

## SCIENTIFIC OPINION

### **Scientific Opinion on the substantiation of health claims related to *Lactobacillus plantarum* 299 (DSM 6595, 67B) and immune system (ID 1077) pursuant to Article 13(1) of Regulation (EC) No 1924/2006<sup>1</sup>**

**EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)<sup>2</sup>**

European Food Safety Authority (EFSA), Parma, Italy

#### SUMMARY

Following a request from the European Commission, the Panel on Dietetic Products, Nutrition and Allergies was asked to provide a scientific opinion on a list of health claims pursuant to Article 13 of Regulation 1924/2006. This opinion addresses the scientific substantiation of health claims in relation to *Lactobacillus plantarum* 299 (DSM 6595, 67B) and “immune system”. The scientific substantiation is based on the information provided by the Member States in the consolidated list of Article 13 health claims and references that EFSA has received from Member States or directly from stakeholders.

The food constituent that is the subject of the health claim is *Lactobacillus plantarum* 299 (DSM 6595, 67B). The Panel considers that *Lactobacillus plantarum* 299 (DSM 6595, 67B) is sufficiently characterised.

The Panel considers that the claimed effect “immune system” is not sufficiently defined. No more details were provided in the proposed wording.

As the claimed effect has not been sufficiently defined, and the evidence provided did not establish that the results obtained in studies with seriously ill patients or from studies in animals, or conducted *in vitro* and *ex vivo* can be extrapolated to the general human population, the Panel concludes that a cause and effect relationship has not been established between the consumption of *Lactobacillus plantarum* 299 (DSM 6595, 67B) and “immune system”.

#### KEY WORDS

*Lactobacillus plantarum* 299 (DSM 6595, 67B), immune system, health claims.

---

1 On request from the European Commission, Question No EFSA-Q-2008-1816, adopted on 02 July 2009

2 Panel members: Jean-Louis Bresson, Albert Flynn, Marina Heinonen, Karin Hulshof, Hannu Korhonen, Pagona Lagiou, Martinus Løvik, Rosangela Marchelli, Ambroise Martin, Bevan Moseley, Hildegard Przyrembel, Seppo Salminen, Sean (J.J.) Strain, Stephan Strobel, Inge Tetens, Henk van den Berg, Hendrik van Loveren and Hans Verhagen. Correspondence: [nda@efsa.europa.eu](mailto:nda@efsa.europa.eu)

For citation purposes: EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA); Scientific Opinion on the substantiation of health claims related to *Lactobacillus plantarum* 299 (DSM 6595, 67B) and immune system (ID 1077) pursuant to Article 13(1) of Regulation (EC) No 1924/2006 on request from the European Commission. EFSA Journal 2009; 7(9):1241. [10 pp.]. doi:10.2903/j.efsa.2009.1241. Available online: [www.efsa.europa.eu](http://www.efsa.europa.eu)

## TABLE OF CONTENTS

|   |   |
|---|---|
| Summary .....   | 1 |
| Table of contents .....   | 2 |
| Background as provided by the European Commission .....         | 3 |
| Terms of Reference as provided by the European Commission ..... | 3 |
| EFSA Disclaimer.....  | 3 |
| Acknowledgements .....  | 3 |
| Information as provided in the consolidated list .....          | 4 |
| Assessment .....  | 4 |
| 1. Characterisation of the food/constituent .....               | 4 |
| 2. Relevance of the claimed effect to human health.....         | 4 |
| 3. Scientific substantiation of the claimed effect .....        | 4 |
| Conclusions .....   | 5 |
| Documentation provided to EFSA .....                            | 5 |
| References .....  | 5 |
| Appendices .....  | 7 |

**BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION**

See Appendix A

**TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION**

See Appendix A

**EFSA DISCLAIMER**

See Appendix B

**ACKNOWLEDGEMENTS**

The European Food Safety Authority wishes to thank for the preparation of this opinion:

The members of the Working Group on claims: Jean-Louis Bresson, Albert Flynn, Marina Heinonen, Hannu Korhonen, Martinus Løvik, Ambroise Martin, Hildegard Przyrembel, Seppo Salminen, Sean (J.J.) Strain, Inge Tetens, Henk van den Berg, Hendrik van Loveren and Hans Verhagen.

The members of the Claims/Sub-Working Group Gut/Immune: Miguel Gueimonde, Martinus Løvik, Bevan Moseley, Seppo Salminen, Stephan Strobel, Hania Szajewska and Hendrik van Loveren.

