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Assessment of the application for renewal of authorisation of selenium-enriched yeast produced by *Saccharomyces cerevisiae* CNCM I-3399 for all animal species

EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP), Vasileios Bampidis, Giovanna Azimonti, Maria de Lourdes Bastos, Henrik Christensen, Birgit Dusemund, Mojca Kos Durjava, 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, Montserrat Anguita, Jaume Galobart, Orsolya Holczknecht, Jordi Tarrés-Call, Elisa Pettenati, Fabiola Pizzo and Paola Manini

Abstract

Selenium-enriched yeast produced by *Saccharomyces cerevisiae* CNCM I-3399 (selenised yeast inactivated) (SELSAF) is characterised as organic selenium mainly containing selenomethionine (Se-Met, ≥ 63%). The applicant requested for the renewal of the authorisation for selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 when used as a feed additive for all animal species. The applicant has provided evidence that the additive in the market complies with the conditions of the authorisation. The Panel on Additives and Products or Substances used in Animal Feed (FEEDAP Panel) confirms that the use of selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 under the current authorised conditions of use is safe for the target species, the consumers and the environment. The additive is non-irritant to skin and eyes but should be considered a respiratory sensitiser. No conclusion can be reached on its dermal sensitising properties. The additive is hazardous by inhalation. Exposure of users by inhalation is very likely. There is no need for assessing the efficacy of the additive in the context of the renewal of the authorisation.

Keywords: nutritional additive, compounds of trace elements, selenium, selenised yeast, *Saccharomyces cerevisiae* CNCM I-3399, SELSAF, safety

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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 14(1) of that Regulation lays down that an application for renewal shall be sent to the Commission at the latest one year before the expiry date of the authorisation.

The European Commission received a request from Phileo – Division of S.I. Lesaffre[2] for renewal of the authorisation of selenium-enriched yeast produced by *Saccharomyces cerevisiae* CNCM I-3399 (Selenised yeast inactivated), when used as a feed additive for all animal species (category: nutritional additives; functional group: compounds of trace elements).

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 14(1) (renewal of the authorisation). The particulars and documents in support of the application were considered valid by EFSA as of 15 February 2019.

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 the efficacy of the product organic form of selenium produced by *Saccharomyces cerevisiae* CNCM I-3399 (Selenised yeast inactivated), when used under the proposed conditions of use (see Section 3.1.3).

1.2. Additional information

The additive is based on selenium-enriched yeast from *S. cerevisiae* CNCM I-3399. The EFSA Scientific Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) issued an opinion on the safety and efficacy of SELSAF (an additive containing 2,000–2,400 mg Se/kg additive), when used in feed for all animal species (EFSA, 2009). Subsequently, the Panel evaluated a new formulation of the additive with a higher selenium concentration (minimum 3,000 mg Se/kg; trade name: SELSAF 3000), with the same conditions of use as for the authorised product (EFSA FEEDAP Panel, 2017).

Selenomethionine (organic form of selenium produced by *S. cerevisiae* CNCM I-3399) is currently authorised as a nutritional additive for all animal species. The first authorisation of selenomethionine (Se-Met) produced by *S. cerevisiae* CNCM I-3399 was granted in 2009 by Commission Regulation (EC) No 900/2009[3]. The authorisation was later modified by Commission Implementing Regulation (EU) No 427/2013[4] limiting the maximum selenium supplementation rate from organic selenium sources to 0.2 mg/kg complete feed. A further amendment of the authorisation was introduced as regards to the characterisation of the active substance, which was replaced as follow: 'organic selenium, mainly selenomethionine (63%) with a content of 2,000 to 3,500 mg Se/kg (97–99% of organic selenium)'.[5]

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[6] in support of the authorisation request for the use of selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 (selenised yeast inactivated) as a feed additive.

