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Safety and efficacy of a feed additive consisting of L-valine produced by *Corynebacterium glutamicum* CGMCC 18932 for all animal species (Xinjiang Fufeng Biotechnologies Co., Ltd.)

EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP), Vasileios Bampidis, Giovanna Azimonti, Maria de Lourdes Bastos, Henrik Christensen, Mojca Durjava, Birgit Dusemund, Maryline Kouba, Marta López-Alonso, Secundino López Puente, Francesca Marcon, Baltasar Mayo, Alena Pechová, Mariana Petkova, Fernando Ramos, Yolanda Sanz, Roberto Edoardo Villa, Ruud Woutersen, Lieve Herman, Montserrat Anguita, Jordi Tarrés-Call and Joana P Firmino

Abstract

Following a request from the European Commission, EFSA was asked to deliver a scientific opinion on the safety and efficacy of L-valine produced by fermentation using a non-genetically modified strain of *Corynebacterium glutamicum* (CGMCC 18932). L-Valine is intended to be used in feed and water for drinking as a nutritional additive, functional group amino acids, their salts and analogues, for all animal species and categories. The production strain is considered suitable for the qualified presumption of safety (QPS) approach to safety assessment. The FEEDAP Panel concluded that L-valine produced by *C. glutamicum* CGMCC 18932 is considered safe for the target species when supplemented to the diet in appropriate amounts according to the nutritional needs of the target species. The use of L-valine produced using *C. glutamicum* CGMCC 18932 in animal nutrition is considered safe for the consumer and for the environment. No conclusion could be drawn on the potential of L-valine produced using *C. glutamicum* CGMCC 18932 to be irritant to the skin or eyes, or a dermal sensitiser due to the lack of data. The FEEDAP Panel concluded that the L-valine produced by fermentation using *C. glutamicum* CGMCC 18932 is an efficacious source of the essential amino acid L-valine for non-ruminant nutrition. To be as efficacious in ruminants as in non-ruminants, supplemental L-valine requires protection against ruminal degradation. The FEEDAP Panel expressed concerns on the use of amino acids in water for drinking for hygienic reasons.

Keywords: nutritional additives, aminoacids, their salts and analogues, L-valine, *Corynebacterium glutamicum*, safety, efficacy

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Question number: EFSA-Q-2021-00566

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1. Introduction

1.1. Background and Terms of Reference

Regulation (EC) No 1831/2003[1] establishes the rules governing the Community authorisation of additives for use in animal nutrition. In particular, Article 4(1) of that Regulation lays down that any person seeking authorisation for a feed additive or for a new use of feed additive shall submit an application in accordance with Article 7.

The European Commission received a request from Xinjiang Fufeng Biotechnologies Co., Ltd. represented in the EU by Erawan Consulting[2] for the authorisation of the additive consisting of L-valine produced by *Corynebacterium glutamicum* CGMCC 18932, when used as a feed additive for all animal species (category: nutritional additives; functional group: aminoacids, their salts and analogues).

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 4(1) (authorisation of a feed additive or new use of a feed additive). EFSA received directly from the applicant the technical dossier in support of this application. The particulars and documents in support of the application were considered valid by EFSA as of 03 August 2022.

According to Article 8 of Regulation (EC) No 1831/2003, 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. EFSA shall deliver an opinion on the safety for the target animals, consumer, user and the environment and on the efficacy of the feed additive consisting of L-valine produced by *Corynebacterium glutamicum* CGMCC 18932, when used under the proposed conditions of use (see **Section 3.1.7**).

1.2. Additional information

The additive is a preparation containing L-valine produced by *C. glutamicum* CGMCC 18932, that is not authorised as a feed additive in the European Union.

The EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) issued a series of scientific opinions on the safety and efficacy of L-valine produced by fermentation using different production strains, when used in feed for all animal species as a nutritional additive (functional group: amino acids, their salts and analogues).

