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SCIENTIFIC SUB-COMMITTEE

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(Annexes I and II)

O. Eng.

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CLASSIFICATION OF HIGH FAT CREAM CHEESE AND POSSIBLE CREATION OF A DEFINITION OF CHEESE OF HEADING 04.06

(Item II.13 on Agenda)

Reference documents :

41.475 (HSC/20)
41.600, Annex G/23, (HSC/20 – Report)
42.040 (HSC/21)
42.056 (HSC/21)
42.113 (HSC/21)
42.100, Annex H/1, (HSC/21 – Report)
42.438 (HSC/22)
42.727 (HSC/22)
42.750, Annex G/12, (HSC/22 – Report)

I. BACKGROUND

1. At its last session in November 1998, the Harmonized System Committee re-examined the questions submitted by Japan concerning the classification of "high fat cream cheese" (HFC) (three specific products) and the possible creation of a definition of cheese of heading 04.06.

2. The products in question are used as a replacement for cream or butter and are presented in bulk. The composition based on analytical results obtained in Japan are as follows :

File No. 2701

	(a)	(b)	(c)	(d)
Moisture content	18.5%	32.7%	39.9%	52.6%
Butterfat content in dry matter	96.7%	95.1%	91.5%	73.2%
Butterfat	78.8%	64.0%	55.0%	34.7%
Acidity	0.02%	0.03%	0.03%	0.69%
Protein	0.7%	1.2	1.5%	9.7%
- casein	0.6%	1.0	1.2%	8.7%
- whey protein	0.0%	0.1%	0.1%	0.3%
pH	7.0	6.9	7.1	4.9
Minerals	0.1%	0.2%	0.3%	0.1%
Lactose	1.0%	1.6%	1.8%	1.9%
Form (under room temperature)	Non-solid	Non-solid	Non-solid	Solid

Note : The figures indicated under (d) are of standard cream cheese which is not any of the products in question (for reference only).

3. According to information submitted, the three products (a) to (c) are manufactured by processing cream with a butterfat content of approx. 42 %. A starter is added followed by the concentration of butterfat up to 68 %. This is followed by the separation of whey before the products are heated to 80 degrees Celsius for one minute and homogenized. They are then cooled down to 12 degrees Celsius, filled and then stored at 2 degrees Celsius, and finally processed to blast frozen. The fermentation period is said to be shorter than that of ordinary fresh cheese.

4. The Secretariat had consulted the International Dairy Federation (IDF) regarding the criteria for distinguishing cheese from other similar products (e.g., dairy spreads). A summary of information furnished by IDF, given in Doc. 42.040, is reproduced at Annex I to this document. The Australian Administration also provided detailed information on the products at issue, manufactured in Australia (see Doc. 42.438). A summary of this information is reproduced at Annex II.

5. During the discussion on this question (HSC/22), the Delegate of Australia stressed that it was important to take into consideration the advice of experts in cases, like this one, while determining the classification of goods. The information supplied by the IDF, for example, was very useful since it clearly indicated that the products in question satisfied all the criteria for cheese provided that they had a texture comparable with that of "semi-solid" products.

6. The Delegate of Japan reiterated the following concerns raised by his Administration in Doc. 42.727 : (a) the manufacturing process of HFC would not satisfy the provisions of CODEX standards; (b) the protein content of HFC was too low for coagulation of cheese to construct a protein structure which is necessary for trapping fat globules to make a stable mass; (c) the fat content of the products in question was very high; (d) the products were not classifiable in heading 04.06 since they were more or less similar to dairy spreads of heading 04.05. The Japanese expert on cheese products said that there should be a clear distinction between dairy spreads and cheese products. Japan, however, did not wish that well-known

cheeses such as Mascarpone be reclassified. He also noted that the fat content mentioned by Australia in Doc. 42.438 was on the basis of the dry matter (see Annex II).

7. The Delegate of the EC said that he was not in favour of creating a definition for cheese of heading 04.06. He acknowledged, however, that there were borderline cases of cheese products, which could satisfy the criteria for dairy spreads in Note 2 (b) to Chapter 4 and were water-in-oil type emulsions. In such cases, other factors such as collusion, coagulation, suspension, etc. had to be taken into consideration for classification.