[1] 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.
[2] Phileo – Division of S.I. Lesaffre, Rue Gabriel Peri, 137, BP 3029, 59703, Marcq en Barouel, France.
[3] Commission Regulation (EC) No 900/2009 of 25 September 2009 concerning the authorisation of selenomethionine produced by *Saccharomyces cerevisiae* CNCM I-3399 as a feed additive. OJ L 256, 25.9.2009, p. 12.
[4] Commission Implementing Regulation (EU) No 427/2013 of 8 May 2013 concerning the authorisation of selenomethionine produced by *Saccharomyces cerevisiae* NCYC R646 as a feed additive for all animal species and amending Regulations (EC) No 1750/2006, (EC) No 634/2007 and (EC) No 900/2009 as regards the maximum supplementation with selenised yeast. OJ L 127, 9.5.2013, p. 20.
[5] Commission Implementing Regulation (EU) No 2017/2233 of 4 December 2017 amending Regulation (EC) No 900/2009 as regards the characterisation of selenomethionine produced by Saccharomyces cerevisiae CNCM I-3399. OJ L 319, 5.12.2017, p. 78.
[6] FEED dossier reference: FAD-2018-0077.

The European Union Reference Laboratory (EURL) considered that the conclusions and recommendations reached in the previous assessment are valid and applicable for the current application.[7]

2.2. Methodologies

The approach followed by the FEEDAP Panel to assess the safety of selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 (selenised yeast inactivated) is in line with the principles laid down in Regulation (EC) No 429/2008[8] and the relevant guidance documents: Guidance on the renewal of the authorisation of feed additives (EFSA FEEDAP Panel, 2013) and Guidance on the characterisation of microorganisms used as feed additives or as production organisms (EFSA FEEDAP Panel, 2018).

3. Assessment

The additive, selenium-enriched yeast from *S. cerevisiae* CNCM I-3399 (selenised yeast inactivated), is characterised as organic selenium (Se) mainly containing selenomethionine (Se-Met, ≥ 63%). It was initially authorised with a content of 2,000–2,400 mg Se/kg additive (97–99% of organic selenium). The authorisation was further amended to introduce a selenium range of 2,000–3,500 mg Se/kg additive. The maximum selenium supplementation rate is 0.2 mg/kg complete feed with a moisture content of 12%.

This assessment regards the renewal of the authorisation of the additive, when used as a nutritional additive (functional group: compounds of trace elements) for all animal species.

3.1. Characterisation

3.1.1. Characterisation of the additive

The additive is marketed in two formulations, SELSAF containing 2,000–2,400 mg Se/kg additive and SEFSAF 3000 containing 2,700–3,500 mg Se/kg additive. Both additives are specified to contain mainly selenium from selenomethionine (≥ 63%).

The applicant stated that no changes in the manufacturing process or composition of the additive have been introduced since the last authorisation. This was confirmed by the analysis of three recent batches for each formulation, which showed compliance with the characterisation of the additive in the authorising Regulation (Regulation (EC) No 2017/2233).[9]

On average, total selenium content in SELSAF (determined in four recent batches) was 2,174 mg/kg additive (range 2,080–2,245), selenium from selenomethionine 1,401 mg/kg (range 1,348–1,480), corresponding to 65.4% (range 64.8–65.9%) of total selenium. Inorganic selenium content was very low: average value for Se IV was 4.0 mg/kg (range 1.9–7.0) whilst Se VI was detectable in one batch (1.5 mg/kg) and below the limit of quantification (LOQ) in the other two batches (LOQ, 0.5 mg/kg).[10]

On average, total selenium content in SELSAF 3000 (determined in five recent batches) was 2,925 mg/kg additive (range 2,877–3,132), selenium from selenomethionine 2,009 mg/kg (range 1,885–2,109), corresponding to 66.6% (range 65.5–67.3%) of total selenium. Inorganic selenium content was very low: average value for Se IV was 3.0 mg/kg (range 1.6–4.2) whilst Se VI was below the limit of quantification in all batches (LOQ 0.5 mg/kg).[10]