L-Valine produced by fermentation using different production strains is currently authorised for its use in all animal species as a nutritional additive (functional group: amino acids, their salts and analogues).[3] L-Valine is also authorised as a sensory additive (functional group: flavouring compounds, FLAVIS No 17.028) for all animal species.[4]

L-Valine is described in a monograph in the European Pharmacopoeia (Monograph 01/2017:0796) (European Pharmacopoeia, 11th edition, 2022).

2. Data and methodologies

2.1. Data

The present assessment is based on data submitted by the applicant in the form of a technical dossier[5] in support of the authorisation request for the use of L-valine (*C. glutamicum* CGMCC 18932)

[1] Regulation (EC) No 1831/2003 of the European Parliament and of the council of 22 September 2003 on the additives for use in animal nutrition. OJ L 268, 18.10.2003, p. 29.

[2] Xinjiang Fufeng Biotechnologies Co., Ltd, No 188 Fangzheng East Street, Ganquanpu Economic and Technological Development Zone, Urumqi City, Xinjiang Country, Republic of China (represented in the EU by Erawan Consulting, Asnières Affaires - 25 rue des Bas, 92600, Asnières-sur-Seine, France).

[3] Commission Implementing Regulation (EU) No 2015/1114 of 9 July 2015 OJ L 182, 10.7.2015, p. 18, and Commission Implementing Regulation (EU) 2020/1797 of 30 November 2020 OJ L 402, 1.12.2020, p. 36 (3c370); Commission Implementing Regulation (EU) 2019/1289 of 31 July 2019 OJ L 203, 1.8.2019, p. 2 (3c371); Commission Implementing Regulation (EU) 2021/719 of 30 April 2021 OJ L 151, 3.5.2021, p. 12 (3c371i); Commission Implementing Regulation (EU) 2021/2077 of 26 November 2021/Corrigendum in OJ L 83 10.3.2022 p. 65 OJ L 426, 29.11.2021, p. 5/Corrigendum in OJ L 83 10.3.2022 p. 65, and Commission Implementing Regulation (EU) 2022/1492 of 8 September 2022 OJ L 234, 9.9.2022, p. 14 (3c371ii).

[4] Commission Implementing Regulation (EU) 2018/249 of 15 February 2018. OJ L 53, 23.2.2018, p. 134.

[5] Dossier reference: FEED-2021-1685.

as a feed additive. The dossier was received on 10 June 2021 and the general information and supporting documentation is available at https://open.efsa.europa.eu/questions/EFSA-Q-2021-00566.

In accordance with Article 38 of the Regulation (EC) No 178/2002[6] and taking into account the protection of confidential information and of personal data in accordance with Articles 39 to 39e of the same Regulation, and of the Decision of EFSA's Executive Director laying down practical arrangements concerning transparency and confidentiality,[7] a non-confidential version of the dossier has been published on Open.EFSA.

According to Article 32c(2) of Regulation (EC) No 178/2002 and to the Decision of EFSA's Executive Director laying down the practical arrangements on pre-submission phase and public consultations,[7] EFSA carried out a public consultation on the non-confidential version of the application from 08 to 29 May 2023 for which no comments were received.

In addition, the confidential version of the technical dossier was subject to a target consultation of the interested Member States from 3 August to 3 November 2022, for which received comments were considered for the assessment.

The FEEDAP Panel used the data provided by the applicant together with data from other sources, such as previous risk assessments by EFSA or other expert bodies, peer-reviewed scientific papers, other scientific reports and experts' (elicitation) knowledge, to deliver the present output.