8. After discussion, the Committee decided to postpone the final decision on the classification question until its next session. Meanwhile, at the suggestion of the Delegate of Japan, it was agreed that the matter be referred to the next session of the Scientific Sub-Committee to examine the following questions :

(i) whether cheese could be a water-in-oil type emulsion and, if so, how to make a distinction between water-in-oil emulsion type dairy spreads and water-in-oil emulsion type cheese;

(ii) the meaning of coagulation in the context of production of cheese and whether heating is regarded as a coagulating agent;

(iii) whether the protein content was a determining factor for cheese;

(iv) the maximum level of fat content on dry basis allowed for cheese products;

(v) water/protein ratio in cheese;

(vi) whether the products at issue met the criteria for dairy spreads set out in Note 2 (b) to Chapter 4.

9. It was agreed that fresh samples of the products, to be supplied by Australia, will be tested by the Customs laboratories of Australia, Japan, France and New Zealand and the results forwarded to the Secretariat (by the administrations concerned), in good time, so that the test results could be considered by the Scientific Sub-Committee while formulating its conclusions on points referred to in paragraph 8 above.

10. The Secretariat sent a note to the Australian Administration requesting the transfer of fresh samples of “high cream cheese” expeditiously to the four Customs laboratories of the administrations mentioned in paragraph 9 above for carrying out the necessary tests as requested by the Committee. The Secretariat had not yet received any laboratory results at the time of preparing this document.

II. SECRETARIAT COMMENTS

Whether cheese could be a water-in-oil type emulsion and, if so, how to make a distinction between water-in-oil emulsion type dairy spreads and water-in-oil emulsion type cheese

11. The Dairy Science and Technology Handbook (edited by Y. H. Hui), Vol. 3, page 22 concerning cheese processes, indicates that "all cheese products are oil/water emulsions, which are stabilized by the natural proteins in cheese acting as surfactants" (surface-active substances).

12. The Secretariat was not able to verify the information provided in paragraph 11 above from other sources. However, the Sub-Committee is requested to note that product (a), identified in paragraph 2 above,was found to be a water-in-oil type emulsion on testing by the Administration. However, the type of emulsion concerning products (b) and (c) was not reported.

The meaning of coagulation in the context of production of cheese and whether heating was regarded as a coagulating agent

13. The term "coagulation" has been found in almost all the literature consulted by the Secretariat in relation to the manufacture of cheese. The Britannica, Vol. 19, page 366, states that coagulating milk makes cheese. The initial coagulation may be brought about by addition of rennet, by addition of bacterial starter that develops acid by fermentation of lactose in the milk, by direct addition of acid, or by a combination of these. In the Food Theory and Applications edited by Pauline C. Paul and Helen H. Palmer, pages 581 - 584, the term "coagulation" is used to refer to the formation of a gel from colloidal milk sol and to flocculation of the proteins, or curdling. It also indicates that coagulation can occur by acid or salts, by heat, by rennin and by freezing.

14. It is however stated that ordinary heating of milk in food preparation does not cause coagulation. Milk is often heated in the presence of other foods that change the ionic environment of the milk proteins, and coagulation may then occur after a very short period of heating. As an example, it is stated that milk may curdle when certain vegetables are cooked in it. In fact, heat is not mentioned as one of the coagulants in cheese making in any of the literature consulted by the Secretariat. However, distinct differences in texture and physical characteristics of cheese can be effected by variations in the coagulating temperature.

Whether the protein content was a determining factor for cheese

15. The Secretariat has not been able to obtain useful information on the effect of protein levels in cheese products. However, it is indicated in the book entitled A Colour Guide to Cheese and Fermented Milks (edited by R. K. Robinson), page 3, that the two major forms of protein that occur in milk (namely the caseins and the whey proteins) are essential for cheese making and of these the caseins are the most important. Caseins not only represent around 70-80% of the total protein present in milk, but also they are the proteins, which form the matrix of the curd and, ultimately, the cheese itself.

16. The Food theory and Applications (edited by Pauline and Palmer), page 599, states that the proteins of cheese, mostly casein, provide much of the physical structure, body, and texture properties. It is also stated that protein is degraded to differing extents depending on the variety of cheese and its maturity. In semi-soft cheeses a considerable proportion of the casein is said to be converted into soluble forms during curing, and this contributes to softness.

17. The above indications seem to suggest that the lower the amount of protein in cheese, the softer it will be. The Secretariat has not found any information regarding an internationally agreed minimum and maximum levels for protein in cheese. Different manufacturers specify different levels according to national laws.

18. Furthermore, information submitted by the Australian Administration (see Annex II) indicates that according to CODEX Standards, protein levels are not used for classifying

products. Moreover, in high fat products such as those under discussion, the protein levels will by definition be very low.

19. The Secretariat understands, however, that a sufficient quantity of proteins (esp. caseins) and/or their derivatives must be present so as to form the w/o type cheese structure (see paragraphs 22 to 24).