Three batches of each formulation were analysed for impurities. Mercury was below the limit of detection (LOD). The content of lead, cadmium and arsenic in SELSAF were 0.07 mg Pb/kg (range 0.06–0.08), 0.03 mg Cd/kg (0.03–0.04) and 0.2 mg As/kg additive. In SELSAF 3000, the corresponding values were 0.07 mg Pb/kg (range < 0.05–0.09), 0.06 mg Cd/kg (0.05–0.07) and 0.3 mg As/kg additive (0.2–0.5).[11] Levels of dioxins (polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/F)) and the sum of dioxins plus dioxin-like polychlorinated biphenyls (DL-PCBs) were 0.061 ng WHO-PCDD/F-TEQ/kg and 0.093 ng WHO-PCDD/F-PCB-TEQ/kg in SELSAF and 0.056 ng WHO-PCDD/F-

[7] The report linked to the previous dossier (related to EFSA-Q-2005-071) is available on the EURL website: https://ec.europa.eu/jrc/sites/jrcsh/files/FinRep-FAD-2005-0007.pdf

[8] Commission Regulation (EC) No 429/2008 of 25 April 2008 on detailed rules for the implementation ofz 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.

[9] Organic selenium mainly selenomethionine (63%) content of 2,000–3,500 mg Se/kg (97–99% of organic selenium).

[10] Technical dossier/Section II/Annex II_1_11.

[11] Technical Dossier/Section II/Annex II_1_14. Mercury, LOD = 0.005 mg/kg.

TEQ/kg and 0.087 ng WHO-PCDD/F-PCB-TEQ/kg in SELSAF 3000.[12] These values comply with the thresholds set in Directive 2002/32/EC[13] for compounds of trace elements or, if not mentioned in the Directive, do not represent a safety concern.

The same batches were analysed for mycotoxins[12] and microbial contamination.[14] The following mycotoxins were investigated: deoxynivalenol, fumonisins B1 and B2, zearalenone, aflatoxins B1, B2, G1 and G2 and ochratoxin A; levels were always below the LOD, except aflatoxin B1 which was 0.12 mg/kg in SELSAF and 0.11 in SELSAF 3000.[15] Data on microbiological contamination included: *Escherichia coli* (< 10 colony forming units (CFU)/g), *Salmonella* spp. (absence in 25 g), moulds (absent) and wild yeasts (absent) in both formulations. The production strain was below < 10 CFU/g in three batches of SELSAF but ranged from 110 to 255 CFU/g in three batches SELSAF 3000.[16]

Results of the particle size distribution of the additive SELSAF measured by laser diffraction in three recent batches were in the ranges 3.5–4.9% for particles < 10 μm, 16.1–25.7% for particles < 50 μm, and 37.5–54.4% for particles < 100 μm. The corresponding values for SELSAF 3000 were 2.5–3.6%, 14.5–18.2% and 36.6–42.0%, respectively.[17]

The dusting potential determined by the Stauber–Heubach method ranged between 1.14 and 3.07 g/m^3 in three recent batches of SELSAF[18] and between 1.21 to 1.62 g/m^3 in three batches of SELSAF 3000.[19] The selenium content of the dust determined in three batches of each formulation varied between 2,062 and 2,148 mg Se/kg dust for SELSAF and between 2,886 and 3,078 mg Se/kg dust for SELSAF 3000.[20]

3.1.2. Characterisation of the production strain

The additive 'organic form of selenium (selenised yeast inactivated)' is produced by a strain of *S. cerevisiae*, which is deposited at the French *Collection Nationale de Cultures de Microorganismes* (CNCM) with accession number CNCM I-3399.[21] This strain is not genetically modified.[22,23]

A bioinformatic analysis of the whole genome sequences (WGS)[24] of the production strain, CNCM I-3399, confirmed its identity as *S. cerevisiae*.[25] This was based on phylogenomic analysis (using 55 conserved genes) to produce a phylogeny against related 118 *S. cerevisiae* and 3 other *Saccharomyces* species (*Saccharomyces kudriavzevii*, *Saccharomyces arboricola* and *Saccharomyces eubayanus*) publicly available genomes, including the reference strain *S. cerevisiae* S288C.

