食 品 法 典 委 员 会

联合国粮食及农业组织　　世界卫生组织

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CL 2025/50-CAC

2025 年 8 月

致： 食典联络点
在食典委享有观察员地位的国际组织联络点

自： 联合国粮农组织/世卫组织联合食品标准计划
食品法典委员会秘书处

主题： ***征求对制定巴氏杀菌驼乳标准提案的意见***

截止日期： **2025 年 9 月 30 日**

背 景

1. 在食品法典委员会（食典委）第四十七届会议（2024）上，注意到 2024 年是国际驼科动物年，阿拉伯联合酋长国（阿联酋）在“其他事项”议题下提交了一份讨论文件和一项关于制定驼乳商品标准的新工作提案（CAC47/CRD03）。

2. 各成员对阿联酋的提案表示欢迎，认为该提案恰逢其时，反映出驼乳和驼乳制品产量和贸易日益增长，并强调需按照既定程序和惯例及时启动该领域工作。

3. 注意到执委会第八十七届会议的结论，即“如果食典委第四十七届会议决定考虑就驼乳开展进一步工作，则应考虑发布通函，寻求成员和观察员对驼乳相关新工作需求和可能范围的意见[1]”、食典委秘书处的程序指南、乳和乳制品法典委员会主持国秘书处提供的支持，食典委第四十七届会议审议并商定了一种方法，即：

   a) 食典委秘书处与乳和乳制品法典委员会主持国秘书处将审查第3号会议厅文件中包含的讨论文件和项目文件的完整性，并向提案方（阿联酋）提供反馈；

   b) 同时，乳和乳制品法典委员会主持国秘书处将与阿联酋和国际乳品联合会一同对现行食典文本进行差距分析；

   c) 提案方将在其他有意向成员的支持下，根据步骤a)和b)中收集的意见，对讨论文件和项目文件进行修订；

   d) 修订后，将发布一份通函，以征求成员和观察员的意见；

[1] REP24/EXEC2，第 85 i 段

e) 讨论文件和项目文件在根据针对通函收到的意见进行进一步完善之后，将提交食典委秘书处，供食典委第四十八届会议审议，并可能作为新工作获得批准。

4. 食典委第四十七届会议指出，通函可就驼乳相关新工作的必要性和可能范围征求有意向成员和观察员的意见，并认为驼乳提案将由执委会第八十九届会议进行严格审查，并由食典委第四十八届会议进行审议。

5. 在食典委第四十七届会议之后，新西兰作为乳和乳制品法典委员会以及国际乳品联合会的主持国，就以下方面进行了差距分析：i）与可能存在的掺假和标签错误问题相关的现行食典文本，ii）与驼乳和驼乳制品相关的现行食典文本。该差距分析见本通函附录 II。

6. 此外，食典委秘书处、新西兰和国际乳品联合会还就讨论文件和项目文件提供了反馈意见，供提出这项新工作的阿联酋审议。上述各方之间的定期会晤促进了意见反馈和信息共享。

7. 更新后的提案旨在提供更多关于驼乳商品食典标准必要性和性质的信息，并考虑到执委会在对新工作提案进行严格审查时需要研究的信息。

征求意见

8. 请食典委成员和观察员就讨论文件和项目文件（本通函附录 I）提出意见。

9. 应就提案的完整性和清晰度以及该领域新工作的性质和相对重要性提出一般性意见，同时考虑到差距分析（附录 II）。

10. 具体而言，要求成员和观察员就以下四个领域提出意见并考虑每个领域的相关问题：

<u>领域1：工作必要性——消费者健康保护和公平贸易做法</u>

- 作为生产和（或）消费成员或观察员，除了讨论文件中提到的问题外，是否知晓有关驼乳的任何其他食品安全和（或）质量问题？
- 是否遇到过某些已知质量问题（如欺诈或真实性相关问题）带来的挑战/问题？如有，能否提供有关这些问题的具体信息？
- 是否遇到过与巴氏杀菌驼乳或驼乳制品相关的贸易问题？
- 考虑到附录 II 中的差距分析，哪些方面的差距表明需要开展驼乳方面的新工作？
- 若对上述任何问题的回答为肯定，请提供相关补充数据/信息，包括巴氏杀菌驼乳和（或）相关驼乳制品的生产数据，以及（或）这些产品的出口/进口数据。

<u>领域2：拟开展工作的可能范围和性质</u>

- 如需开展新工作，考虑到有关乳和乳制品的现行食典文本，拟议工作范围聚焦于巴氏杀菌驼乳是否恰当？对工作范围有何建议？

- 请指明工作中应重点关注的具体产品（如有）。
- 哪种食典文本（标准、指南、操作规范）可以最有效地解决讨论文件中提出的问题，或与该商品类别相关、涉及保护消费者健康和确保食品贸易公平做法的其他问题？

