Safety and efficacy of Bonvital® (Enterococcus faecium DSM 7134) as a feed additive for laying hens

EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP), Vasileios Bampidis, Giovanna Azimonti, Maria Bastos, Henrik Christensen, Birgit Dusemund, Maryline Koub, Mojca Fasmon Durjava, Marta López-Alonso, Secundino López Puente, Francesca Marcon, Baltasar Mayo, Alena Pechnová, Mariana Petkova, Fernando Ramos, Yolanda Sanz, Roberto Villa, Ruud Woutersen, Noël Dierick, Giovanna Martelli, Montserrat Anguita, Jaume Galobart, Joana Revez and Rosella Brozzi

Abstract

Following a request from the European Commission, EFSA Panel on Additives and Products or Substances used in Animal Feed was asked to deliver a scientific opinion on the safety and efficacy of Bonvital® for laying hens. Bonvital® is an additive containing viable cells of Enterococcus faecium DSM 7134 marketed in two forms, a granular and a powder form, both with a guaranteed minimum concentration of E. faecium DSM 7134 of $1.0 \times 10^{10}$ colony forming units (CFU)/g additive. Bonvital® in either form is intended for use in feed for laying hens at the minimum concentration of $1.0 \times 10^{9}$ CFU/kg complete feed and at the maximum concentration of $1.0 \times 10^{10}$ CFU/kg feedingstuffs. Bonvital powder® is also proposed for use in water for drinking at the minimum concentration of $5.0 \times 10^{8}$ CFU/L. The use of Bonvital® in animal nutrition is considered safe for the target animals. The results of a tolerance trial in which hens were fed the additive at 10-fold the maximum recommended dose support this conclusion. Delivery of comparable doses of the additive via water for drinking is considered as safe for laying hens. Bonvital® at the proposed conditions of use is safe for consumers of products derived from animals fed the additive and for the environment. Bonvital® is not a dermal or ocular irritant but a potential dermal and respiratory sensitiser. Bonvital® has the potential to be efficacious in improving the hen’s performance when supplemented at $1.0 \times 10^{9}$ CFU/kg feed or $5.0 \times 10^{8}$ CFU/L water for drinking.

Keywords: zootechnical additive, gut flora stabiliser, Bonvital®, Enterococcus faecium DSM 7134, hens, safety, efficacy

Requestor: European Commission

Question number: EFSA-Q-2018-00419

Correspondence: feedap@efsa.europa.eu
Panel members: Giovanna Azimonti, Vasileios Bampidis, Maria de Lourdes Bastos, Henrik Christensen, Birgit Dusemund, Mojca Fašmon Durjava, Maryline Kouba, Marta López-Alonso, Secundino López Puente, Francesca Marcon, Baltasar Mayo, Alena Pechová, Mariana Petkova, Fernando Ramos, Yolanda Sanz, Roberto Edoardo Villa and Ruud Woutersen.

Acknowledgments: The Panel wishes to acknowledge the contribution of Yolanda García Cazorla to this opinion.

Suggested citation: EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Bampidis V, Azimonti G, Bastos M, Christensen H, Dusemund B, Kouba M, Fašmon Durjava M, López-Alonso M, López Puente S, Marcon F, Mayo B, Pechová A, Petkova M, Ramos F, Sanz Y, Villa R, Woutersen R, Dierick N, Martelli G, Anguita M, Galobart J, Revez J and Brozzi R, 2020. Scientific Opinion on the safety and efficacy of Bonvital® (Enterococcus faecium DSM 7134) as a feed additive for laying hens. EFSA Journal 2020;18(11):6277, 9 pp. https://doi.org/10.2903/j.efsa.2020.6277

ISSN: 1831-4732

© 2020 European Food Safety Authority. EFSA Journal published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

This is an open access article under the terms of the Creative Commons Attribution-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited and no modifications or adaptations are made.