EFSA has verified the European Union Reference Laboratory (EURL) report as it relates to the methods used for the control of the active substance in animal feeds.[8]

2.2. Methodologies

The approach followed by the FEEDAP Panel to assess the safety and the efficacy of L-valine is in line with the principles laid down in Regulation (EC) No 429/2008[9] and the relevant guidance documents: Guidance on studies concerning the safety of use of the additive for users/workers (EFSA FEEDAP Panel, 2012), Guidance on the assessment of the safety of feed additives for the consumer (EFSA FEEDAP Panel, 2017a), Guidance on the identity, characterisation and conditions of use of feed additives (EFSA FEEDAP Panel, 2017b), Guidance on the assessment of the safety of feed additives for the target species (EFSA FEEDAP Panel, 2017c), Guidance on the assessment of the efficacy of feed additives (EFSA FEEDAP Panel, 2018a), Guidance on the characterisation of microorganisms used as feed additives or as production organisms (EFSA FEEDAP Panel, 2018b), Guidance on the assessment of the safety of feed additives for the environment (EFSA FEEDAP Panel, 2019).

3. Assessment

The subject of the assessment is a product consisting of L-valine (minimum 98.0% on a dry matter (DM) basis) produced by *C. glutamicum* CGMCC 18932, intended to be used as a nutritional additive (functional group amino acids, their salts and analogues) in feed and water for drinking for all animal species.

3.1. Characterisation

3.1.1. Characterisation of the production organism

L-Valine is produced by fermentation by a non-genetically modified strain of *C. glutamicum*, which is deposited in the China General Microbiological Culture Collection Centre (CGMCC) with accession number CGMCC 18932. *C. glutamicum* CGMCC 18932 was originally isolated from soil.[10]

The taxonomic identification of the production strain as *C. glutamicum* was confirmed by average nucleotide identity (ANI) calculation based on the whole genome sequence (WGS) data, showing a value of 99.96% with the *C. glutamicum* type strain ATCC 14067^T.[11]

[6] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, pp. 1–48.
[7] Decision available at: https://www.efsa.europa.eu/en/corporate-pubs/transparency-regulation-practical-arrangements
[8] The full report is available on the EURL website: https://joint-research-centre.ec.europa.eu/publications/feed-2021-1685_en
[9] Commission Regulation (EC) No 429/2008 of 25 April 2008 on detailed rules for the implementation of Regulation (EC) No 1831/2003 of the European Parliament and of the Council as regards the preparation and the presentation of applications and the assessment and the authorisation of feed additives. OJ L 133, 22.5.2008, p. 1.
[10] Annex_II_2_2 Corynebacterium glutamicum_CGMCC18932_registration collection.
[11] Annex_II_2_3 L-Valine_WGs report.

The susceptibility of the production strain to the antibiotics recommended by the EFSA FEEDAP guidance for *Corynebacterium* (EFSA FEEDAP, 2018b) was tested and the results showed that the minimum inhibitory concentration values for all tested antimicrobials were below the FEEDAP cut-off values.[12] Therefore, the production strain *C. glutamicum* CGMCC 18932 is considered susceptible to all relevant antibiotics.

The WGS data of the production strain was screened for the presence of antimicrobial resistance genes towards the [redacted].[11]

3.1.2. Manufacturing process

[redacted].[13]

3.1.3. Characterisation of the active substance/additive

L-Valine (International Union of Pure and Applied Chemistry (IUPAC)) name: ((2*S*)-2-amino-3-methylbutanoic acid; synonyms: α-amino isovaleric acid, 2-amino-3-methylbutyric acid), a compound identified by Chemical Abstracts Service (CAS) No 72-18-4 and European Inventory of Existing Commercial Chemical Substances (EINECS) No 200-773-6, has a molecular weight of 117.15 g/mol; the molecular formula is $C_5H_{11}NO_2$ and its structural formula is given in Figure 1.