领域 3：工作对成员的重要性

- 考虑到《食品法典委员会程序手册》中的优先排序标准[2]，制定巴氏杀菌驼乳或驼乳制品的国际标准对贵国或食典委而言是否属于优先重点？
- 如果食典委依据所附提案启动新工作程序，贵国是否愿意参与此项工作？

领域 4：未来开展此项工作的机制

- 如果这项工作被列为优先重点并获食典委批准，开展拟议工作的适当机制应如何设计？

11. 应通过食典委成员和观察员的食典联络点，利用在线评议系统提出意见。

12. 食典委成员和观察员的食典联络点可登陆在线评议系统，在“My reviews”页面选定“Enter”，进入相关文件提出意见。

13. 要求食典委成员和观察员组织的联络点在文件层面上提供一般性意见。有关意见种类和类型的其他内容，参见在线评议系统常见问题。

14. 在线评议系统其他资源，包括用户手册和简要指南，见以下链接：https://www.fao.org/fao-who-codexalimentarius/resources/ocs/en/。

15. 关于在线评议系统的问题，请联系 Codex-OCS@fao.org。

[2] 《食品法典委员会程序手册》，第 2 节：食典标准和相关文本的制定；确定工作重点的标准

APPENDIX I

PART 1 (English only)

DISCUSSION PAPER ON THE DEVELOPMENT OF A CAMEL MILK COMMODITY STANDARD

Author: United Arab Emirates

Co-authors: Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Libya, Sudan, Syria, Tunisia, Yemen, Kenya, Chad, Mali, Niger, Somalia, China, Morocco, Kazakhstan, Mongolia, and the International Union of Food Science and Technology (IUFoST)[3]

Background

1. The United Nations designated 2024 as the International Year of Camelids (IYC 2024) to spotlight the overlooked potential of camelids.

2. Raising awareness and encouraging increased investment in the camelid sector aligns with the objectives of this year, with added support for research, capacity development, and the adoption of innovative practices and technologies in the food production sector. Camelids, through the provision of milk and meat, contribute significantly to the advancement of Sustainable Development Goals (SDGs), specifically those addressing hunger, the elimination of extreme poverty, the empowerment of women, and the sustainable utilization of terrestrial ecosystems.

3. Furthermore, during the 11th session of the FAO/WHO Coordinating Committee for the Near East (CCNE11), the United Arab Emirates (UAE) introduced a proposal to develop a regional standard for pasteurized camel milk of the species *Camelus dromedarius* (one-humped camel), highlighting the increase in camel milk production and trade, at regional and international levels, and therefore the importance to develop both regional and international standards for this commodity.

United Arab Emirates' efforts in developing a camel milk standard

4. Several actions were undertaken by UAE and other supporting Codex members and observers, subsequent to the discussions at CCNE11. UAE engaged with a broad range of members and stakeholders and re-oriented the submission towards proposed work on an international standard, while ascertaining that the Codex Criteria on new work priorities were fulfilled (and documented as such).

5. This is a summary of what was carried out:

   (a) Continuous engagement with Members and Observers that started from March 2024 to further reshape the proposal, with emphasis on key observers and contributors such as the International Dairy Federation (IDF), along with engagement with the Codex Secretariat (26 August 2024).

   (b) Organization of structured meetings and discussions with the IDF (14 August 2024) and the host country of the Codex Committee for Milk and Milk Products (CCMMP) (25 June 2024).

   (c) The organization of the International Symposium on the Development of Camel Milk Standard (24-25 September 2024), where significant feedback was received on the proposal that helped re-shape it to its current form.

   (d) Informal but structured consultations conducted by United Arab Emirates with Members of the different Codex Coordinating Committees: CCNE (9 October 2024-30 April 2025), CCASIA (14 October 2024), CCAFRICA (18 October 2024-19 May 2025), CCLAC (28 October-28 November), CCEURO (12 November), CCNASWAP (26 November 2025) facilitated by the respective coordinators.

   (e) Feedback via correspondence and meetings with experts and industry representatives from both academia and representatives of the camel milk sector from many countries such as Botswana, France, Kazakhstan, Mali, Mauritania, Mongolia, Morocco, Niger, Pakistan and Tunisia (May 2024-June 2025).

[3] Through the contribution of IUFoST's disciplinary group on food regulatory science: the Global Food Regulatory Science Society (GFoRSS).

