CODEX ALIMENTARIUS COMMISSION E

Food and Agriculture Organization of the United Nations

World Health Organization

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CODEX COMMITTEE ON FATS AND OILS

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DISCUSSION PAPER ON THE REVISION OF THE LIMIT FOR CAMPESTEROL IN THE CODEX STANDARD FOR OLIVE OILS AND OLIVE POMACE OILS

prepared by Australia
with the assistance of Argentina, United States of America and New Zealand

BACKGROUND

1. CCFO, at its 22nd meeting, considered a discussion paper[1] prepared by Australia proposing new work to review the campesterol limit in the Codex standard Codex *Standard for Olive Oils and Olive Pomace Oils (CODEX Stan 33).* The Committee agreed that there was insufficient support to initiate new work on the revision of the campesterol level in the Codex standard at that stage. The Committee also agreed that the delegation of Australia, in cooperation with Argentina, the United States and any other interested countries, would revise the discussion paper for consideration at the next session, taking into account additional data that would become available in the meantime.

2. The Chair emphasized that in order to arrive at data that is truly representative of global variability close attention must be paid to the following conditions when collecting data for consideration by the Committee: geographical variation; climatic and seasonal variation (over several seasons); plant varieties; and data which are statistically sound[2] .

ISSUES

3. There are several problems with the limits set in Section 3 (Essential Composition and Quality Factors) of the Codex standard. However, campesterol is the parameter for which exceptions to the limit are most common, and which is in the most obvious and urgent need of revision—a fact attested to in the scientific literature on olive oil composition (see Table 1 for some examples). These data show that the campesterol limit is not achieved by a number of varieties in a number of different regions, including in traditional olive-growing countries. It is clear that the problem is not simply one of having grown a certain variety in a certain region, nor is it a problem restricted to new producing countries or to countries with less experience in the growing of olives and the production and analysis of olive oils.

4. Limits for fatty acids, sterols and other minor components of olive oils are used by competent authorities in a number of Codex member countries to detect and prosecute fraudulent practices, in particular adulteration of olive oils with other edible oils. These limits are not relevant to the protection of public health and safety and are not principally aimed at defining the expected limits of olive oil composition. Compositional limits set for the purpose of detecting fraudulent practices, without regard to the global variability in olive oil composition, act to prevent legitimate trade in authentic virgin olive oils where the composition of such oils falls outside of the restrictive limits due to seasonal, varietal or geo/climatic conditions. It is acknowledged that exceptions to several of the compositional limits established in international standards for olive oils are common.

5. Deviations from these standards do not reflect any inherent problems with the quality or authenticity of these oils but rather natural variations in oil chemistry. Plant sterols are well recognised as being an

1 CX/FO 11/22/11
2 Paras 72- 78 REP 11/FO

important factor in enhancing the reputation of olive oil as being "healthy" oil. They have been found to be effective in lowering elevated cholesterol, and are now being added to a wide range of foods.

6. The limits for campesterol established in the International Olive Council (IOC) and Codex standards therefore act as a barrier to trade for authentic olive oils. Since technical regulations that are aligned with the Codex standards are presumed to be consistent with member's obligations under the World Trade (WTO) agreements, the limits set for campesterol in the Codex standard must be truly representative of global variability in order to avoid disruptions to trade.