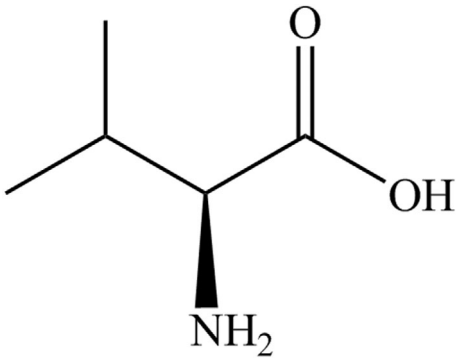

Figure 1: Molecular structure of L-valine

The additive is specified to contain ≥ 98.5% L-valine on 'as is' basis and ≤ 0.5% moisture.[14] Analysis of five batches showed an average valine concentration of 98.8% (range 97.9–99.9%) on 'as is' basis, and moisture was < 0.5% in all batches. It is noted that one of the analysed batches showed a L-valine content below the specification of the applicant.[15]

The specific optical rotation measured in five batches ranged from +27.1 to +28.9°, which falls within the reference range given in the European Pharmacopoeia (+25.6 to +29.0°) and confirms the L-enantiomer of L-valine.[16] Other constituents (analysed in three batches) as e.g. nitrogen compounds,

[12] Annex_II_2_9 L-Valine_MIC determination.
[13] Point 2–3 Manufacturing process_L-valine.
[14] Valine was analysed using the EU official method.
[15] Annex_II_1_6 CoAs_L-Valine_5 batches.
[16] Annex II_1_5 CoAs_L-Valine_5 batches.

organic acids, ions, amino acids other than valine showed negligible levels and often below the quantification limits. Residue on ignition (sulphated ash) was ≤ 0.2%.[15]

3.1.4. Impurities

Three different production batches of the additive were analysed for impurities. Concentrations of lead, cadmium, mercury and arsenic were all below the limit of quantification (LOQ).[17]

The same batches were analysed for aflatoxins (B1, B2, G1, G2), ochratoxin A, fumonisin (B1), toxins T2 and HT2, deoxynivalenol and zearalenone concentrations were below their LOQ.[18] Fumonisin B2 ranged from LOQ to 44.4 μg/kg (values above LOQ in two batches).

Three batches were also analysed for polychlorinated dibenzodioxins/dibenzofurans (PCDD/Fs), dioxin-like polychlorinated biphenyls (DL-PCBs) and non-DL-PCBs. The overall results were found below the LOQ of the analytical methods, with exception of one batch that revealed some DL- and non-DL-PCBs values over the LOQ (PCB 156: 47 ng/kg; PCB 167: 25 ng/kg; PCB 138: 0.64 μg/kg; PCB 153: 0.81 μg/kg; PCB 180: 0.19 μg/kg). In the three batches, the sum of dioxins calculated considering the upper bond was 0.16 ng TEQ-WHO/kg, the sum of DL-PCBs was 0.14 ng TEQ-WHO/kg, the sum of non-DL-PCBs was 2.1 μg TEQ-WHO/kg, and the sum of dioxin and DL-PCBs was 0.30 ng/kg (DM basis).[19]

Residues of methanol and ethanol have been evaluated on five different recent production batches of L-Valine and were all below the LOQ (< 10 mg/kg).[20]

The microbial contamination of the additive was analysed in three batches. Counts were below the LOD (< 10 colony forming units (CFU/g)) for total mesophilic counts, total coliforms, *E. coli*, anaerobic sulphate reducing bacteria, *C. perfringens*, yeast and moulds. Coagulase-positive *Staphylococci* were < 100 CFU/g, and *Salmonella* spp. were absent in 25 g samples.[21]

Endotoxin activity was measured (European Pharmacopoeia method D) in three batches of the additive and ranged from 0.001 to 0.002 IU/mg.[22]

The FEEDAP Panel considers that the microbial contamination and the amounts of the detected impurities do not raise safety concerns.