3.1.3. Conditions of use

The additive (mainly selenomethionine 63%) with a content of 2,000–3,500 mg Se/kg (97–99% of organic selenium) is currently authorised to be used in feed for all animal species up to a total of 0.2 mg Se/Kg complete feed (12% moisture), being the maximum authorised total selenium content in complete feed 0.5 mg/kg.

Under other provisions, the authorisation foresees that

- The additive shall be incorporated into feed in the form of a premixture,
- For user safety: breathing protection, safety glasses and gloves should be worn during handling.

The applicant proposes to keep the same conditions of use as authorised.

[12] Technical Dossier/Section II/Annex II_1_15.
[13] Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed. OJ L 140, 30.5.2002, p. 10.
[14] Technical Dossier/Section II/Annex II_1_13.
[15] Reported LODs. Deoxyvalenol, LOD = 0.050 mg/kg;. Fumonisins: B1 and B2, LOD = 0.020 mg/kg. Zearalenone, LOD = 0.020 mg/kg. Aflatoxins: B1, B2 and G1 LOD = 0.0001 mg/kg, aflatoxin G2, LOD = 0.0002 mg/kg. Ochratoxin A, LOD = 0.0002 mg/kg.
[16] Technical Dossier/Section II/Annex II_1_16.
[17] Technical Dossier/Section II/Annex II_1_17.
[18] Technical Dossier/Section II/Annex II_1_18.
[19] Technical Dossier/Section II/Annex II_1_19.
[20] Technical dossier/Section II, page 26.
[21] Technical Dossier/Section II/Annex II_2_1.
[22] Technical Dossier/Section II/Annex II_2_2.
[23] Technical Dossier/Supplementary information July 2019/Appendix/Appendix_II_1.
[24] Technical Dossier/Supplementary information July 2019/Appendix/Appendix_I_1 and Appendix_I_2.
[25] Technical Dossier/Supplementary information July 2019/Appendix/Technical Report_CNCM_I-3399.

3.2. Safety

The safety of the additive selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 (SELSAF and SELSAF 3000) for the target species, consumers, users and the environment has been evaluated in previous opinions (EFSA 2009, EFSA FEEDAP Panel, 2017). In 2009, the FEEDAP Panel concluded that 'provided that the maximum authorised Se content in complete feed is not exceeded, the use of SELSAF (with a minimum selenium content of 2,000 mg/kg) as a Se source is considered to be safe for all animal species' and that the use of SELSAF at the recommended level in feeds is safe for the consumers' and 'does not pose an additional risk to the environment compared to other sources of Se for which it will substitute'. Concerning the safety for the user, the Panel concluded that 'SELSAF is not a skin or eye irritant. However, the potential for skin or respiratory sensitisation cannot be excluded and would require that protective measures be taken by the users of the product'. These conclusions were extended to an additional formulation with a minimum content of selenium in the additive of 3,000 mg/kg (EFSA FEEDAP Panel, 2017). In 2017 opinion, the FEEDAP Panel concluded that 'selenium is hazardous upon inhalation; owing to the dusting potential and the selenium content of dust, persons handling the additive are at risk. The additive should be considered as a respiratory sensitiser. The additive is not an irritant for eyes and skin. No conclusions can be reached on the dermal sensitising properties of the additive' (EFSA FEEDAP Panel, 2017).

The strain *S. cerevisiae* (CNCM I-3399) is considered by EFSA as suitable for the Qualified Presumption of Safety (QPS) approach to safety assessment (EFSA, 2007; EFSA BIOHAZ Panel, 2020). In the present application, the applicant has provided a confirmation of the taxonomic identification of the strain as *S. cerevisiae*. Consequently, it is presumed safe for the target species, consumers of products from animals fed the additive and the environment. Therefore, the FEEDAP Panel concluded that selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 is considered safe for the target species, the consumers and the environment.