Table 1: Selected examples of campesterol outside of IOC/EU/Codex specifications

Variety/ Country	Problem	Reference
Cornicabra/ Spain	Between 25% and 75% of samples over 5 seasons >4.0, with average of 4.0 and std dev 0.2	Sterol and alcohol composition of Cornicabra virgin olive oil: the campesterol content exceeds the upper limit of 4% established by EU regulations. Rivera del Álamo, R.M., Fregapane, G., Aranda, F., Gómez-Alonso, S. and M.D. Salvador (2004). Food Chem. 84: 533-537.
Cornicabra/ Spain	>75% of samples over 5 seasons >4.0, with average of 4.2 and std dev 0.15	Cornicabra virgin olive oil: a study of five crop seasons. Composition, quality and oxidative stability. Salvador Rivera, M.D., Aranda, F., Gómez-Alonso, S. and G. Fregapane (2001). Food Chem. 74: 267-274.
Cornicabra/ Spain	89/102 (87%) of samples >4% over two growing seasons.	Analytical evaluation of 'Cornicabra' virgin olive oil from Castilla-La Mancha, Spain. Alvarruiz1, A., Fernández, E., Montero, F., Granell, J. & Pardo, J.E. (2003). Food, Agriculture & Environment 2: 48-52.
Several/ Australia	Several samples outside of limits	The Natural Chemistry of Australian Extra Virgin Olive Oil. R.J. Mailer (2007). Rural Industries Research and Development Corporation, Canberra.
Barnea/ Australia	16 of 17 samples > 4.0, with average of 4.5 and std dev 0.3	A Survey of Australian Olive Cultivars to Determine Compliance with International Standards. R.J. Mailer & J. Ayton (2008). Rural Industries Research and Development Corporation, Canberra.
Koroneiki/ Australia	4 of 8 samples > 4.0, with average of 3.9 and std dev 0.6	A Survey of Australian Olive Cultivars to Determine Compliance with International Standards. R.J. Mailer & J. Ayton (2008). Rural Industries Research and Development Corporation, Canberra.
Several/ Argentina	All Barnea & 70% Arbequina samples > 4.0, with ranges up to 5.5	Characterization of Monovarietal Argentinian Olive Oils from New Productive Zones. Liliana N. Ceci Æ Amalia A. Carelli (2007). J Am Oil Chem Soc 84: 1125–1136.
Koroneiki/ Greece	Average of 72 samples: 4.2	Effect of Extraction System, Stage of Ripeness, and Kneading Temperature on the Sterol Composition of Virgin Olive Oils. A. Koutsaftakis, F. Kotsifaki & E. Stefanoudaki (1999). J Am Oil Chem Soc 76: 1477–1481.
Several, Australia	33% (291 of 888) samples >4.0, multiple seasons, all regions, all varieties[3]	Combined database of Australian olive oil analyses, AORL, MOLS, Mailer, R. and NSW Department of Primary Industries, 2012, unpublished.
Several, United States	14 different varietals, collected from Feb – April 2011 in California and Texas. 7 of 60 samples >4.0 [4]	TASC 2011 Project Report–Composite Chemical Picture of U.S. Olive Oil: Removal of Potential Trade Barriers-Year 2. S. Wang, P. Darragh & B. Golino (2011). United States Department of Agriculture, Washington

3 Australian Oils Research Laboratory (AORL) and Modern Olive Laboratory Service (MOLS) are ISO 17025 accredited by National Association of Testing Authorities (NATA), Australia as well as American Oil Chemists Society (AOCS) and International Olive Council (IOC) recognised laboratories.

4 US analyses conducted by AORL, Wagga Wagga, Australia,

7. The production and trade of virgin olive oils from emerging olive oil producing countries is increasing substantially. It is therefore crucial for CCFO to examine the evidence that clearly shows the current limit for campesterol acts as a technical barrier to trade in virgin olive oils, and the Codex standard should be reviewed to ensure it acts as a fair and equitable benchmark for international trade in olive oil.

8. The failure of Codex to address the natural variations shown by a significant proportion of oils produced around the world is currently being used not only as a trade barrier but also as a tool utilised by some to obtain high quality oils at a discounted price. The vast majority of these oils that do not meet the standard are blended with other olive oils until they meet the standardised limits for the particular component. The resultant blends are then sold, at a price premium, as virgin olive oils. This practice is clearly inconsistent with the Codex mandate of promoting fair practices in the food trade.

9. The effect of diverse factors on campesterol levels in olive oils is borne out in many studies. Recent work in Australia[5] demonstrates the strong genetics × environment effect on campesterol levels, and clearly rules out adulteration or poor oil quality as causal factors.

PROPOSAL

10. We contend that the limit for campesterol should be raised to a value which does not arbitrarily discriminate against authentic olive oils. Based on available evidence, we believe the limit should be set to 4.8%, a value which would encompass the great majority of oils produced from Barnea, Arbequina, Koreneiki, Cornicabra and similar high-campesterol varieties, regardless of where in the world they are grown.