The EFSA Journal is a publication of the European Food Safety Authority, an agency of the European Union.
# Table of contents

Abstract .................................................................................................................................................... 1
1. Introduction ..................................................................................................................................... 4
   1.1. Background and Terms of Reference as provided by the requestor ....................................................... 4
   1.2. Additional information ....................................................................................................................... 4
2. Data and methodologies ................................................................................................................... 5
   2.1. Data ................................................................................................................................................ 5
   2.2. Methodologies .................................................................................................................................. 5
3. Assessment ...................................................................................................................................... 5
   3.1. Characterisation ............................................................................................................................... 5
       3.1.1. Characterisation of the additive ......................................................................................................... 5
       3.1.2. Conditions of use ............................................................................................................................. 5
   3.2. Safety ............................................................................................................................................. 5
   3.3. Efficacy ........................................................................................................................................... 6
       3.3.1. Conclusions on efficacy for laying hens .............................................................................................. 7
   3.4. Post-market monitoring ..................................................................................................................... 7
4. Conclusions ...................................................................................................................................... 7
5. Documentation as provided to EFSA/Chronology ................................................................................. 8
References ................................................................................................................................................ 8
Abbreviations ............................................................................................................................................ 9
1. **Introduction**

1.1. **Background and Terms of Reference as provided by the requestor**

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 a feed additive shall submit an application in accordance with Article 7.

The European Commission received a request from Lactosan GmbH & Co.KG.\(^2\) for authorisation of the product Bonvital® (*Enterococcus faecium* DSM 7134), when used as a feed additive for laying hens (category: Zootechnical additives; functional group: gut flora stabilisers).

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). The particulars and documents in support of the application were considered valid by EFSA as of 2 July 2018.

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 product Bonvital® (*Enterococcus faecium* DSM 7134), when used under the proposed conditions of use (see Section 3.1.2).

1.2. **Additional information**

EFSA issued several opinions on the product when used with chickens for fattening (EFSA, 2004, 2009a; EFSA FEEDAP Panel, 2010), piglets and pigs for fattening (EFSA, 2007a; EFSA FEEDAP Panel, 2019a), sows (EFSA, 2007b; EFSA FEEDAP Panel, 2014, 2019b), dogs (EFSA, 2009b) and chickens reared for laying and minor avian species (EFSA FEEDAP Panel, 2013a). EFSA issued an opinion on the safety and efficacy of a microbial product containing *Enterococcus faecium* DSM 7134 and *Lactobacillus rhamnosus* when used in feed for calves for rearing (EFSA FEEDAP Panel, 2013b).

Bonvital® is currently authorised as a zootechnical additive (functional group: gut flora stabiliser) for use in piglets, pigs for fattening,\(^3\) sows,\(^4\) chickens for fattening,\(^5\) chickens reared for laying and minor poultry species other than those used for laying (4b1706).\(^6\) The active agent *E. faecium* DSM 7134 is also authorised in combination with *Lactobacillus rhamnosus* DSM 7133 under a different trade name for calves for rearing.\(^7\)

---

\(^1\) 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.

\(^2\) Lactosan GmbH & Co.KG, Industriest. West 5, A-8605 Kapfenberg, Austria.

\(^3\) Commission Implementing Regulation (EU) 2020/159 of 5 February 2020 concerning the renewal of the authorisation of *Enterococcus faecium* DSM 7134 as a feed additive for weaned piglets and pigs for fattening and repealing Regulation (EC) No 538/2007 (holder of authorisation Lactosan Starterkulturen GmbH & Co). OJ L 34, 6.2.2020, p. 22.

\(^4\) Commission Implementing Regulation (EU) No 1083/2014 of 15 October 2014 concerning the authorisation of a preparation of *Enterococcus faecium* DSM 7134 (Bonvital) as a feed additive for sows. OJ L 298, 16.10.2014, p. 5 and Commission Implementing Regulation (EU) 2019/1315 of 2 August 2019 concerning the authorisation of a preparation of *Enterococcus faecium* DSM 7134 as a feed additive (in water for drinking) for sows (holder of authorisation Lactosan GmbH & Co), OJ L 205, 5.8.2019, p. 7.