The data submitted indicate high dusting potential, up to 3.07 g/m^3 for SELSAF and 1.62 g/m^3 for SELSAF 3000. The selenium concentration in the dust would correspond to that in the additive (maximum analysed values: 2,148 mg/kg for SELSAF and 3,078 mg/kg for SELSAF 3000). It can therefore be calculated that a maximum concentration of 6.6 and 5.0 mg Se/m^3 could be released by the dust when handling the additives (3.07 g dust/m^3 $\times$ 2,148 mg Se/kg dust from the additive for SELSAF and 1.62 g dust/m^3 $\times$ 3,078 mg Se/kg dust from the additive for SELSAF 3000). A conservative estimate of respirable selenium from dust would be about 1.26 mg/m^3 for SELSAF and about 1 mg/m^3 for SELSAF 3000.[26] Concerning threshold limit values (TLV) for selenium compounds, maximum tolerable air concentrations between 0.02 and 0.2 mg Se/m^3 have been set by different organisations (e.g. German Maximale Arbeitsplatz Konzentration (MAK) List, Occupational Safety and Health Administration (OSHA), National European Authorities). Consequently, and considering the above estimate of selenium from the dust of the additive, its handling represents a risk to users by inhalation. No data on respiratory sensitisation was made available in the dossier; taking into account the proteinaceous nature of the additive, the FEEDAP Panel considers it as a likely respiratory sensitiser.

The applicant conducted a literature search on the safety of the additive covering the period 2009–2019. The search included the databases: Biosis Toxicology, Registry of Toxic Effects of Chemical Substances (RTECS), Toxfile, Medline, Embase, Global health, CAB Abstracts, Current Content Search, Food Science and Technology Abstracts (FSTA). The search included the terms: selenium, (s)cerevisiae, yeast, se-enriched yeast, safe, toxic, (in)toleran, pathogen, virulence combined with keywords related to human, animals and plants. The search identified 11 hits, 5 of them were EFSA opinions.

One of the studies investigated the effects of selenium-induced oxidative stress on the reproductive potential in male mice (Kaushal and Bansal, 2009). Another publication reviewed the role and the effects of Se supplementation in cattle (Mehdi and Dufrasne, 2016). The other studies investigated the effect of high dietary selenium on zootechnical performance and/or oxidative stress in the target species, e.g. up to 3 mg/kg feed in pigs (ZePing et al., 2016) and poultry (Lu et al., 2019), up to 15 mg/kg feed in

[26] For SELSAF the respirable fraction in the additive was 4.9%; the fraction below 50 μm was 25.7%. Assuming that the dust consists only of particles ≤ 50 μm, its respirable fraction could be estimates to be 19.1% (4.9 of 25.7). The selenium concentration in the respirable dust would be then 1.26 mg/m^3 (19.1 $\times$ 6.6 mg Se/m^3 per 100). For SELSAF 3000, the respirable fraction in the additive was 3.6% and the fraction below 50 μm was 18.2%, leading to an estimate of the respirable fraction of 19.8% (3.6 of 18.2). The selenium concentration in the respirable dust would be then 0.99 mg/^{3} (19.8 $\times$ 5.0 mg Se/m^3 per 100).

Atlantic salmon (Berntssen et al., 2017), and up to 24.5 mg Se/week[27] in sheep (Hugejiletu et al., 2013). Although these studies were not designed to assess the safety of the additive per se, none of them reported safety issues with the additive under assessment when administered in the diet at concentrations 15- to 75-fold higher than the maximum authorised level in feed. Therefore, the FEEDAP Panel concludes that there is no new evidence that would lead the Panel to reconsider its previous conclusions on the safety of the product for target species, consumers and the environment under the authorised conditions of use.

