol. The additive is produced from vegetable oils, by multiple extraction and refining steps, which include crystallisation, multiple distillations and standardisation of the additive with vegetable oil.

[9] European Parliament and Council Directive No 95/2/EC of 20 February 1995 on food additives other than colours and sweeteners OJ No L 61, 18. 3. 1995, p. 1.

[10] Regulation (EC) No 1925/2006 of the European Parliament and of the Council of 20 December 2006 on the addition of vitamins and minerals and of certain other substances to foods OJ No L 404, 30.12. 2006, p. 26.

[11] Directive 2002/46/EC of the European Parliament and of the Council of 10 June 2002 on the approximation of the laws of the Member States relating to food supplements OJ L 183, 12.7.2002, p. 51.

[12] Commission Regulation (EU) No 37/2010 of 22 December 2009 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin OJ L 15, 20.1.2010, p. 1.

The additive contains by specification a minimum of 30 % total tocopherols. The analysis of 20 batches (five from each of the four producers)[13] showed a mean concentration of 87.4 % total tocopherols (range 78.3 – 95.4 %). The mean concentrations of alpha-, beta-, gamma- and delta-tocopherol were 11.0, 1.3, 54.1 and 20.9 %, respectively.

The analytical data from 17 batches of the additive from four producers[14] comply with the purity criteria set by Commission Directive 2008/84/EC for food additives[15] (sulphated ash, specific rotation, arsenic, lead, mercury, heavy metals (as lead)). Dioxins were detected at concentrations ≤ 0.32 ng PCDD/F (WHO-TEQ)/kg, while the sum of dioxins and dioxin-like PCBs was ≤ 1.25 ng PCDD/F-PCBs(WHO-TEQ)/kg. The concentrations of the analysed mycotoxins (aflatoxin B1, B2, G1, G2 and M1 and ochratoxin A) were below the limit of quantification in all the samples analysed.

2.1.2. Tocopherol-rich extracts of natural origin / delta-rich

The delta-rich form of the additive contains by specification a minimum of 80 % total tocopherols and a minimum of 70 % delta-tocopherol. The analysis of five batches[16] showed a mean concentration of 81.2 % total tocopherols (range 80.8 – 81.4 %) and a mean concentration of 72.9 % delta-tocopherol (72.0-75.8 %). The mean concentrations of alpha, beta and gamma tocopherol were 0.9, 0.2 and 7.2 %, respectively. The additive is produced from vegetable oils, by multiple extraction and refining steps, including fractionation and molecular distillation.

The analytical data from three batches[17] of the additive comply with the purity criteria set by Commission Directive 2008/84/EC for food additives (sulphated ash, specific rotation, arsenic, lead, mercury, heavy metals (as lead)). Dioxins were detected at concentrations ≤ 0.69 ng PCDD/F (WHO-TEQ)/kg, dioxin like PCBs were ≤ 0.274 ng PCDD/F-PCBs(WHO-TEQ)/kg. The concentrations of the analysed mycotoxins (aflatoxins B1, B2, G1, G2 and M1) were below the limit of quantification.

2.1.3. Synthetic tocopherol

The active substance is all-rac-alpha-tocopherol (CAS number 10191-41-0; EINECS number 233-466-0; chemical formula $C_{29}H_{50}O_2$) consisting of eight stereoisomers (RRR, RRS, RSS, RSR, SRR, SSR, SRS and SSS) in equal quantities. It is synthesised from trimethyl-hydrochinon and isophytol using zinc chloride/HCl as catalysts. All-rac–alpha-tocopherol is then purified by distillation.

The additive consists of pure all-rac-alpha-tocopherol (96 % by specification, compliant with PhEur[18]). Product consistency is confirmed by analyses of five batches showing an average concentration of 97.9 %.[19] Residual solvents comply with the VICH (VICH, 2000). Control methods are in place.

The analytical data from five batches[20] of the additive comply with the purity criteria set by Commission Directive 2008/84/EC for food additives[21] (refractive index, specific absorption in ethanol at 292 nm, sulphated ash, specific rotation and lead).