The antimicrobial activity was tested according to the EFSA FEEDAP Panel guidance on characterisation of microorganisms used as feed additives or as production organisms (2018b) except for one of the species of microorganism proposed (*E. coli*) for which a different strain was used (ATCC 11229 instead of ATCC 25922). Results of the tests supported the evidence of the absence of antimicrobial activity of *C. glutamicum* CGMCC 18932.[23]

The presence of viable cells of the production strain in the final product was investigated [redacted] Therefore, the final product does not contain cells of the production strain.[24]

3.1.5. Physical properties of the additive

The product under assessment is a white crystalline odourless powder. The bulk density (measured in three batches) ranged from 478–482 kg/m^3 and the tap density ranged from 645–649 kg/m^3.[25]

Solubility in water (20°C), measured in five different production batches, showed an average of 58.6 g/L (range 56.7–60.5 g/L).[26]

[17] Annex II_1_7 L-Valine_3 batches_Heavy Metals_Mycotoxins_dioxins. LOQ in mg/kg were 0.5 for lead and arsenic, 0.2 for cadmium and 0.02 for mercury.
[18] Annex II_1_7 L-Valine_3 batches_Heavy Metals_Mycotoxins_dioxins. LOQ in μg/kg were 0.3 for aflatoxin B1; 0.5 for aflatoxin B2, G1, G2, and ochratoxin A; 5 for zearalenone and T-2 toxin; 0.05 for deoxynivalenol, 20 for fumonisin B1 and B2; and 10 for HT-2 toxin.
[19] Annex II_1_7 L-Valine_3 batches_Heavy Metals_Mycotoxins_dioxins.
[20] Annex_RFI_Q2_1 L-valine_CGMCC 18932_Residues content.
[21] Annex II_1_8 L-Valine_Microbial purity.
[22] Annex_II_1_12 L-Valine_Bacterial Endotoxins.
[23] Annex_II_1_10 L-Valine_Antibacterial activity.
[24] Annex_II_1_13 L-Valine_Abs prod strain.
[25] Annex_II_1_14 L-Valine_Physical state.
[26] Annex_II_2_8 L-Valine_Solubility data.

The dusting potential of three batches of the additive was determined using the Stauber–Heubach method and showed values ranging 1,040–1,115 mg/m^3.[25]

The particle size distribution of the product was analysed in three batches by laser-diffraction method; the results showed that the fraction of particles having a diameter < 100 μm was [redacted], of < 50 μm represented [redacted], of < 10 μm represented [redacted] and of < 1 μm represented [redacted] (v/v).[27]

3.1.6. Stability and homogeneity

3.1.6.1. Shelf life

The shelf life of the additive [redacted] was studied [redacted] for 12 months. [redacted][28] and [redacted].[29]

3.1.6.2. Stability

[redacted][30]

.[31]

[redacted][32]

.[33]

[redacted]

.[34]

3.1.6.3. Homogeneity

[redacted][35]

3.1.7. Conditions of use

The additive under assessment can be added via premixture or directly into feedingstuffs (including complete feed and complementary feed), for all animal species and categories. It is also proposed to be used in water for drinking, taking into account possible amino acids imbalances when supplementing the additive through feed and water for drinking at the same time.

[27] Annex_II_1_15 PSD Report No. 200 184_L-Valine; and Annex_II_1_16 Raw data_PSD.
[28] Annex_II_4_1 Additive_stability study 25C.
[29] Annex_II_4_2 Additive_stability study 40C.
[30] Annex_II_4_3 PM_Feeds manufacture.
[31] Annex_II_4_6 Stability study_PM_Z; and Annex_II_4_7 Stability study_PM_K.
[32] Annex_II_4_9 Stability study_Feeds_Mash_Z; and Annex_II_4_10 Stability study_Feeds_Mash_K.
[33] Annex_II_4_11 Stability study_Feeds_Pellets_Z; Annex_II_4_12 Stability study_Feeds_Pellets_K.
[34] Annex_II_4_14 Stability study_Water_25C; and Annex_II_4_16 Stability study_Water_40C.
[35] Annex_II_4_19 Homogeneity_Feeds_Mash_Pellet.