The applicant states that no adverse effects or specific interactions or incompatibilities have been reported for the additive from the studies identified in the literature. In addition, the applicant claims that no adverse effects have been reported in the framework of its global monitoring plan.[28]

3.2.1. Conclusions on safety

Based on the above and the fact that the manufacturing process, the composition of the additive and the conditions of use for the species/categories for which the additive is authorised have not been modified, the FEEDAP Panel considers that there is no evidence to reconsider the conclusions reached in previous assessments. The Panel concludes that the additive selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 remains safe for the target species, the consumer and the environment under the conditions of use currently authorised. The additive is non-irritant to skin and eyes but should be considered a respiratory sensitiser. No conclusion can be reached on its dermal sensitising properties. Exposure of users by inhalation is very likely. The additive is hazardous by inhalation.

3.3. Efficacy

The present application for renewal of the authorisation does not include a proposal for amending or supplementing the conditions of the original authorisation that would have an impact on the efficacy of the additive. Therefore, there is no need for assessing the efficacy of the additive in the context of the renewal of the authorisation.

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[29] and Good Manufacturing Practice.

4. Conclusions

The applicant has provided evidence that the additive currently in the market complies with the existing conditions of authorisation.

The FEEDAP Panel confirms its previous conclusion that selenium-enriched yeast produced by *S. cerevisiae* CNCM I-3399 is safe for the target species, the consumers and the environment.

The additive is non-irritant to skin and eyes but should be considered a respiratory sensitiser. No conclusion can be reached on its dermal sensitising properties. Exposure of users by inhalation is very likely. The additive is hazardous by inhalation.

There is no need for assessing the efficacy of the additive in the context of the renewal of the authorisation.

5. Recommendations

In accordance with the more recent relevant opinions on selenium from selenised yeasts, the FEEDAP Panel recommends the denomination of the additive under assessment as 'selenium in the form of organic compounds produced by the selenium-enriched yeast *S. cerevisiae* CNCM I-3399'. In the view of the Panel, the denomination of selenised-yeast derived additives as Se-Met could be misleading.

[27] 24.5 mg Se/week, or 3.5 mg Se/day corresponding to 2.9 mg/kg feed, assuming a daily intake of 1.2 kg for a 60-kg animal (EFSA FEEDAP Panel, 2017).

[28] Technical dossier/Section III/Annex_III_2_Complaints.

[29] 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.

The FEEDAP Panel maintains and update its previous recommendation that the additive should be authorised in two formulations, with the (guaranteed) minimum and maximum selenium content in both of them, i.e. 2,000–2,400 and 3,000–3,500 mg Se/kg additive.

Documentation provided to EFSA/Chronology

Date	Event
29/10/2018	Dossier received by EFSA. Selenium enriched yeast (*Saccharomyces cerevisiae* CNCM I-3399) for all animal species. Submitted by Phileo - Division of S. I. LESAFFRE
14/11/2018	Reception mandate from the European Commission
15/02/2019	Application validated by EFSA – Start of the scientific assessment
20/03/2019	Request of supplementary information to the applicant in line with Article 8(1)(2) of Regulation (EC) No 1831/2003 – Scientific assessment suspended. *Issues: characterisation, safety for target species, safety for the consumer, safety for the user and efficacy*
15/05/2019	Comments received from Member States
15/01/2020	Reception of supplementary information from the applicant - Scientific assessment re-started
07/05/2020	Opinion adopted by the FEEDAP Panel. End of the Scientific assessment

References

Berntssen MHG, Sundal TK, Olsvik PA, Amlund H, Rasinger JD, Sele V, Hamre K, Hillestad M, Buttle L and Ornsrud R, 2017. Sensitivity and toxic mode of action of dietary organic and inorganic selenium in Atlantic salmon (*Salmo salar*). Aquatic Toxicology, 192, 116–126.