## INFORMATION AS PROVIDED IN THE CONSOLIDATED LIST

The consolidated list of health claims pursuant to Article 13 of Regulation 1924/2006<sup>3</sup> submitted by Member States contains main entry claims with corresponding conditions of use and literature from similar health claims. The information provided in the consolidated list for the health claims subject to this opinion is given in Table 1.

Table 1. Main entry health claims related to *Lactobacillus plantarum* 299 (DSM 6595, 67B), including conditions of use from similar claims, as proposed in the Consolidated List.

| ID   | Food or Food component   | Health Relationship | Proposed wording              |
|------|--|---------------------|-------------------------------|
| 1077 | <i>Lactobacillus plantarum</i> 299 (DSM 6595, 67B)             | Immune system       | Supports natural/body defence |
|      | <b>Conditions of use</b><br>- At least 10 <sup>9</sup> cfu/day |                     |                               |

## ASSESSMENT

### 1. Characterisation of the food/constituent

The food constituent that is the subject of the health claim is *Lactobacillus plantarum* 299 (DSM 6595, also as 67B) (hereafter *L. plantarum* 299 (DSM 6595)). The identification and characterisation of the strain *Lactobacillus plantarum* 299 (DSM 6595) by both phenotypic and genotypic methods are reported (Johansson et al., 1993; Johansson et al., 1995; Molin et al., 2006; Molin et al., 1993; Nigatu et al., 2001).

The Panel notes that the deposit of the strain in the DSMZ (Deutsche Sammlung von Mikroorganismen und Zellkulturen) as DSM 6595 is indicated. In the DSMZ, which is a non-public International Depository Authority under the Budapest Treaty, cultures can be deposited in a restricted-access collection as Patent deposits.

The Panel considers that the food constituent, *Lactobacillus plantarum* 299 (DSM 6595, 67B), which is the subject of the health claim, is sufficiently characterised.

### 2. Relevance of the claimed effect to human health

The claimed effect is “immune system”. The Panel assumes that the target population is the general population.

“Immune system” is not sufficiently defined and no more details were provided in the proposed wording.

The Panel considers that the claimed effect, “immune system”, has not been sufficiently defined.

### 3. Scientific substantiation of the claimed effect

Twelve references were cited to substantiate the claimed effect. The references include four human intervention studies, a meta-analysis, one *ex vivo*, two *in vitro* and three animal studies and a reference related to a company internal report on *Lactobacillus plantarum* and intestinal mucins. With respect to the latter reference, the Panel considers that no scientific data was provided that could be used to substantiate the claimed effect.

<sup>3</sup> Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. OJ L 404, 30.12.2006, p. 9–25.

Three intervention studies have been presented on the effects of *Lactobacillus plantarum* 299 (DSM 6595, 67B) on the incidence of bacterial infection in patients either suffering from severe acute pancreatitis, or after liver transplantation or undergoing major abdominal surgery (Olah et al., 2002; Rayes et al., 2002a and 2000b). The meta-analysis of these intervention studies was presented on a poster (Alenfall et al., 2004). The Panel considers that the evidence provided does not establish that the results obtained from these studies with seriously ill patients can be extrapolated to the general population.

In the human intervention study by Johansson et al. (1993), different strains of lactobacilli were administered to healthy volunteers and reduction of pathogens in rectal mucosa was measured. It was not clear from the study whether the effect could be attributed to *L. plantarum* 299 (DSM 6595, 67B).

Studies on *ex vivo* IL-10 (interleukin 10) production by human mucosal cells induced by *L. plantarum* (Pathmakanthan et al., 2004), bacterial strain adherence to mucosal cells *in vitro* (Alderberth et al., 1996), *in vitro* antimicrobial activity (Jacobsen et al., 1999), reduced translocation of pathogens in rat models (Mao et al., 1997; Adawi et al., 1999), and reduced intestinal permeability in an animal model of biliary obstruction after enteral administration of *L. plantarum* species 299 (LP299) (White et al., 2006) were provided. The Panel notes that the evidence provided in the animal, *in vitro* and *ex vivo* studies does not predict the effect of *L. plantarum* 299 (DSM 6595, 67B) in humans.

Overall, the evidence provided did not establish that the results obtained in studies with seriously ill patients or from studies in animals, or conducted *in vitro* and *ex vivo* can be extrapolated to the general human population.

The Panel concludes that a cause and effect relationship has not been established between the consumption of *Lactobacillus plantarum* 299 (DSM 6595, 67B) and “immune system”.

## CONCLUSIONS

On the basis of the data available, the Panel concludes that:

- The food constituent, *Lactobacillus plantarum* 299 (DSM 6595, 67B), which is the subject of the health claim is sufficiently characterised.
- The claimed effect is “immune system”. The target population is assumed to be the general population. “Immune system” has not been sufficiently defined.
- A cause and effect relationship has not been established between the consumption of *Lactobacillus plantarum* 299 (DSM 6595, 67B) and “immune system”.