No inclusion levels have been proposed, as the quantitative requirements of L-valine depend on the species, the physiological state of the animal, the performance level, the environmental conditions, and the amino acid composition of the unsupplemented diet.

3.2. Safety

3.2.1. Safety for the target species, consumers and the environment

The additive under assessment contains > 98.0% L-valine on DM basis. Safety concerns from the additive could derive from the residues of the fermentation process/production strain remaining in the final product. The production strain belongs to a species, *C. glutamicum*, that qualifies for the qualified presumption of safety (QPS) approach for safety assessment (EFSA, 2007) when used for production purposes (EFSA BIOHAZ Panel, 2023). The strain was unambiguously identified as *C. glutamicum* and was shown not to harbour acquired antimicrobial resistance determinants for antibiotics of human and veterinary importance (see Section 3.1.1). The final product does not contain viable cells of the production strain. Consequently, no safety concerns for target animal, consumers and the environment are expected from the additive concerning the production strain and the fermentation residues that may be present in the final additive.

L-Valine requirements of different species (non-ruminant and ruminant) and animal categories, absorption and metabolic fate of L-valine, and tolerance to L-valine excess in the diet were described in previous opinions (EFSA FEEDAP Panel, 2013, 2014). The use of the amino acid 'per se' does not raise safety concerns for the target animals, provided it is supplemented in appropriate amounts to the diets. The FEEDAP Panel has concerns on the use of amino acids in water for drinking for hygienic reasons (EFSA FEEDAP Panel, 2010).

The amino acid L-valine, supplemented to feed, will be incorporated into proteins of tissues and/or products of animal origin and any of its potential excess will be incorporated into the intestinal microbial mass, metabolised and excreted as urea/uric acid and carbon dioxide. Therefore, the composition of tissues and products of animal origin will not be affected by the use of L-valine in animal nutrition and consequently it raises no concerns for the consumers. The use of the additive in animal nutrition would not lead to any localised increase in the concentration of L-valine or its metabolites in the environment.

3.2.1.1. Conclusions on safety for the target species, consumers and the environment

L-Valine produced using *C. glutamicum* CGMCC 18932 is safe for the target species when supplemented in appropriate amounts to the diet according to the nutritional needs of the target species. The FEEDAP Panel has concerns on the use of amino acids in water for drinking for hygienic reasons. The use of L-valine produced by *C. glutamicum* CGMCC 18932 in animal nutrition is considered safe for the consumers and for the environment.

3.2.2. Safety for the user

The additive under assessment has a dusting potential up to 1,115 mg/m^3. Therefore, exposure of users by inhalation is likely.

No specific, skin/eye irritation or skin sensitisation studies were provided for the additive under assessment. In the absence of data, the FEEDAP Panel cannot conclude on the potential of the additive to be irritant to skin or eyes, or on its potential to be a dermal sensitiser.

3.3. Efficacy

Efficacy studies are not required for amino acids that occur naturally in plant and animal proteins. The nutritional role of the amino acid L-valine is well established in the scientific literature. L-Valine produced by fermentation using *C. glutamicum* CGMCC 18932 is regarded as an efficacious source of the essential amino acid L-valine for non-ruminant nutrition. The Panel indicated in a previous opinion (EFSA FEEDAP Panel, 2013) that ruminal degradation would reduce the delivery of the amino acid to the abomasum, and that protective measures should be considered.

3.4. Post-market monitoring

The FEEDAP Panel considers that there is no need for specific requirements for a post-market monitoring plan other than those established in the Feed Hygiene Regulation[36] and Good Manufacturing Practice.

4. Conclusions

L-Valine produced using *C. glutamicum* CGMCC 18932 is safe for the target species when supplemented to the diet in appropriate amounts according to the nutritional needs of the target species. The FEEDAP Panel has concerns on the use of amino acids in water for drinking for hygienic reasons.

