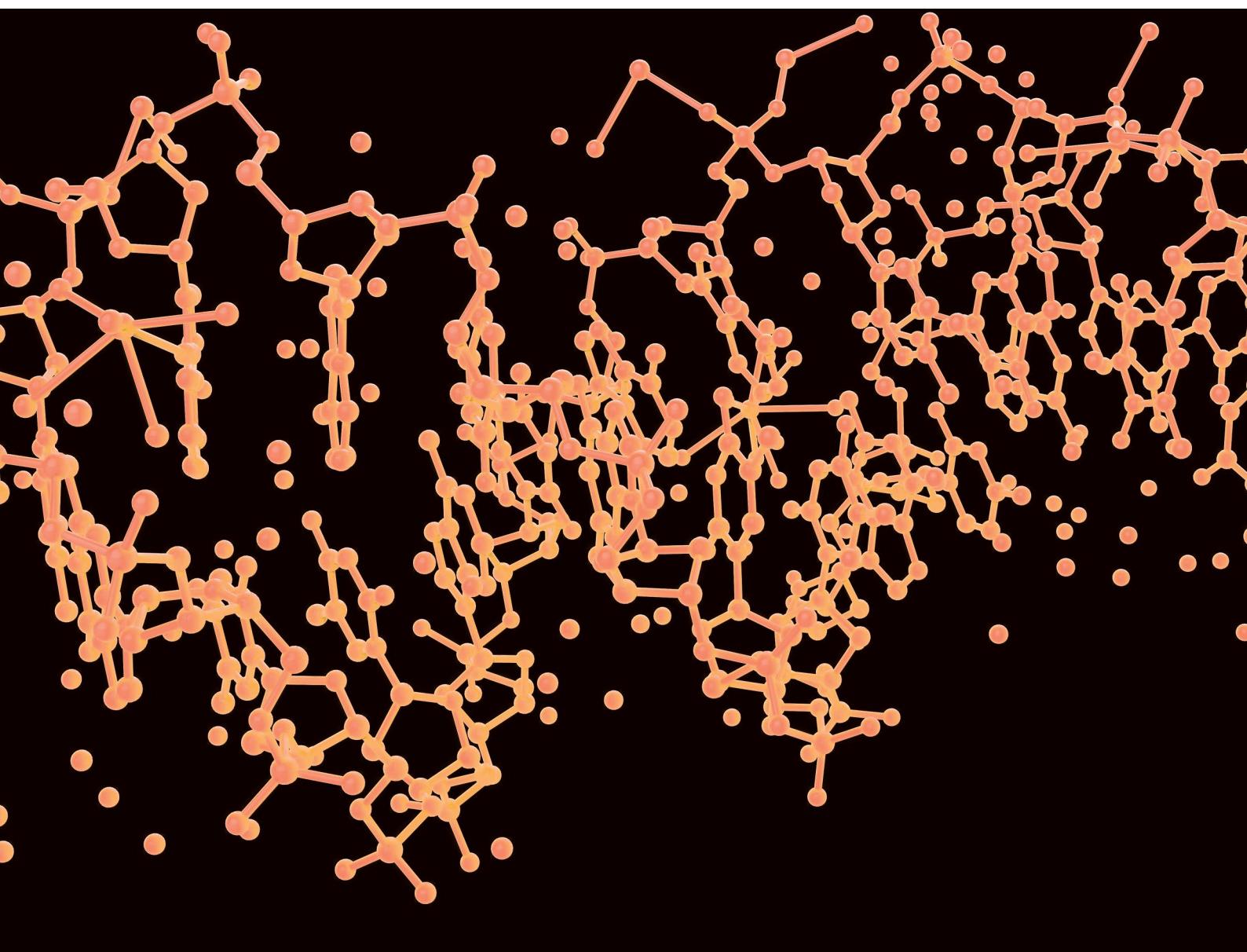


The Joint FAO/WHO Expert Meetings on Nutrition (JEMNU)

# Nitrogen to protein conversion factors for soy-based and milk-based ingredients used in infant formula and follow-up formula

Report of the meeting of the expert panel  
Geneva, Switzerland, 16–17 July 2019



Food and Agriculture  
Organization of the  
United Nations



World Health  
Organization





Food and Agriculture  
Organization of the  
United Nations



World Health  
Organization

**The Joint FAO/WHO Expert Meetings on Nutrition (JEMNU)**

**NITROGEN TO PROTEIN CONVERSION  
FACTORS FOR SOY-BASED AND MILK-BASED  
INGREDIENTS USED IN INFANT FORMULA  
AND FOLLOW-UP FORMULA**

---

Report of the meeting of the expert panel  
Geneva, Switzerland, 16–17 July 2019

The Joint FAO/WHO Expert Meetings on Nutrition (JEMNU): nitrogen to protein conversion factors for soy-based and milk-based ingredients used in infant formula and follow-up formula. Report of the meeting of the expert panel, Geneva, Switzerland, 16–17 July 2019

ISBN 978-92-5-132515-5 (FAO)  
ISBN 978-92-4-000021-6 (WHO)

**© World Health Organization and Food and Agriculture Organization of the United Nations, 2020**

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo/>).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated below. In any use of this work, there should be no suggestion that the World Health Organization (WHO) or the Food and Agriculture Organization of the United Nations (FAO) endorse any specific organization, products or services. The use of the WHO or FAO logo is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the World Health Organization (WHO) or the Food and Agriculture Organization of the United Nations (FAO). WHO and FAO are not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

Any mediation relating to disputes arising under the licence shall be conducted in accordance with the mediation rules of the World Intellectual Property Organization <http://www.wipo.int/amc/en/mediation/rules>.