The maximum level of fat content on dry basis allowed for cheese products

20. There seems to be no information regarding the maximum required levels of fat content allowed for cheese products. However, milk fat is said to be necessary for flavour development of most cheeses. It acts as a solvent for many of the flavour components and can modify the flavouring properties of the compounds. The individual fat levels mentioned for various types of cheeses do not seem to suggest a maximum limit. For soft and cream cheeses, the greater the fat content the higher will be the yield and the better the quality.

21. Information submitted by Australia (see Annex II) indicates that the CODEX does not mention maximum levels of fat; only minimum levels in some specified varieties of cheeses are mentioned.

Water/protein ratio

22. The Secretariat could not obtain any specific information regarding water/protein ratio in cheese. However, the Dairy Science and Technology Handbook Vol. 1, pages 282-289, edited by Y.H. Hui provides information on the major functional properties of milk proteins in relation to water.

23. Information provided in this handbook indicates that the functional properties of milk proteins is principally a function of :

- their behaviour in water in relation to their spatial structure and their physico-chemical properties (voluminosity, surface hydrophobicity, amphipolarity), and

- their flexibility in relation to spatial structures and water content.

24. Regarding the water/protein interactions, it is indicated that water, the major constituent of milk (87%), is not only a solvent but also plays a key role in determining the three-dimensional structure of proteins as well as determining many of the functional properties of proteins in foods. These properties come into play during processing (rehydration of protein ingredients normally preserved dry, emulsification, foaming, cheese processes, etc.) and when the food product is consumed. Water-protein interactions also affect other functional properties of proteins such as rheological behavior, thickening, gelling, emulsifying, and foaming properties.

Whether the products at issue met the criteria for dairy spreads set out in Note 2 (b) to Chapter 4

25. Note 2 (b) to Chapter 4 defines "dairy spreads" as a spreadable water-in-oil type emulsion, with a milkfat content of 39% or more but less than 80% by weight. The products in question seem to be spreadable (non-solid) and satisfy the milkfat content criterion for dairy spread. The main question to be considered, therefore, is whether or not the products at issue are water-in-oil type emulsions.

26. According to the information provided by Japan, one of the products (product (a)) was found to be a water-in-oil type emulsion and satisfied the provisions of Note 2 (b) to Chapter 4. With regard to products (b) and (c) the Japanese Administration stated that the emulsion type was unsettled (see paragraphs 2 and 9 of Doc. 42.727). Subsequently, the Delegate of Japan clarified that these two products were soluble neither in water nor in oil (see paragraph 5 of Annex G/12 to Doc. 42.750). However, it is not clear whether they are in the nature of emulsions of the water-in-oil type or otherwise. The Customs laboratories of Australia, France, Japan and New Zealand are requested to clarify this aspect. The Sub-Committee is invited to examine the matter taking into account the above information, the results of analysis by the laboratories and any other information and comments from Member Administrations. Samples of the products will be available for examination by Delegates during the meeting.

III. CONCLUSION

27. The Sub-Committee is invited to examine the questions raised by the HS Committee (see paragraph 8 above), taking into account the information and comments above.

Milk product comprising butterfat of 55% to 79%, moisture between 18% - 40 %, protein between 0.5% and 1.5% and whey protein of not more than 0.1%. The product is a semi-solid at room temperature and is manufactured by processing cream with a butterfat content of approx. 42%. A starter is added followed by the concentration of butterfat up to 68%. This is followed by the separation of whey before the product is heated to 80 degrees Celsius for one minute and homogenized. It is then cooled down to 12 degrees Celsius, filled and then stored at 2 degrees Celcius, and finally processed to blast frozen. The fermentation period is shorter than of ordinary fresh cheese. (This description has to be completed by adding further details to be provided by the laboratories and Member Administrations).

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IDF SUMMARY INFORMATION
(Extract from Doc. 42.040)

8. "IDF reports that cheese is tentatively defined by Codex Alimentarius (draft Standard A-6, Appendix VII of ALINORM 97/11) as follows :

"Cheese is the ripened or unripened solid or semi-solid product in which the whey protein/casein ratio does not exceed that of milk, obtained by :

(a) coagulating wholly or partly the following raw materials : milk, skimmed milk, partly skimmed milk, cream, whey cream, or buttermilk, or any combination of these materials, through the action of rennet or other suitable coagulating enzymes, and by partially draining the whey resulting from such coagulation; and/or

(b) processing techniques involving coagulation of milk and/or materials obtained from milk which give an end-product which has similar physical, chemical and organoleptical characteristics as the product defined under (a) above."