The use of L-valine produced using *C. glutamicum* CGMCC 18932 in animal nutrition at the proposed conditions of use is considered safe for the consumers and for the environment.

The FEEDAP Panel cannot conclude on the potential of L-valine produced by *C. glutamicum* CGMCC 18932 to be irritant to the skin or eyes, or a dermal sensitiser due to the lack of data. The exposure through inhalation is likely.

The additive L-valine produced by fermentation using *C. glutamicum* CGMCC 18932 is regarded as an efficacious source of the essential amino acid L-valine for non-ruminant nutrition. For the supplemental L-valine to be as efficacious in ruminants as in non-ruminant species, it requires protection against degradation in the rumen.

References

EFSA (European Food Safety Authority), 2007. Opinion of the Scientific Committee on a request from EFSA on the introduction of a Qualified Presumption of Safety (QPS) approach for assessment of selected microorganisms referred to EFSA. EFSA Journal 2007;5(12)587: 85 pp. https://doi.org/10.2903/j.efsa.2007.587

EFSA BIOHAZ Panel (EFSA Panel on Biological Hazards), Koutsoumanis, K, Allende, A, Álvarez-Ordóñez, A, Bolton, D, Bover-Cid, S, Chemaly, M, De Cesare, A, Hilbert, F, Lindqvist, R, Nauta, M, Peixe, L, Ru, G, Simmons, M, Skandamis, P, Suffredini, E, Cocconcelli, PS, Fernández Escámez, PS, Prieto Maradona, M, Querol, A, Sijtsma, L, Suarez, JE, Sundh, I, Vlak, JM, Barizzone, F, Hempen, M, Correia, S and Herman, L, 2023. Scientific Opinion on the update of the list of qualified presumption of safety (QPS) recommended microorganisms intentionally added to food or feed as notified to EFSA. EFSA Journal 2023;21(1):7747, 23 pp. https://doi.org/10.2903/j.efsa.2023.7747

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2012. Guidance on studies concerning the safety of use of the additive for users/workers. EFSA Journal 2012;10(1):2539, 5 pp. https://doi.org/10.2903/j.efsa.2012.2539

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2013. Scientific Opinion on the safety and efficacy of L-valine produced by *Corynebacterium glutamicum* (KCCM 80058) for all animal species, based on a dossier submitted by CJ Europe GmbH. EFSA Journal 2013;11(10):3429, 20 pp. https://doi.org/10.2903/j.efsa.2013.3429

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2014. Scientific Opinion on the safety and efficacy of L-valine (ValAMINO®) produced by *Corynebacterium glutamicum* (DSM 25202) for all animal species, based on a dossier submitted by Evonik Industries AG. EFSA Journal 2014;12(7):3795, 14 pp. https://doi.org/10.2903/j.efsa.2014.3795

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Rychen G, Aquilina G, Azimonti G, Bampidis V, Bastos ML, Bories G, Chesson A, Cocconcelli PS, Flachowsky G, Gropp J, Kolar B, Kouba M, López-Alonso M, López Puente S, Mantovani A, Mayo B, Ramos F, Saarela M, Villa RE, Wallace RJ, Wester P, Anguita M, Dujardin B, Galobart J and Innocenti ML, 2017a. Guidance on the assessment of the safety of feed additives for the consumer. EFSA Journal 2017;15(10):5022, 17 pp. https://doi.org/10.2903/j.efsa.2017.5022

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Rychen G, Aquilina G, Azimonti G, Bampidis V, Bastos ML, Bories G, Chesson A, Cocconcelli PS, Flachowsky G, Gropp J, Kolar B, Kouba M, López-Alonso M, López Puente S, Mantovani A, Mayo B, Ramos F, Saarela M, Villa RE, Wallace RJ, Wester P, Anguita M, Galobart J and Innocenti ML, 2017b. Guidance on the identity, characterisation and conditions of use of feed additives. EFSA Journal 2017;15(10):5023, 12 pp. https://doi.org/10.2903/j.efsa.2017.5023

[36] Regulation (EC) No 183/2005 of the European Parliament and of the Council of 12 January 2005 laying down requirements for feed hygiene. OJ L 35, 8.2.2005, p. 1.