(f) The outcomes of the National Working Group of Experts for the Development of Camel Milk Standard which is formed from government entities, laboratories, and Manufacturers from private sector (four meetings since May 2024).

(g) Dissemination of camel milk work in different occasions such as the Dairy Olympics held in Al Ain-Abu Dhabi from 7 to 9 April 2025 where several presentations on camel milk were delivered from professionals and academics from Bulgaria, Mongolia and UAE.

Production and trade of camel milk products and potential for growth

6. The Food and Agriculture Organization (FAO) issued statistics of camel milk from 1961 until 2023. Since 1961, the annual growth in camel milk production is estimated to be at 6.5% (Konuspayeva et al., 2023).

7. Data reported by FAOSTAT (2023) shows that Kenya leads world producers of raw camel milk, followed by Somalia, Pakistan, Mali, Ethiopia, Saudi Arabia, Niger, and the United Arab Emirates.

8. In 2023, global camel milk production reached 4,117,710 tonnes. From 2013 until 2023, global camel milk production experienced a typical increase of 0.89%, increasing from 3,679,284 tonnes to 4,117,710 tonnes. Table 1 shows the production of raw camel milk for the top ten producing countries during the year 2023.

Table 1: Raw camel milk production during 2023 (in tonnes) (FAO, 2023)

Country	Production (tonnes)
Kenya	1026467
Somalia	993501.6
Pakistan	956000
Mali	293333
Ethiopia	226519.6
Saudi Arabia	136003.3
Niger	107504.5
United Arab Emirates	89367.78
Sudan	60853.16
Chad	36066.57

9. The total production of raw camel milk shows a moderate increase between 2016 and 2023. Kenya, Somalia and Pakistan maintained the lead position in terms of the quantities of camel milk produced. A significant difference is observed in raw camel milk produced quantities in those countries compared to the remaining of the top ten producing countries, namely Mali, Ethiopia, Saudi Arabia, Niger, and UAE (**Table 1**).

10. In many countries, the camel milk sector is dominated by informal trade in both volume and number of stakeholders involved, this is the case in Saudi Arabia (Faye et al. (2014)).

11. Also, in Kenya, as reported by Akweya et al. (2012), the subsector of camel milk has largely remained informal with minimum regulation from relevant authorities.

12. On the other hand, consumer preference for unprocessed milk (mostly for cultural reasons), and low-level awareness of camel milk among non-traditional consumers, have been limiting factors to wider expansion of trade.

13. **The profile of production of pasteurized camel milk** differs from that of raw camel milk in terms of countries leading industrialization of production. In this regard, pasteurized camel milk produced in UAE is regularly sold across the country in many forms (fresh milk, flavored milk, milk powder, ghee, drinking yoghurt, etc.) and is also exported worldwide (Leila et al., 2022).

14. While Kenya holds 26% of the global production of camel milk, Akweya et al. (2012) reported that only 12% of the total milk produced is traded: 10% sold to rural consumers, and only 2% to urban

markets. The remaining 88% is consumed in local households, with a significant proportion going to waste due to post-production losses and the lack of good infrastructure for collection and transport.