9. The IDF states that, in general, the whey protein to casein ratio in cheese shall not exceed that of milk used. When this happens, the product is no longer "cheese" but "whey cheese".

10. The draft Codex standard for cheese cited above does not specify any composition of cheese, except for the whey protein to casein ratio mentioned above. More detailed composition criteria are left to subordinated standards for individual cheese varieties. The individual variety "cream cheese" is regulated by such a subordinated Codex Standard (Standard C-31) which is currently being revised by Codex Alimentarius.

11. According to the draft of the revised Codex Standard, the key elements for cream cheese indicated by the IDF are that "it is an unripened, semi-solid or solid milk product obtained by coagulation and having a smooth, spreadable texture with the following composition :

- the whey protein/casein ratio does not exceed that of milk (cream) used; and

- it contains minimum 60% milkfat in the dry matter, minimum 35% dry matter, and minimum 67% moisture on fat-free basis."

12. According to the IDF, the three products referred by Japan (see paragraph 2 above) satisfy all the criteria in paragraph 11 above to be considered "cheese" provided that they have a texture comparable with that of "semi-solid" used in the Codex definition. If that is the case, the products could probably be classified in heading 04.06 as cheese. The IDF is doubtful whether these products could be classified under heading 04.03 given that that heading does not cover products concentrated by whey drainage.

13. Regarding a definition of cheese for HS purposes, the IDF suggests that it would be advisable to limit the definition to the Codex Alimentarius reference documents to avoid confusion. However, as the Codex definition of cheese is still a draft, it is recommended that the insertion of such a definition should await finalization by the Codex Alimentarius Commission in July 1999."

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SUMMARY INFORMATION SUBMITTED BY AUSTRALIA
(Extract from Doc. 42.438)

PRODUCT	**Characteristics of High Fat Cream Cheese**
MOISTURE	No minimum levels are listed for actual mass percentages for moisture in cheese. However, the CODEX draft Standard for cream cheese does specify minimum moisture content of 67% on fat-free basis.
MINIMUM FAT IN DRY MATTER	60%
MINIMUM DRY MATTER	35%
BASIC INGREDIENT	Milk or milk products
PROCESS	Coagulation and separation of whey facilitating a concentration of milk solids
TEXTURE	Solid or semi-solid
PH	Fermentation is not necessarily an integral part of cheese making, as "coagulation" can be achieved in many ways besides by the production of lactic acid by lactic bacteria. ***CODEX provisions do not mention pH levels, as they are not necessary considerations in describing "cheese".***
FAT	***CODEX makes no mention of fat maxim for cheese***. Only minimum levels have been specified for certain varieties of cheese. The products under consideration fall within the CODEX requirement.
PROTEIN	***CODEX does not attempt to classify products according to protein levels***. The only mention of protein in the CODEX provisions refers to a ratio between whey protein and casein. There is no mention of quantitative requirements for protein, either maximum or minimum. The products in question, however, meet the draft CODEX requirement that whey protein ratio does not exceed that of milk. In high fat products the protein levels will by definition be very low.
PHYSICAL STATE	***Unlike dairy spreads, which are principally in the form of an emulsion of the type water-in-oil, four physical states (collusion, suspension, solution and emulsion) occur within cheese, including the products under discussion***.

TEST METHOD	***A test method to conclusively differentiate between cream cheese and dairy spreads on the basis of the physical state of fat is not possible*** because there will always be some propensity for isolated pockets of fat aggregation to occur during cheese manufacturing and storage.
SHELF LIFE AND STORAGE	***CODEX does not attempt to set shelf life and storage conditions for cheese***. The appropriate specifications will vary considerably between cheese varieties. ***For fresh cream cheeses, shelf life is relatively short***. It is recommended that these cheeses be kept chilled or frozen in certain cases.
COLOUR	***CODEX does not define the colour of cheese***. However, for cream cheese, it requires that it have "*…a white to light cream colour*" in contrast to butter and dairy spreads which are generally a darker shade of yellow.
PERMITTED ADDITIVES	***The draft CODEX Standards for cream cheese and dairy spreads differ in the lists of additives***, which are allowed. However, none of the additives can be used to define either cream cheese or dairy spreads.
FUNCTIONALITY	***Cream cheese can be put to a number of uses (see Annex, paragraph …..***."The fact that "cream or butter" may, at times, be substituted, is purely coincidental***.*** These are, however, inferior substitutes for cream cheese. ***Very little cream cheese is consumed directly (as is the case with hard rather than semi-soft varieties)***. It is the overall functionality of the variety, which makes it such a versatile source of component for a wide range of end usage."