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Rychen G, Aquilina G, Azimonti G, Bampidis V, Bastos ML, Bories G, Chesson A, Cocconcelli PS, Flachowsky G, Gropp J, Kolar B, Kouba M, López-Alonso M, López Puente S, Mantovani A, Mayo B, Ramos F, Saarela M, Villa RE, Wallace RJ, Wester P, Anguita M, Galobart J, Innocenti ML and Martino L, 2017c. Guidance on the assessment of the safety of feed additives for the target species. EFSA Journal 2017;15(10):5021, 19 pp. https://doi.org/10.2903/j.efsa.2017.5021

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Rychen G, Aquilina G, Azimonti G, Bampidis V, Bastos ML, Bories G, Chesson A, Cocconcelli PS, Flachowsky G, Gropp J, Kolar B, Kouba M, López-Alonso M, López Puente S, Mantovani A, Mayo B, Ramos F, Saarela M, Villa RE, Wallace RJ, Wester P, Anguita M, Galobart J, Innocenti ML and Martino L, 2018a. Guidance on the assessment of the efficacy of feed additives. EFSA Journal 2018;16 (5):5274, 25 pp. https://doi.org/10.2903/j.efsa.2018.5274

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Rychen G, Aquilina G, Azimonti G, Bampidis V, Bastos ML, Bories G, Chesson A, Cocconcelli PS, Flachowsky G, Gropp J, Kolar B, Kouba M, López-Alonso M, López Puente S, Mantovani A, Mayo B, Ramos F, Saarela M, Villa RE, Wallace RJ, Wester P, Glandorf B, Herman L, Kärenlampi S, Aguilera J, Anguita M, Brozzi R and Galobart J, 2018b. Guidance on the characterisation of microorganisms used as feed additives or as production organisms. EFSA Journal 2018;16(3):5206, 24 pp. https://doi.org/10.2903/j.efsa.2018.5206

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Bampidis V, Bastos M, Christensen H, Dusemund B, Kouba M, Kos Durjava M, López-Alonso M, López Puente S, Marcon F, Mayo B, Pechová A, Petkova M, Ramos F, Sanz Y, Villa RE, Woutersen R, Brock T, de Knecht J, Kolar B, van Beelen P, Padovani L, Tarres-Call J, Vettori MV and Azimonti G, 2019. Guidance on the assessment of the safety of feed additives for the environment. EFSA Journal 2019;17(4):5648, 78 pp. https://doi.org/10.2903/j.efsa.2019.5648

EFSA FEEDAP Panel (Panel on Additives and Products or Substances Used in Animal Feed), 2010. Scientific Opinion on the use of feed additives authorised/applied for use in feed when supplied via water. EFSA Journal 2010;8 (12):1956, 9 pp. https://doi.org/10.2903/j.efsa.2010.1956

Jäger W, Kalinowski J and Pühler A, 1997. A *Corynebacterium glutamicum* gene conferring multidrug resistance in the heterologous host *Escherichia coli*. Journal of Bacteriology, 179, 2449–2451. https://doi.org/10.1128/jb.179.7.2449-2451

Abbreviations

CAS	Chemical Abstracts Service
CFU	colony forming unit
CV	coefficient of variation
DM	dry matter
EINECS	European Inventory of Existing Chemical Substances
EURL	European Union Reference Laboratory
FEEDAP	EFSA Scientific Panel on Additives and Products or Substances used in Animal Feed
FLAVIS	The EU Flavour Information System
FL-no	FLAVIS number
IUPAC	International Union of Pure and Applied Chemistry
LOD	limit of detection
LOQ	limit of quantification
MW	molecular weight