## DOCUMENTATION PROVIDED TO EFSA

Health claims pursuant to Article 13 of Regulation (EC) No 1924/2006 (No: EFSA-Q-2008-1816). The scientific substantiation is based on the information provided by the Member States in the consolidated list of Article 13 health claims and references that EFSA has received from Member States or directly from stakeholders.

The full list of supporting references as provided to EFSA is available on: <http://www.efsa.europa.eu/panels/nda/claims/article13.htm>.

## REFERENCES

Adawi D, Molin G, Ahrné S, Jeppsson B, 1999. Modulation of the Colonic Bacterial Flora Affects Differently Bacterial Translocation and Liver Injury in an Acute Liver Injury Model. *Microbial Ecology in Health and Disease*, 11, 47-54.

- Adlerberth I, Ahrne S, Johansson ML, Molin G, Hanson LA, Wold AE, 1996. A mannose-specific adherence mechanism in *Lactobacillus plantarum* conferring binding to the human colonic cell line HT-29. *Appl Environ Microbiol*, 62, 2244-2251.
- Alenfall J, Åstrom M, Bengmark S, Bengtsson P, 2004. Early enteral supply of *Lactobacillus plantarum* 299 reduce the incidence of infections in severely ill patients: A meta-analysis of three randomized controlled trials. Poster Presentation ESPEN 2004.
- Jacobsen CN, Rosenfeldt Nielsen V, Hayford AE, Moller PL, Michaelsen KF, Paerregaard A, Sandstrom B, Tvede M, Jakobsen M, 1999. Screening of probiotic activities of forty-seven strains of *Lactobacillus* spp. by in vitro techniques and evaluation of the colonization ability of five selected strains in humans. *Appl Environ Microbiol*, 65, 4949-4956.
- Johansson ML, Molin G, Jeppsson B, Nobaek S, Ahrne S, Bengmark S, 1993. Administration of different *Lactobacillus* strains in fermented oatmeal soup: in vivo colonization of human intestinal mucosa and effect on the indigenous flora. *Appl Environ Microbiol.*, 59, 15-20
- Johansson ML, Quednau M, Molin G, Ahrné S, 1995. Randomly amplified polymorphic DNA (RAPD) for rapid typing of *Lactobacillus plantarum* strains. *Lett Appl Microbiol.*, 21, 155-159.
- Mao Y, Nobaek S, Adawi D, Molin G, Jeppsson B, 1997. Comparison of the Effects of Different Strains of *Lactobacillus* in Reducing Bacterial Translocation on Methotrexate-Induced Enterocolitis in Rats. *Diegstive Surgery Basel*, 14, 284-291.
- Molin G, Ahrné S, Jeppsson B, Vasquez A, Berggren A. 2006. New *Lactobacillus* strains with the ability to colonize the human vagina, useful in probiotic food products, hygiene products, and pharmaceutical compositions for promoting vaginal health and preventing and treating vaginal infections. Patent WO2006038869.
- Molin G, Jeppsson B, Johansson ML, Ahrné S, Nobaek S, Ståhl M, Bengmark S. 1993. Numerical taxonomy of *Lactobacillus* spp. associated with healthy and diseased mucosa of the human intestines. *J. Appl. Microbiol.*, 74, 314-323.
- Nigatu A, Ahrné S, Molin G, 2001. Randomly amplified polymorphic DNA (RAPD) profiles for the distinction of *Lactobacillus* species. *Antoine van Leeuwenhoek*, 79, 1-6.
- Olah A, Belagyi T, Issekutz A, Gamal ME, Bengmark S, 2002. Randomized clinical trial of specific lactobacillus and fibre supplement to early enteral nutrition in patients with acute pancreatitis. *Br J Surg*, 89, 1103-1107.
- Pathmakanthan S, Li CK, Cowie J, Hawkey CJ, 2004. *Lactobacillus plantarum* 299: beneficial in vitro immunomodulation in cells extracted from inflamed human colon. *J Gastroenterol Hepatol*, 19, 166-173.
- Rayes N, Hansen S, Seehofer D, Muller AR, Serke S, Bengmark S, Neuhaus P, 2002a. Early enteral supply of fiber and *Lactobacilli* versus conventional nutrition: a controlled trial in patients with major abdominal surgery. *Nutrition*, 18, 609-615.
- Rayes N, Seehofer D, Hansen S, Boucsein K, Muller AR, Serke S, Bengmark S, Neuhaus P, 2002b. Early enteral supply of lactobacillus and fiber versus selective bowel decontamination: a controlled trial in liver transplant recipients. *Transplantation*, 74, 123-127.
- White JS, Hoper M, Parks RW, Clements WD, Diamond T, Bengmark S, 2006. The probiotic bacterium *Lactobacillus plantarum* species 299 reduces intestinal permeability in experimental biliary obstruction. *Lett Appl Microbiol*, 42, 19-23.