\(^5\) Commission Regulation (EU) No 998/2010 of 5 November 2010 concerning the authorisation of *Enterococcus faecium* DSM 7134 as a feed additive for chickens for fattening (holder of the authorisation Lactosan GmbH & Co KG). OJ L 290, 6.11.2010, p. 22.

\(^6\) Commission Implementing Regulation (EU) No 775/2013 of 12 August 2013 concerning the authorisation of a preparation of *Enterococcus faecium* DSM 7134 as a feed additive for chickens reared for laying and minor poultry species other than those used for laying (holder of authorisation Lactosan GmbH & Co KG). OJ L 217, 13.8.2013, p. 32.

\(^7\) Commission Implementing Regulation (EU) No 1101/2013 of 6 November 2013 concerning the authorisation of a preparation of *Enterococcus faecium* DSM 7134 and *Lactobacillus rhamnosus* DSM 7133 as a feed additive for calves for rearing and amending Regulation (EC) No 1288/2004 (holder of authorisation Lactosan GmbH & Co KG). OJ L 296, 7.11.2013, p. 1.
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\(^8\) in support of the authorisation request for the use of Bonvital\(^\circledR\) (Enterococcus faecium DSM 7134) as a feed additive.

The FEEDAP Panel used the data provided by the applicant together with data from other sources, such as previous risk assessments by EFSA, to deliver the present output.

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.\(^9\)

2.2. Methodologies

The approach followed by the FEEDAP Panel to assess the safety and the efficacy of Bonvital\(^\circledR\) (Enterococcus faecium DSM 7134) is in line with the principles laid down in Regulation (EC) No 429/2008 and the relevant guidance documents: Guidance on zootechnical additives (EFSA FEEDAP Panel, 2012) and Technical guidance: Tolerance and efficacy studies in target animals (EFSA FEEDAP Panel, 2011).

3. Assessment

Bonvital\(^\circledR\) is an additive consisting of viable cells of Enterococcus faecium DSM 7134 intended for use as a zootechnical additive (gut flora stabilisers) in feed and water for drinking for laying hens.

3.1. Characterisation

3.1.1. Characterisation of the additive

Bonvital\(^\circledR\) is an additive containing viable cells of E. faecium DSM 7134 marketed in two forms:

- Bonvital powder\(^\circledR\): composed of cell concentrate (3%), carrier (sweet whey powder, 96%), lactose (0.5%), sodium citrate (0.1%), sodium glutamate (0.1%), sodium ascorbate (0.05%), sodium lactate (0.2%) and mannitol (0.05%) with a guaranteed minimum concentration of E. faecium DSM 7134 of \(1 \times 10^{10}\) CFU/g additive.\(^10\)

- Bonvital granules\(^\circledR\): microencapsulated formula composed of cells concentrate (3%), saccharose (70%), maltodextrin (20%), sodium citrate (1.0%), sodium glutamate (1.0%), sodium ascorbate (0.5%), sodium lactate (2.5%), mannitol (1.5%) and starch (0.5%), with a guaranteed minimum concentration of E. faecium DSM 7134 of \(1 \times 10^{10}\) CFU/g additive.\(^11\)

Since the additive under application has the same formulation and method of manufacture as that considered in previous opinions (EFSA, 2004, 2007a,b; EFSA FEEDAP Panel, 2013a, 2014, 2019b), the data pertaining to impurities, physical properties, shelf life, stability and capacity to homogeneously disperse in feed and water still apply.

3.1.2. Conditions of use

Bonvital\(^\circledR\) in either form is intended for use in feed for laying hens at the minimum inclusion level of \(1.0 \times 10^9\) and at the maximum inclusion level of \(1.0 \times 10^{10}\) CFU/kg feedingstuffs. Bonvital powder\(^\circledR\) is also proposed for use in water for drinking at the minimum concentration of \(5.0 \times 10^8\) CFU/L.