The main impurities resulting from the synthesis consist of tocopherol-related products (impurity A: all-rac-trans-2,3,4,6,7-pentamethyl-2-(4,8,12-trimethyltridecyl)-2,3-dihydrobenzofuran-5-ol; impurity B: all-rac-cis-2,3,4,6,7-pentamethyl-2-(4,8,12-trimethyltridecyl)-2,3-dihydrobenzofuran-5-ol; impurity C: 4-methoxy-2,3,6-trimethyl-5-[(all-RS,E)-3,7,11,15-tetramethylhexadec-2-enyl]phenol; impurity D:

[13] Technical dossier/Section II/Annex 2.1.3.b; Annex 2.1.3.c ; Annex 2.1.3.d ; Annex 2.1.3.g
[14] Technical dossier/Section II/Annex 2.1.3.f ; Annex 2.1.3.g ; Supplementary information May 2012/Annex Qi
[15] Commission Directive 2008/84/EC of 27 August 2008 laying down specific purity criteria on food additives other than colours and sweeteners OJ L 253/1, 20.9.2008, p.1
[16] Technical dossier/Section II/Annex 2.1.3.e
[17] Technical dossier/Section II/Annex 2.1.3.h
[18] PhEur specification: min. 96%
[19] Technical dossier/Section II/Annex 2.1.3.j
[20] Technical dossier/Section II/Annex 2.1.3.j
[21] Commission Directive 2008/84/EC of 27 August 2008 laying down specific purity criteria on food additives other than colours and sweeteners OJ L 253/1, 20.9.2008, p.1

(all-RS,all-E)-2,6,10,14,19,23,27,31-octamethyldotriaconta-12,14,18-triene). On average from five batches,[22] they amount to approximately 1.6 %. All data on impurities A-D confirm compliance with PhEur.

2.2. Stability and homogeneity

Three, five and three commercial batches of tocopherol-rich extracts of natural origin,[23] tocopherol-rich extracts of natural origin / delta-rich[24] and all-rac-alpha-tocopherol,[25] respectively, were stored in closed packages up to 36 months at 25 °C. After three years of storage, a decrease in the concentration of tocopherol of about 3% was observed for tocopherol-rich extracts of natural origin, while no losses were observed in the other two products.

Tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin/delta-rich and all-rac-alpha-tocopherol are added to feedingstuffs and premixtures as an antioxidant. By definition, such additives are not considered stable in feedingstuffs and premixtures.

Tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta-rich and all-rac-alpha-tocopherol are mainly used as antioxidants in fats and oils and in feedingstuffs containing oils and fats. As the additives are fat-soluble, no further demonstration of homogeneity in such feeds are considered necessary.

2.3. Conditions of use

Tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin / delta-rich and all-rac-alpha-tocopherol are intended to be used as antioxidants in feed for all animal species with no minimum and maximum content.

2.4. Evaluation of the analytical methods by the European Union Reference Laboratory (EURL)

EFSA has verified the EURL report as it relates to the methods used for the control of the synthetic alpha-tocopherol in animal feed. The Executive Summary of the EURL report can be found in the Appendix

3. Safety

In a previous opinion on the safety and efficacy of vitamin E for all animal species (EFSA, 2010), the FEEDAP Panel already assessed the safety of RRR-alpha-tocopherol and the acetate ester of all-rac-alpha-tocopherol for all animal species, the consumer, the user and the environment. The FEEDAP Panel is not aware of any more recent scientific findings that would modify its previous conclusions.

In that opinion, no safety concerns were expressed concerning RRR-alpha-tocopherol and the acetate ester of all-rac-alpha-tocopherol for all animal species, the consumer, the user and the environment.

Since no relevant differences in the kinetics and toxicity are known for the four forms alpha-, beta-, gamma- and delta- tocopherol, the conclusions drawn in the previous opinion on the safety of RRR-alpha-tocopherol can reasonably be extended to tocopherol-rich extracts of natural origin containing RRR tocopherols.

Since the tocopheryl esters are generally absorbed in the intestine as tocopherols, the conclusions drawn in the previous opinion on the safety of all-rac-alpha-tocopheryl acetate can reasonably be extended to all-rac-alpha-tocopherol.