11. Anticipating the counter-argument that such a level increases the prospects of adulteration of olive oils, we argue that a concomitant change of the limit for stigmasterol from the current limit—which reads "< *campesterol*"(which effectively allows up to 3.9% stigmasterol in olive oil)—to a specific limit of ≤ 1.9% will, along with the existing limits for brassicasterol (≤ 0.1% for grades other than olive pomace oils), Δ7-stigmastenol (currently ≤ 0.5%) and apparent β–sitosterol (≥93%), safeguard the integrity of olive oils and ensure fair practices in trade. In addition, CCFO should give consideration to incorporating new test methods in the Codex standard that safeguard the integrity of authentic olive oils particularly against new fraudulent practices such as dedorisation.

12. The proposed values are based on an analysis of 888 samples collected in Australia over several years, and represent a range of seasons and varieties. Campesterol levels were 3.71 ± 0.67% (mean ± std dev). Two hundred and ninety samples (33%) had a campesterol level higher than 4.0%. 283 of those had a campesterol level in the range 4.0-4.8%.

13. In order to establish that the proposed revised values will neither exclude authentic olive oils with a campesterol level between 4.0% and 4.8% nor enable greater amounts of adulterated oils to meet the standard, the proposal has been analysed against several datasets: the US data for 60 samples presented in Table 1; Argentinean data for 418 samples having campesterol level higher than 4.0%; and Canadian inspection data of 371 oils in the market place, covering the years 2005–2010. The Canadian samples were consumer samples, taken at the retail level of trade, labelled as olive oil, and not of known authenticity.

14. The US data show that all seven of the oils with campesterol in the range 4.0–4.8% have a stigmasterol level of ≤ 1.9% and would pass the current proposal. A similar result is seen for the 283 Australian samples with campesterol levels of 4.0 – 4.8%. All but two have a stigmasterol level of ≤ 1.9% and would pass the current proposal.

15. The 418 Argentinean oil samples included 395 samples with campesterol in the range 4.0–4.8%. Of these, 389 (98%) have stigmasterol ≤ 1.9% and would pass the current proposal.

16. The Canadian testing data show that for oils with campesterol in the range 4.0-4.8%, cases of adulteration with pomace oil, refined oil or other seed oils were clearly identifiable through aberrant results for other parameters—particularly brassicasterol, stigmastadiene, Δ7-stigmastenol, apparent β-sitosterol and erythrodiol/uvaol—while those oils with very high levels of campesterol (>4.8%) tended to have very high stigmasterol levels in addition to other defects.

5 *Sterols in Australian Olive Oils: the effects of technological and biological factors*, Guillaume, C., Ravetti, L. & Johnson, J. (2010), Rural Industries Research and Development Corporation Publication No. 10/173.

CONCLUSIONS

17. The Committee is invited to consider the issues raised in the discussion paper and recommend that the 36th Session of the Codex Alimentarius Commission approve new work to review the campesterol and stigmasterol limit in the Codex *Standard for Olive Oils and Olive Pomace Oils* (CODEX STAN 33-1981) so as to establish a limit that is truly representative of global variability in this parameter in olive oils.

APPENDIX 1:

PROPOSAL FOR NEW WORK – CODEX COMMITTEE ON FATS AND OILS

PREPARED BY

Australia with the assistance of Argentina, United States of America and New Zealand.

1. Purpose and Scope of the Proposed Work

To review the current *Codex Standard for Olive Oils and Olive Pomace Oils (Codex Stan 33-1981)* (the Codex standard) to establish compositional parameters truly representative of global variability for olive oils – in particular to revise the limit for campesterol, along with a consequential change to the limit for stigmasterol.