3.2. Safety

In a previous opinion (EFSA FEEDAP Panel, 2013a), E. faecium DSM 7134 was unambiguously identified and found not to belong to the hospital-associated clade and not to express resistance to clinically relevant antibiotics. The metabolic end products of the species are those typical of lactic acid bacteria and do not raise concerns. Therefore, the use of E. faecium DSM 7134 in animal nutrition is

---

\(^8\) FEED dossier reference: FAD-2018-0024.
\(^9\) The full report is available on the EURL website: https://ec.europa.eu/jrc/sites/jrcsh/files/FinRep-FAD-2008-0007.pdf
\(^10\) Technical dossier/Section II/Annex II.1-9.
\(^11\) Technical dossier/Section II/Annex II.1-10.
not expected to raise concerns for the consumers of animal products. Since neither the active agent nor the other components of the additive give rise to concerns, the FEEDAP Panel considers the use of Bonvital® safe for the consumers.

In the same opinion, the Panel also concluded that since *E. faecium* is a natural component of gut microbiota, its use as Bonvital® in animal feeding is not expected to pose any risk for the environment. The Panel considers these conclusions to apply also in the current assessment.

In the same opinion, Bonvital® was found to be not a dermal and ocular irritant, but a potential dermal and respiratory sensitiser. The use of the additive in laying hens is considered unlikely to introduce hazards for users of the product not already considered as part of that assessment. Therefore, the conclusions reached in the previous assessment also apply to the current application.

No new information has been provided, except for a tolerance trial with laying hens described below. The FEEDAP Panel is not aware of any new information that would lead it to reconsider the conclusions drawn previously and considers that the extension of use to the new species for which the application is made would not have an impact on the safety aspects already evaluated.

The trial was made with 112 pullets (Lohmann Classic, 23-week-old) kept in 16 pens (of 7 animals each) and randomly assigned to three treatment groups after a 30-day acclimatisation phase. The treatment groups were a control group receiving the basal diet (based on wheat, soybean meal and maize) with no additive, and two Bonvital® groups (form not specified), one receiving the additive at the minimum recommended level of $1 \times 10^9$ CFU/kg feed and the other at 100-fold the minimum recommended level or 10-fold the maximum recommended level ($1 \times 10^{11}$ CFU/kg feed). The intended inclusion level of the additive in the feed was confirmed by analysis. The control group included 6 pens and the two Bonvital® groups, 5 pens each. Feed intake was measured on a weekly basis, eggs were collected and weighed daily, and egg mass was calculated on a daily basis. Feed to egg mass ratio was also calculated. Mortality and general health of hens were monitored throughout the study. An analysis of variance (ANOVA) or a non-parametric test (Kruskal–Wallis if not normally distributed) was carried out with the data. For performance data, the treatment was the main effect. For the life weight, the individual data were used but the pen was included as a random effect in the model. Means of the three groups were compared with least significance difference or by pairs with the Bonferroni–Holm test (or U test for not normally distributed data). The statistical significance level was set at $p < 0.05$.

During the trial 3, hens died (1 in the control and 2 in the $1\times$ group). No significant differences were found in any of the measured parameters between groups (mean values for daily feed intake: 111 g/day, final body weight: 1.85 kg, laying rate 93.4%, egg weight: 59.7 g, egg mass per hen and per day: 55.7 g and feed to egg mass ratio (kg feed per kg egg mass): 1.99).

The level proposed for use in water for drinking would provide essentially the same exposure as that proposed in feedingstuffs. Consequently, the conclusions on safety of the additive when used in feedingstuffs also apply to use in water for drinking for laying hens.

Considering the nature of the active agent and the composition of the additive, the use of Bonvital® in animal nutrition is considered safe for the target animals. The results of a tolerance trial support this conclusion. Delivery of comparable doses of the additive via water for drinking is considered as safe for laying hens.

### 3.3. Efficacy

Four trials were conducted in two Member States and in a third country to investigate the effects of Bonvital® on the performance of laying hens. However, one was disregarded due to poor reporting.