[22] Technical dossier/Section II/Annex 2.1.3.j
[23] Technical dossier/Section II/Annex 2.4.1.a
[24] Technical dossier/Section II/Annex 2.4.1.b
[25] Technical dossier/Section II/Annex 2.4.1.c

4. Efficacy

Since tocopherol-rich extracts and all-rac-alpha-tocopherol are used as antioxidants in food (E 306 and E 307, respectively) and their function in feed is essentially the same as that in food, no further demonstration of efficacy is necessary.

All-rac-alpha-tocopherol has also vitamin E activity; 1 mg of all-rac-alpha-tocopherol is equivalent to 1.10 IU vitamin E.

CONCLUSIONS

The FEEDAP Panel extends the conclusions drawn in its opinion on the safety of vitamin E (including RRR-alpha-tocopherol and all-rac-alpha-tocopheryl acetate) to tocopherol-rich extracts and all-rac-alpha-tocopherol. Tocopherol-rich extracts and all-rac-alpha-tocopherol at use levels are safe for all animal species and the consumer. No concern for user safety is expected from the use of tocopherol-rich extracts and all-rac-alpha-tocopherol in feed. The use of tocopherol-rich extracts and all-rac-alpha-tocopherol in animal nutrition will not result in a substantial increase in concentration in the environment.

Since tocopherol-rich extracts and all-rac-alpha-tocopherol are used as antioxidants in food and their function in feed is essentially the same as that in food, no further demonstration of efficacy is necessary.

DOCUMENTATION PROVIDED TO EFSA

1. Tocopherol-rich extracts of natural origin (E306), Tocopherol- rich extracts of natural origin/delta rich (E306), Synthetic alpha tocopherol (E307). August 2010. Submitted by ANTOXIAC EEIG.

2. Tocopherol-rich extracts of natural origin (E306), Tocopherol- rich extracts of natural origin/delta rich (E306), Synthetic alpha tocopherol (E307). Supplementary information. May 2012. Submitted by ANTOXIAC EEIG.

3. Evaluation report of the European Union Reference Laboratory for Feed Additives on the Methods(s) of Analysis for tocopherol-rich extracts of natural origin, tocopherol-rich extracts of natural origin/delta-rich, synthetic alpha-tocopherol.

4. Comments from Member States received through ScienceNet.

REFERENCES

EC (European Commission), 2003, online. Tolerable Upper Intake Level of Vitamin E. Available from http://ec.europa.eu/food/fs/sc/scf/out195_en.pdf

EFSA (European Food Safety Authority), 2006, online. Tolerable Upper Intake Levels for Vitamins and Minerals by the Scientific Panel on Dietetic products, nutrition and allergies (NDA) and Scientific Committee on Food (SCF). Available from http://www.efsa.europa.eu/en/scdocs/oldsc/ndaintakevitaminsminerals.htm

EFSA (European Food Safety Authority), 2008. Opinion on mixed tocopherols, tocotrienols tocopherol and tocotrienols as sources for vitamin E added as a nutritional substance in food supplements. The EFSA Journal 640, 1-34.

EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP), 2010. Scientific opinion on the safety and efficacy of vitamin e as a feed additive for all animal species. EFSA Journal 2010;8(6):1635, 28 pp.

European Pharmacopoeia, 2010. All rac-alpha-tocopherol. European Pharmacopoeia 7.0, 2, 3104-3105.

VICH (International Cooperation on Harmonisation of Technical Requirements for Registration of Veterinary Medicinal Products), 2000. VICH Topic GL18 – Impurities: residual solvents in new veterinary medicinal products, active substances and excipients. Available at: http://www.vichsec.org/pdf/2000/Gl18_st7.pdf

APPENDIX

Executive Summary of the Evaluation Report of the European Union Reference Laboratory for Feed Additives on the Method(s) of Analysis for tocopherol-rich extracts of natural origin, tocopherol- rich extracts of natural origin/delta rich, synthetic alpha tocopherol[26]

In the current grouped application (FAD-2010-0105 and FAD-2010-0271), authorisation is sought under Article 10(2) for two forms of Tocopherol-rich extracts of natural origin (E 306) including the delta rich Tocopherol-rich extracts of natural origin and Synthetic alpha-tocopherol (E 307) under the category/functional group 1(b) 'technological additives/antioxidants', according to the classification system of Annex I of Regulation (EC) No 1831/2003. Specifically, authorisation is sought for the use of the two Tocopherol-rich extracts of natural origin and the Synthetic alpha-tocopherol for all animal species and categories. The feed additives are intended to be incorporated to feedingstuffs directly or through premixtures, with no recommended minimum or maximum concentration levels, as previously set in the regulation.