2. Its Relevance and Timeliness

The proposed work is within the Codex Committee on Fats and Oils (CCFO) term of reference: *"To elaborate world wide standards for fats and oils of animal, vegetable and marine origin including margarine and olive oil."*

A recent global survey of olive oils undertaken by the International Olive Council (IOC) at the request of CCFO (see CX/FO 05/19/04), and data from the scientific literature, indicate that a significant proportion of authentic olive oils from a number of member countries regularly exceeds compositional limits established in the current Codex standard, in particular the limit for campesterol.

Australia and other countries have encountered difficulties in the trade of authentic olive oils where they have failed to meet compositional limits established in the Codex standard. As Codex standards are referenced under WTO Agreements, the compositional limits set for sterols in olive oil need to be truly representative of global variability in these parameters, in order to ensure that unrepresentative limits do not act as potential technical barriers to trade in authentic olive oils.

It is necessary to review the limit for campesterol in Section 3 (Essential Composition and Quality Factors) of the Codex standard to take account of the global variability in sterol composition in olive oils, given the increasing production and trade in olive oils from all member nations.

3. The Main Aspects to be Covered

Revision of the limit for campesterol and, as a consequence, the limit for stigmasterol, in Section 3 (Essential Composition and Quality Factors) of the Codex standard, with regard to global data on olive oil composition.

4. An Assessment Against the *Criteria for the Establishment of Work Priorities*

This new work proposal is consistent with the following criteria applicable to commodities:

(a) Consumer protection from the point of view of health, food safety, ensuring fair practices in the food trade and taking into account the identified needs of developing countries.

Compositional limits for campesterol in the Codex standard are not relevant to the protection of public health and safety. These limits have been established to ensure fair practices in global food trade by enabling the identification of adulteration of olive oil with other edible oils. Campesterol is not the only measurement parameter in olive oil that can be used to determine if an oil has been adulterated. A compositional limit for campesterol for authentic olive oils that is not globally representative can act as a technical barrier to trade where such oils fall outside the limit due to seasonal, varietal or geo/climatic reasons.

(b) Volume of production and consumption in individual countries and volume and pattern of trade between countries.

According to data published by the IOC[6] global olive oil production in 2009 - 2010 was 2974 kilo tonnes (kt). The top five producers in 2009-2010 were the EU (2225 kt, approximately 75% of global production), Syria (150 kt, 5%), Tunisia (150 kt, 5%), Turkey (147 kt, 5%) and Morocco (140 kt, 4.7%). For the same year the top five (provisional data) exporting states or countries were the EU (444 kt, approximately 68% of global exports), Tunisia (97 kt, 14.9%), Turkey (30 kt, 4.6%), Morocco (21 kt, 3.2%) and Argentina (19 kt, 2.9%).

6 www.internationaloliveoil.org/estaticos/view/131-world-olive-oil-figures

The top five importing states or countries in 2009-2010 were the USA (258 kt, approximately 40% of global imports), the EU (78 kt, 12%), Brazil (51 kt, 7.8%), Japan (41 kt, 6.3%) and Canada (37 kt, 5.7%). For the same year the top five consumers were the EU (1846 kt, approximately 64%), the USA 258 kt, 8.9%), Syria (121 kt, 4.2%), Turkey (110 kt, 3.8%) and Morocco (90 kt, 3.1%).

(c) Diversification of national legislations and apparent resultant or potential impediments to international trade.

The Codex standard may be used as a benchmark for standards by member states in setting their domestic regulations.

The WTO's Agreement on Technical Barriers to Trade provides that where a member adopts a technical regulation that is in accordance with a relevant international standard, it shall be *presumed not to constitute a barrier to trade* (Article 2.5). The adoption of a standard which is not underpinned by a rigorous evidence-based scientific framework provides scope for unjustified barriers to trade. There is sound scientific evidence on the global variation of levels of campesterol which demonstrates that they regularly exceed levels currently in the Codex and IOC olive oil standards.

In 2010, the United States Department of Agriculture (USDA) completed a revision of the *United States Standards for Grades of Olive Oil and Olive-Pomace Oil*. In revising the standard, the USDA set a limit of ≤4.5% for campesterol which diverges from the Codex standard, though this limit, being less restrictive, does not operate as an impediment to international trade.