**Suggested citation.** The Joint FAO/WHO Expert Meetings on Nutrition (JEMNU): nitrogen to protein conversion factors for soy-based and milk-based ingredients used in infant formula and follow-up formula. Report of the meeting of the expert panel, Geneva, Switzerland, 16–17 July 2019. Geneva: World Health Organization and Food and Agriculture Organization of the United Nations; 2020. Licence: CC BY-NC-SA 3.0 IGO.

**Cataloguing-in-Publication (CIP) data.** CIP data are available at <http://apps.who.int/iris>.

**Sales, rights and licensing.** To purchase WHO publications, see <http://apps.who.int/bookorders>. To submit requests for commercial use and queries on rights and licensing, see <http://www.who.int/about/licensing>.

**Third-party materials.** If you wish to reuse material from this work that is attributed to a third party, such as tables, figures or images, it is your responsibility to determine whether permission is needed for that reuse and to obtain permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

**WHO Photographs.** WHO photographs are copyrighted and are not to be reproduced in any medium without obtaining prior written permission. Requests for permission to reproduce WHO photographs should be addressed to: [http://www.who.int/about/licensing/copyright\\_form/en/](http://www.who.int/about/licensing/copyright_form/en/)

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO or FAO concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products, whether or not these have been patented, does not imply that they are endorsed or recommended by WHO or FAO in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by WHO and FAO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO and FAO be liable for damages arising from its use.

Cover photo: © Zapp2Photo

---

# CONTENTS

|   |    |
|---|----|
| Acknowledgements  | v  |
| Abbreviations and acronyms  | vi |
| Executive summary   | 1  |
| 1 Introduction  | 5  |
| 2 Background  | 7  |
| 3 The GRADE framework for assessing quality of evidence   | 9  |
| 4 Results of systematic review on nitrogen to protein conversion factors  | 11 |
| 5 Discussion of the systematic review   | 15 |
| 6 Quality of evidence for nitrogen to protein conversion factors: GRADE assessments   | 20 |
| 7 Final determination of recommended nitrogen to protein conversion factors   | 23 |
| 8 Conclusions   | 25 |
| <b>Annexes</b>  | 29 |
| Annex 1 List of participants  | 31 |
| Annex 2 Call for data on nitrogen to protein conversion factors for soy-based and milk-based ingredients  | 33 |
| Annex 3 Call for experts for the Joint FAO/WHO Expert Meetings on Nutrition (JEMNU) on nitrogen to protein conversion factors for soy-based and milk-based ingredients used in infant formula and follow-up formula | 35 |
| Annex 4 Discussion paper prepared by Canada and the United States of America  | 38 |
| Annex 5 The final GRADE evidence profiles   | 42 |
| Annex 6 Methods for amino acid analysis – best practice   | 52 |



---

# ACKNOWLEDGEMENTS

FAO and WHO gratefully acknowledge the technical input and expert advice provided by the members of the Joint FAO/WHO Expert Meetings on Nutrition (JEMNU) which was convened to provide scientific advice on the nitrogen to protein conversion factor(s) for soy-based and milk-based ingredients in infant formulas and follow-up formulas, as well as Professor Daniel Tomé, Professor Christophe Cordella, Dr Omar Dib and Ms Christine Péron, who conducted the background systematic review.

Acknowledgement is also made to Dr Karen McColl, who prepared this meeting report, Dr Hilary Cadman from Cadman Editing Services, Australia, for technical editing of the report, and Ms Sue Hobbs from minimum graphics, New Zealand, for cover design and formatting of the report.

FAO and WHO express special appreciation to the US Food and Drug Administration for providing financial support for implementing the work of JEMNU requested by the 39th Session of the Codex Committee on Nutrition and Food for Special Dietary Uses (CCNFSDU) held in December 2017.

# ABBREVIATIONS AND ACRONYMS

|         |  |
|---------|--|
| CAC     | Codex Alimentarius Commission                                      |
| CCNFSDU | Codex Committee on Nutrition and Foods for Special Dietary Uses    |
| CRE     | WHO Office of Compliance, Risk Management and Ethics               |
| DOI     | declaration of interests   |
| IDF     | International Dairy Federation                                     |
| ISO     | International Organization for Standardization                     |
| FAO     | Food and Agriculture Organization of the United Nations            |
| GRADE   | Grading of Recommendations, Assessment, Development and Evaluation |
| JEMNU   | Joint FAO/WHO Expert Meetings on Nutrition                         |
| PICO    | population, intervention, comparator and outcome                   |
| WHO     | World Health Organization  |

预览已结束，完整报告链接和二维码如下：

[https://www.yunbaogao.cn/report/index/report?reportId=5\\_24731](https://www.yunbaogao.cn/report/index/report?reportId=5_24731)