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;587: 16 pp. https://doi.org/10.2903/j.efsa.2007.587

EFSA (European Food Safety Authority), 2009. Safety and efficacy of SELSAF (Selenium enriched yeast from *Saccharomyces cerevisiae* CNCM I-3399) as feed additive for all species. EFSA Journal 2009;992:124. https://doi.org/10.2903/j.efsa.2009.992

EFSA BIOHAZ Panel (EFSA Panel on Biological Hazards), Koutsoumanis K, Allende A, Alvarez-Ordóñez A, Bolton D, Bover-Cid S, Chemaly M, Davies R, De Cesare A, Hilbert F, Lindqvist R, Nauta M, Peixe L, Ru G, Simmons M, Skandamis P, Suffredini E, Cocconcelli PS, Fernández Escámez PS, Maradona MP, Querol A, Suarez JE, Sundh I, Vlak J, Barizzone F, Correia S and Herman L, 2020. Scientific Opinion on the update of the list of QPS-recommended biological agents intentionally added to food or feed as notified to EFSA (2017–2019). EFSA Journal 2020;18(2):5966, 56 pp. https://doi.org/10.2903/j.efsa.2020.5966

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2013. Guidance on the renewal of the authorisation of feed additives. EFSA Journal 2013;11(10):3431, 8 pp. https://doi.org/10.2903/j.efsa.2013.3431

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, Mayo B, Ramos F, Saarela M, Villa RE, Wallace RJ, Wester P, Pechova A, López-Gálvez G and Mantovani A, 2017. Scientific opinion of the safety and efficacy of selenium-enriched yeast (*Saccharomyces cerevisiae* CNCM I-3399) for all animal species. EFSA Journal 2017;15(7):4937, 10 pp. https://doi.org/10.2903/j.efsa.2017.4937

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, 2018. 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

Hugejiletu H, Bobe G, Vorachek WR, Gorman ME, Mosher WD, Pirelli GJ and Hall JA, 2013. Selenium supplementation alters gene expression profiles associated with innate immunity in whole-blood neutrophils of sheep. Biological Trace Elements Research, 154, 28–44.

Kaushal N and Bansal MP, 2009. Diminished reproductive potential of male mice in response to selenium-induced oxidative stress: involvement of HSP70, HSP70-2, and MSJ-1. Journal of Biochemical and Molecular Toxicology, 23, 125–136.

Lu J, Qu L, Shen MM, Wang XG, Guo J, Hu YP, Dou TC and Wang KH, 2019. Effects of high-dose selenium-enriched yeast on laying performance, egg quality, clinical blood parameters, organ development, and selenium deposition in laying hens. Poultry Science, 98, 2522–2530.

Mehdi Y and Dufrasne I, 2016. Selenium in Cattle: a review. Molecules, 21, 545. https://doi.org/10.3390/molecules21040545

ZePing Z, Barcus M, Jonggun K, Lum KL, Mills C and XinGen L, 2016. High dietary selenium intake alters lipid metabolism and protein synthesis in liver and muscle of pigs. Journal of Nutrition, 146, 1625–1633.

Abbreviations

BIOHAZ	EFSA Panel on Biological Hazards
CFU	colony forming unit
CNCM	Collection Nationale de Cultures de Microorganismes
EURL	European Union Reference Laboratory
FEEDAP	EFSA Panel on additives and products or substances used in animal feed
FSTA	Food Science and Technology Abstracts
LOD	limit of detection
LOQ	limit of quantification
MAK	Maximale Arbeitsplatz Konzentration
OSHA	Occupational Safety and Health Administration
PCBs	polychlorinated biphenyls
PCDD/F	polychlorinated dibenzo-*p*-dioxins and dibenzofurans
QPS	Qualified Presumption of Safety
RTECS	Registry of Toxic Effects of Chemical Substances
TEQ	toxic equivalent
TLV	threshold limit value
WGS	whole genome sequence
WHO	World Health Organization