Tocopherol-rich extracts of natural origin contain alpha, beta, gamma and delta tocopherols, while the main component of Synthetic alpha-tocopherol is all-rac alpha-tocopherol (or dl-alpha-tocopherol).

According to the Applicants:

Tocopherol-rich extracts of natural origin are viscous oils consisting of a minimum of 30% of alpha, beta, gamma and delta tocopherol;

Tocopherol rich extracts of natural origin/delta rich is a viscous oil with minimal content of 70 % delta tocopherol and 80 % total tocopherols; and

Synthetic alpha-tocopherol is a viscous oil with a minimal content of 96 % all-rac alpha-tocopherol.

For the determination of all-rac alpha-tocopherol in the feed additive (i.e. Synthetic alpha-tocopherol), both Applicants submitted the European Pharmacopoeia method (07/2011:0692), where identification is based on optical rotation, infrared absorption spectrophotometry and thin-layer chromatography with ultraviolet detection; while quantification is based on Gas Chromatography coupled to Flame Ionisation Detection (GC/FID). Even though no performance characteristics are provided, the EURL recommends for official control the European Pharmacopoeia method for the determination of all-rac alpha-tocopherol in the feed additive (i.e. Synthetic alpha-tocopherol).

For the determination of the different tocopherol forms (alpha, beta, gamma and delta tocopherol) in the feed additives (i.e. two Tocopherol-rich extracts of natural origin) Applicant FAD-2010-0105 submitted the JECFA method (equivalent to the AOAC method 988.14). The method allows the quantification of each separate form of tocopherols (alpha, beta, gamma and delta tocopherol). The determination is based on Gas Chromatography coupled to Flame Ionisation Detection (GC/FID), using the relative retention times of the corresponding propionate forms, where hexadecyl hexadecanoate is used as internal standard. Even though no performance characteristics are provided, the EURL recommends for official control the AOAC method 988.14 (equivalent to the JECFA method), based on Gas Chromatography coupled to Flame Ionisation Detection (GC/FID) for the determination of the tocopherol forms (alpha, beta, gamma and delta tocopherol) in the feed additives (i.e. two Tocopherol-rich extracts of natural origin).

For the determination of all-rac alpha-tocopherol in premixtures and feedingstuffs containing Synthetic alpha-tocopherol, both Applicants submitted the ring-trial validated Community method

[26] The full report is available on the EURL website:
http://irmm.jrc.ec.europa.eu/EURLs/EURL_feed_additives/authorisation/evaluation_reports/Pages/index.aspx

(Commission Regulation (EC) No142/2009), based on reverse phase High Performance Liquid Chromatography coupled to a UV or Fluorescence Detector (HPLC/UV or HPLC/FLD). Furthermore, the Community method allows the separate determination of the various tocopherol forms (alpha, beta, gamma and delta tocopherol), using a normal phase HPLC.

Additionally, the Applicant (FAD-2010-0105) applied the above mentioned Community method, without the saponification step, for the determination of the free/added tocopherol forms (alpha, beta, gamma and delta tocopherol) in premixtures and feedingstuffs containing Tocopherol-rich extracts of natural origin. The Applicant reported performance characteristics determined in the frame of a verification study, demonstrating the applicability of the Community method for the determination of free/added tocopherol forms in premixtures and feedingstuffs, thus extending its original scope.

Based on the performance characteristics presented, the EURL recommends for official control the ring-trial validated Community method for the determination of all-rac alpha-tocopherol (E 307) in premixtures and feedingstuffs. Furthermore, the EURL recommends the ring-trial validated Community method to quantify the content of free/added tocopherol forms (alpha, beta, gamma and delta tocopherol) in premixtures and feedingstuffs. Provided that the composition of the specific feed additive (E 306) utilised in the preparation of these matrices is known, the results of analysis of the various tocopherol forms may allow for estimating the added amount of this additive to premixtures and feedingstuffs.

Further testing or validation of the methods to be performed through the consortium of National Reference Laboratories as specified by article 10 (Commission Regulation (EC) No 378/2005) is not considered necessary.