## APPENDICES

### APPENDIX A

#### BACKGROUND AND TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

The Regulation 1924/2006 on nutrition and health claims made on foods<sup>4</sup> (hereinafter "the Regulation") entered into force on 19<sup>th</sup> January 2007.

Article 13 of the Regulation foresees that the Commission shall adopt a Community list of permitted health claims other than those referring to the reduction of disease risk and to children's development and health. This Community list shall be adopted through the Regulatory Committee procedure and following consultation of the European Food Safety Authority (EFSA).

Health claims are defined as "any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health".

In accordance with Article 13 (1) health claims other than those referring to the reduction of disease risk and to children's development and health are health claims describing or referring to:

- a) the role of a nutrient or other substance in growth, development and the functions of the body; or
- b) psychological and behavioural functions; or
- c) without prejudice to Directive 96/8/EC, slimming or weight-control or a reduction in the sense of hunger or an increase in the sense of satiety or to the reduction of the available energy from the diet.

To be included in the Community list of permitted health claims, the claims shall be:

- (i) based on generally accepted scientific evidence; and
- (ii) well understood by the average consumer.

Member States provided the Commission with lists of claims as referred to in Article 13(1) by 31 January 2008 accompanied by the conditions applying to them and by references to the relevant scientific justification. These lists have been consolidated into the list which forms the basis for the EFSA consultation in accordance with Article 13 (3).

#### ISSUES THAT NEED TO BE CONSIDERED

##### IMPORTANCE AND PERTINENCE OF THE FOOD<sup>5</sup>

Foods are commonly involved in many different functions<sup>6</sup> of the body, and for one single food many health claims may therefore be scientifically true. Therefore, the relative importance of food e.g. nutrients in relation to other nutrients for the expressed beneficial effect should be considered: for functions affected by a large number of dietary factors it should be considered whether a reference to a single food is scientifically pertinent.

It should also be considered if the information on the characteristics of the food contains aspects pertinent to the beneficial effect.

##### SUBSTANTIATION OF CLAIMS BY GENERALLY ACCEPTABLE SCIENTIFIC EVIDENCE

Scientific substantiation is the main aspect to be taken into account to authorise health claims. Claims should be scientifically substantiated by taking into account the totality of the available scientific data, and by weighing the evidence, and shall demonstrate the extent to which:

---

<sup>4</sup> OJ L12, 18/01/2007

<sup>5</sup> The term 'food' when used in this Terms of Reference refers to a food constituent, the food or the food category.

<sup>6</sup> The term 'function' when used in this Terms of Reference refers to health claims in Article 13(1)(a), (b) and (c).

- (a) the claimed effect of the food is beneficial for human health,
- (b) a cause and effect relationship is established between consumption of the food and the claimed effect in humans (such as: the strength, consistency, specificity, dose-response, and biological plausibility of the relationship),
- (c) the quantity of the food and pattern of consumption required to obtain the claimed effect could reasonably be achieved as part of a balanced diet,
- (d) the specific study group(s) in which the evidence was obtained is representative of the target population for which the claim is intended.

EFSA has mentioned in its scientific and technical guidance for the preparation and presentation of the application for authorisation of health claims consistent criteria for the potential sources of scientific data. Such sources may not be available for all health claims. Nevertheless it will be relevant and important that EFSA comments on the availability and quality of such data in order to allow the regulator to judge and make a risk management decision about the acceptability of health claims included in the submitted list.

The scientific evidence about the role of a food on a nutritional or physiological function is not enough to justify the claim. The beneficial effect of the dietary intake has also to be demonstrated. Moreover, the beneficial effect should be significant i.e. satisfactorily demonstrate to beneficially affect identified functions in the body in a way which is relevant to health. Although an appreciation of the beneficial effect in relation to the nutritional status of the European population may be of interest, the presence or absence of the actual need for a nutrient or other substance with nutritional or physiological effect for that population should not, however, condition such considerations.

Different types of effects can be claimed. Claims referring to the maintenance of a function may be distinct from claims referring to the improvement of a function. EFSA may wish to comment whether such different claims comply with the criteria laid down in the Regulation.