The three trials considered shared the same experimental design that consisted on the comparison of the performance of a control group of layers with that of another group receiving the additive at the minimum recommended inclusion level of $1.0 \times 10^5$ CFU/kg feed. The intended inclusion level of the additive in the feed was confirmed by analysis. Hens were fed *ad libitum* diets based on wheat, maize, soybean meal (trial 14), wheat, soybean meal and maize (trial 215) or wheat, soybean and...
maize (trial 3\textsuperscript{16}). The total numbers of layers used and number of replicates per treatment for each trial are shown in Table 1 and the breeds used were Bovans Brown (trial 1), ISA brown (trial 2) and Lohmann Brown-Classc (trial 3). The hens were randomly allocated to cages at 16 (trial 1) or 18 weeks of age (trials 2 and 3) and allowed a period of acclimatisation of 4 or 6 weeks during which they were fed a basal diet. The start of the experiments was at 20, 22 and 24 weeks of age, for trials 1, 2 and 3, respectively, and the duration was 24 weeks (168 days) in studies 1 and 2 and 26 weeks (182 days) in study 3.

Individual liveweight, egg production and mass, feed consumption and feed to egg mass ratio were measured or calculated. An ANOVA or a non-parametric test (Mann–Whitney if not normally distributed in studies 2 and 3) was carried out with the data. For performance data, the treatment was included in the model as a fixed effect. The statistical significance level was set at $p < 0.05$.

Mortality of hens remained within acceptable values and did not significantly differ between groups in any of the trials. The hens in the Bonvital\textsuperscript{®} group showed a significantly greater laying rate and daily egg mass in two trials (1 and 2), compared to control. Feed to egg mass ratio was significantly better in the hens fed with Bonvital\textsuperscript{®} compared to control in two trials (1 and 3) and in the remaining trial (2) the improvement was only numerical due to a greater feed intake observed in the Bonvital\textsuperscript{®} group.

The level proposed for use in water for drinking ($5.0 \times 10^8$ CFU/L) would provide essentially the same exposure as that proposed in complete feed. Consequently, the conclusions on efficacy of the additive when used in feedingstuffs also apply to use in water for drinking for laying hens.

### 3.3.1. Conclusions on efficacy for laying hens

Bonvital\textsuperscript{®} has the potential to be efficacious in improving the hens’ performance when supplemented at $1 \times 10^9$ CFU/kg feedingstuffs. Delivery of comparable doses of the additive via water for drinking is considered as efficacious for laying hens.

### 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\textsuperscript{17} and Good Manufacturing Practice.

### 4. Conclusions

Bonvital\textsuperscript{®} at the proposed conditions of use is safe for the laying hens, consumers of products derived from animals fed the additive and the environment.

Bonvital\textsuperscript{®} is not a dermal or ocular irritant but a potential dermal and respiratory sensitiser.

---

\textsuperscript{16} Technical dossier/Supplementary information January 2020/Annexes II, III and IV and Supplementary information May 2020/Annexes 1-3 and LH_01_19 without Pen 11.

\textsuperscript{17} 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.
Bonvital® has the potential to be efficacious in improving the hen’s performance when supplemented at $1 \times 10^9$ CFU/kg feed or $5.0 \times 10^9$ CFU/L water for drinking.

5. Documentation as provided to EFSA/Chronology

| Date       | Event                                                                                                                                                                                                 |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27/04/2018 | Dossier received by EFSA. Bonvital for laying hens. Submitted by Lactosan GmbH & Co.KG                                                                                                               |
| 18/05/2018 | Reception mandate from the European Commission                                                                                                                                                    |
| 02/07/2018 | Application validated by EFSA – Start of the scientific assessment                                                                                                                                    |
| 03/10/2018 | Comments received from Member States                                                                                                                                                               |
| 22/11/2018 | Request of supplementary information to the applicant in line with Article 8(1)(2) of Regulation (EC) No 1831/2003 – Scientific assessment suspended. Issues: efficacy                                           |
| 24/01/2020 | Reception of supplementary information from the applicant - Scientific assessment re-started                                                                                                         |
| 30/09/2020 | Opinion adopted by the FEEDAP Panel. End of the Scientific assessment                                                                                                                                  |

References

EFSA (European Food Safety Authority), 2004. Opinion of the Scientific Panel on Additives and Products or Substances used in Animal Feed on a request from the Commission on the safety of product Bonvital (Provita E) for chickens for fattening. EFSA Journal 2004;2(11):120, 4 pp. https://doi.org/10.2903/j.efsa.2004.120