In Australia, the Australian Olive Association developed the Australian olive industry code of practice and the voluntary Australian Standard for olive oils and olive-pomace oils (AS 5264—2011). Similar to the approach of the USDA, the Australian Standard also adopts a less restrictive limit for campesterol (≤4.8%), so authentic olive oils are not excluded, while safeguarding the authenticity of olive oils through a tighter limit for stigmastadiene and introduction of tests for pyropheophytins and diacylglycerols.

(d) International or regional market potential.

While EU countries, Syria, Tunisia, Turkey and Morocco are likely to remain the leading exporters of olive oils in the near future, considerable expansion of production in a number of other countries (eg Argentina, Israel, Brazil, Republic of South Africa, China and Australia) is likely to change trading patterns in the medium term. The Codex standard should be applicable to product from non-traditional olive oil producing countries.

(e) Amenability of the commodity to standardisation.

The Codex standard has been in place since 1981 and incorporates sections and provisions in line with Codex requirements for commodity standards. However, as different varieties emerge and production occurs under new geo/climatic conditions, differences in compositional parameters are becoming more apparent. Standardisation of olive oil parameters will require consideration of compositional data from new varieties, a broader range of countries and different production practices.

(f) Coverage of the main consumer protection and trade issues by existing or proposed general standards.

Natural compositional variation attributable to olive variety, season and geo/climatic conditions is not adequately addressed in the existing Codex standard.

(g) Work already undertaken by other international organizations in this field and/or suggested by the relevant international intergovernmental body (ies).

The IOC recently carried out a survey of fatty acid profiles of olive oils to inform adoption of a limit for linolenic acid in the Codex standard and to inform development and amendment of its own standards for olive oils. Responses were obtained from Australia, Egypt, France, Israel, New Zealand, Saudi Arabia and South Africa. Data from Australia, France, Israel, and Saudi Arabia all showed that a proportion of production consistently exceeded limits in the Codex and IOC standards.

Data gathered independently, and from the scientific literature, show that olive oils from a number of countries, both traditional and emerging producers, consistently exceed the limits for campesterol.

5. Relevance to the Codex Strategic Objectives

The new work proposed would contribute to ensuring fair practices in the international trade in olive oils, taking into account the needs and special concerns of all countries, by satisfying the following strategic objectives and priorities elaborated in *Codex Alimentarius Commission: Strategic Plan 2008-2013*.

Goal 1: Promoting Sound Regulatory Frameworks:

Development of more globally representative Codex standards will help to ensure their widest adoption by member countries, minimising the potential negative effects of technical regulations on international trade by ensuring that they do not act as technical barriers to trade.

Goal 2: Promoting Widest and Consistent Application of Scientific Principles and Risk Analysis:

The proposed work will promote the development of Codex commodity standards based on rigorous scientific analysis of data collected from all regions of the world, so that the compositional parameters are globally relevant.

Goal 4: Promoting Cooperation between Codex and Relevant International Organizations:

Codex and member countries will continue to work closely with the IOC in collecting and analysing data and in developing more globally applicable requirements in the Codex and IOC standards.

6. Information on the Relation Between the Proposal and Other Existing Codex Documents

The proposed new work aims to review the current *Codex Standard for Olive Oils and Olive Pomace Oils (Codex Stan 33-1981)*.

7. Identification of any Requirement for and Availability of Expert Scientific Advice

None

8. Identification of any Need for Technical Input to the Standard from External Bodies so that this can be Planned for

Continued involvement of the IOC in the revision of the Codex standard would be expected.

9. The Proposed Timeline for Completion of the New Work, (including the start date, the proposed date for adoption at Step 5, and the proposed date for adoption by the Commission; the time frame for developing a standard should not normally exceed five years.)

Approval as new work by the 36th Session of the CAC 2013

Proposed draft amendments considered at step 4 by the 24th Session of CCFO in 2015

Since the matter is minor, the proposed amendment could be sent to the Commission in 2015 for adoption at Step 5/8 with the omission of steps 6 and 7 in the Codex process.

10. Work to be Lead by

To be determined.

11. Members of Electronic Working Group

To be determined (if relevant).