#### **WORDING OF HEALTH CLAIMS**

Scientific substantiation of health claims is the main aspect on which EFSA's opinion is requested. However, the wording of health claims should also be commented by EFSA in its opinion.

There is potentially a plethora of expressions that may be used to convey the relationship between the food and the function. This may be due to commercial practices, consumer perception and linguistic or cultural differences across the EU. Nevertheless, the wording used to make health claims should be truthful, clear, reliable and useful to the consumer in choosing a healthy diet.

In addition to fulfilling the general principles and conditions of the Regulation laid down in Article 3 and 5, Article 13(1)(a) stipulates that health claims shall describe or refer to "the role of a nutrient or other substance in growth, development and the functions of the body". Therefore, the requirement to describe or refer to the 'role' of a nutrient or substance in growth, development and the functions of the body should be carefully considered.

The specificity of the wording is very important. Health claims such as "Substance X supports the function of the joints" may not sufficiently do so, whereas a claim such as "Substance X helps maintain the flexibility of the joints" would. In the first example of a claim it is unclear which of the various functions of the joints is described or referred to contrary to the latter example which specifies this by using the word "flexibility".

The clarity of the wording is very important. The guiding principle should be that the description or reference to the role of the nutrient or other substance shall be clear and unambiguous and therefore be specified to the extent possible i.e. descriptive words/ terms which can have multiple meanings should be avoided. To this end, wordings like "strengthens your natural defences" or "contain antioxidants" should be considered as well as "may" or "might" as opposed to words like "contributes", "aids" or "helps".



In addition, for functions affected by a large number of dietary factors it should be considered whether wordings such as "indispensable", "necessary", "essential" and "important" reflects the strength of the scientific evidence.

Similar alternative wordings as mentioned above are used for claims relating to different relationships between the various foods and health. It is not the intention of the regulator to adopt a detailed and rigid list of claims where all possible wordings for the different claims are approved. Therefore, it is not required that EFSA comments on each individual wording for each claim unless the wording is strictly pertinent to a specific claim. It would be appreciated though that EFSA may consider and comment generally on such elements relating to wording to ensure the compliance with the criteria laid down in the Regulation.

In doing so the explanation provided for in recital 16 of the Regulation on the notion of the average consumer should be recalled. In addition, such assessment should take into account the particular perspective and/or knowledge in the target group of the claim, if such is indicated or implied.

## **TERMS OF REFERENCE**

### **HEALTH CLAIMS OTHER THAN THOSE REFERRING TO THE REDUCTION OF DISEASE RISK AND TO CHILDREN'S DEVELOPMENT AND HEALTH**

EFSA should in particular consider, and provide advice on the following aspects:

- Whether adequate information is provided on the characteristics of the food pertinent to the beneficial effect.
- Whether the beneficial effect of the food on the function is substantiated by generally accepted scientific evidence by taking into account the totality of the available scientific data, and by weighing the evidence. In this context EFSA is invited to comment on the nature and quality of the totality of the evidence provided according to consistent criteria.
- The specific importance of the food for the claimed effect. For functions affected by a large number of dietary factors whether a reference to a single food is scientifically pertinent.

In addition, EFSA should consider the claimed effect on the function, and provide advice on the extent to which:

- the claimed effect of the food in the identified function is beneficial.
- a cause and effect relationship has been established between consumption of the food and the claimed effect in humans and whether the magnitude of the effect is related to the quantity consumed.
- where appropriate, the effect on the function is significant in relation to the quantity of the food proposed to be consumed and if this quantity could reasonably be consumed as part of a balanced diet.
- the specific study group(s) in which the evidence was obtained is representative of the target population for which the claim is intended.
- the wordings used to express the claimed effect reflect the scientific evidence and complies with the criteria laid down in the Regulation.

When considering these elements EFSA should also provide advice, when appropriate:

- on the appropriate application of Article 10 (2) (c) and (d) in the Regulation, which provides for additional labelling requirements addressed to persons who should avoid using the food; and/or warnings for products that are likely to present a health risk if consumed to excess.

## **APPENDIX B**

### **EFSA DISCLAIMER**

The present opinion does not constitute, and cannot be construed as, an authorisation to the marketing of the food/food constituent, a positive assessment of its safety, nor a decision on whether the food/food constituent is, or is not, classified as foodstuffs. It should be noted that such an assessment is not foreseen in the framework of Regulation (EC) No 1924/2006.

It should also be highlighted that the scope, the proposed wordings of the claims and the conditions of use as proposed in the Consolidated List may be subject to changes, pending the outcome of the authorisation procedure foreseen in Article 13(3) of Regulation (EC) No 1924/2006.