EFSA (European Food Safety Authority), 2007a. Opinion of the Scientific Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) on the safety and efficacy of product Bonvital, a preparation of Enterococcus faecium, as a feed additive for piglets and pigs for fattening in accordance with Regulation (EC) No 1831/2003. EFSA Journal 2007;5(1):440, 9 pp. https://doi.org/10.2903/j.efsa.2007.440

EFSA (European Food Safety Authority), 2007b. Opinion of the Scientific Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) on the safety and efficacy of product Bonvital, a preparation of Enterococcus faecium, as a feed additive for sows in accordance with Regulation (EC) No 1831/2003. EFSA Journal 2007;5(7):521, 8 pp. https://doi.org/10.2903/j.efsa.2007.521

EFSA (European Food Safety Authority), 2009a. Scientific Opinion of the Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) on a request from the European Commission on the safety and efficacy of Bonvital (Enterococcus faecium) as feed additive for chickens for fattening. EFSA Journal 2009;7(3):990, 12 pp. https://doi.org/10.2903/j.efsa.2009.990

EFSA (European Food Safety Authority), 2009b. EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP); Scientific Opinion of on Bonvital as a feed additive for dogs. EFSA Journal 2009;7(11):1379, 11 pp. https://doi.org/10.2903/j.efsa.2009.1379

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2010. Scientific Opinion on Bonvital (Enterococcus faecium) as a feed additive for chickens for fattening. EFSA Journal 2010;8(6):1636, 5 pp. https://doi.org/10.2903/j.efsa.2010.1635

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2011. Technical guidance: tolerance and efficacy studies in target animals. EFSA Journal 2011;9(5):2175, 15 pp. https://doi.org/10.2903/j.efsa.2011.2175

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2012. Guidance for the preparation of dossiers for zootechnical additives. EFSA Journal 2012;10(1):2536, 19 pp. https://doi.org/10.2903/j.efsa.2012.2536

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2013a. Scientific Opinion on the safety and efficacy of Bonvital (Enterococcus faecium) for chickens reared for laying and minor avian species. EFSA Journal 2013;11(4):3167, 10 pp. https://doi.org/10.2903/j.efsa.2013.3167

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2013b. Scientific Opinion on the safety and efficacy of Provita LE (Enterococcus faecium and Lactobacillus rhamnosus) as a feed additive for calves for rearing. EFSA Journal 2013;11(4):3175, 14 pp. https://doi.org/10.2903/j.efsa.2013.3175

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2014. Scientific Opinion on the safety and efficacy of Bonvital (Enterococcus faecium) as a feed additive for sows. EFSA Journal 2014;12(2):3565, 9 pp. https://doi.org/10.2903/j.efsa.2014.3565

EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Bampidis V, Azimonti G, Bastos ML, Christensen H, Dusemund B, Koubia M, Kos Durjava Mojca, López-Alonso M, López Puente S, Marcon F, Mayo B, Pechova A, Petkova M, Ramos F, Sanz Y, Villa R, Woutersen R, Chesson A, Coconcelli PS, Rychen G, Wallace RJ, Saarela M and Brozzi R, 2019a. Scientific Opinion on the assessment of the application for renewal of authorisation of Bonvital® (Enterococcus faecium DSM 7134) as a feed additive for weaned piglets and pigs for fattening. EFSA Journal 2019;17(3):5650, https://doi.org/10.2903/j.efsa.2019.5650
EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), Bampidis V, Azimonti G, Bastos ML, Christensen H, Dusemund B, Koubia 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, Anguita M, Galobart J, Holczknecht O, Manini P, Tarres-Call J, Pettenati E and Pizzo F, 2019b. Scientific Opinion on the safety and efficacy of Bonvital (Enterococcus faecium, DSM 7134) as an additive in water for drinking for sows. EFSA Journal 2019;17(2):5612, 7 pp. https://doi.org/10.2903/j.efsa.2019.5612

Abbreviations

ANOVA  analysis of variance
CFU  colony forming unit
EURL  European Union Reference Laboratory