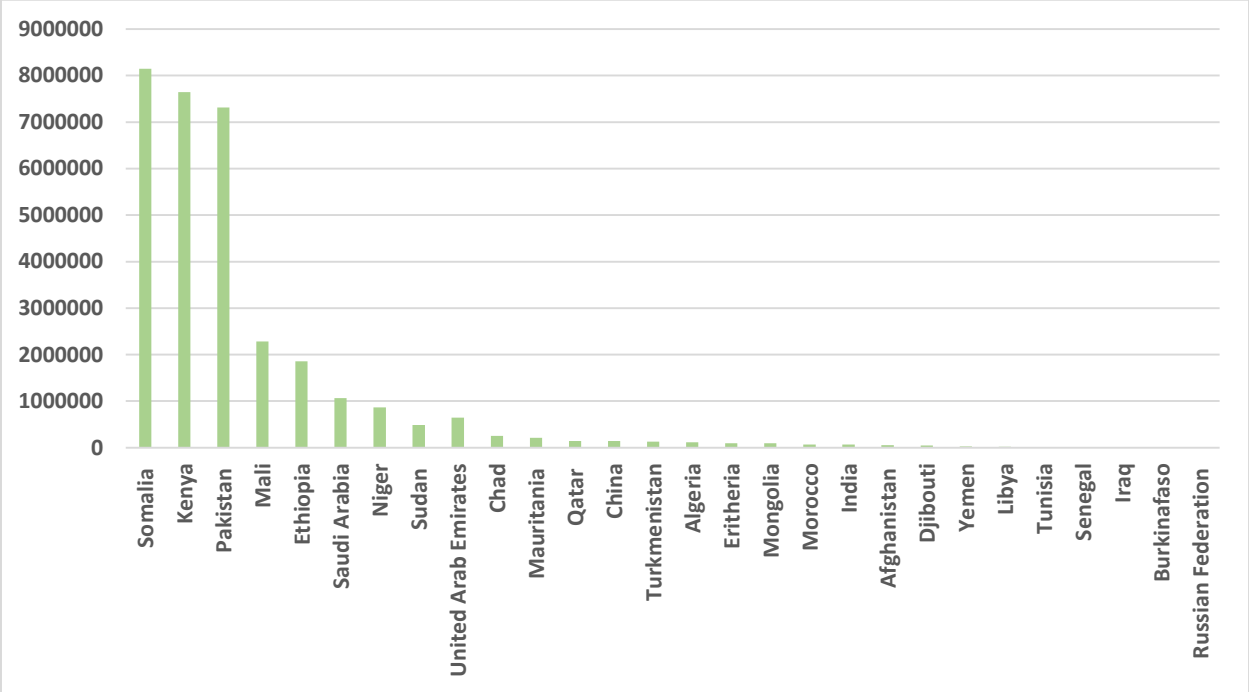

Figure 1: Cumulative raw camel milk production from 2016 to 2023 (source FAOSTAT 2023).

15. Several **camel milk products** were identified as being produced and traded. They include:

- pasteurized camel milk;
- condensed UHT camel milk;
- traditional fermented camel milk;
- dried fermented camel milk products;
- camel butter;
- camel milk cheese;
- camel milk yoghurt;
- camel milk powder;
- camel milk ice cream; and
- chocolate-flavored camel milk powder.

16. In addition, fermented camel milk is significantly produced in some Asian countries (Kazakhstan, Russia, and Uzbekistan) where it is known under the name of "Shubat". France is also reported to produce the "Bosse de Fagnes" cheese, a camel milk cheese, which is traded nationally and exported to other European Union (EU) countries.

17. Experts and representatives of the production sector that gathered at the International Symposium on Camel Milk Products[4] reported that the production of pasteurized camel milk in the United Arab Emirates exceeds 7,000 tonnes annually, where 1,800 tonnes are reported to be exported to China, the EU and the United States of America. The remainder is consumed locally or traded within the Near East region.

[4] International Symposium on Camel Milk Products: https://gforss.org/2024/09/20/2024_camelmilkworkshop/

18. Data provided by **Republic of Tunisia** indicates that production of pasteurized camel milk reached five tonnes annually. Similarly, and according to export data from UAE, camel milk powder exports reached 330 tonnes annually, the equivalent of 3,300 tonnes of liquid milk.

19. According to data provided by the **Sultanate of Oman**, the raw camel milk production doubled in 2023 from the production recorded in 2022 going from 1,149.7 tonnes to 2,367.15 in 2023. The production recorded during the nine first months of 2024 reached 3,755 tonnes, showing a significant increase. Oman exported the raw liquid milk mainly to the Kingdom of Saudi Arabia. The exported quantities during 2023 reached 2,367 tonnes.

20. In Mongolia, the camel milk sector is considered as an active and promoting pillar of the Mongolian economy. According to Mongolia official sources, the production of raw camel milk from bactrian camels raised from 10,000 tonnes to 13,000 tonnes between 2021 and 2023. In parallel, the production of fermented camel milk products witnessed a considerable raise during the last five years, going from 9.1 tonnes in 2019 to 106.5 tonnes in 2023 according to the same source.

21. In **Pakistan**, currently, only one camel manufacturing company exists until now, the volume of Pasteurized camel milk produced reaches 330 tonnes per month subsequently used for powder production, cheese etc (Discussion held with ELC Biotech Company).

22. According to the National Chamber of Entrepreneurs of the **Republic of Kazakhstan** "Atameken", the production of raw camel milk in Kazakhstan increased progressively from 2020 to 2023 going from 12427.3 tonnes to 18168.2 tonnes.

23. In **Yemen**, the raw camel milk production exhibited a slight increase between 2019 and 2023, going from 2910 tonnes in 2019 to 3480 tonnes in 2023 (Yemen Statistics Book, 2023).

24. According to State Department for Livestock Development in **Kenya** (2025), the recorded production of raw camel milk were respectively and in tonnes: 1109098.98 (2019), 1097561.37 (2020), 1052397.01(2021), 862922.53 (2022), 1026467.15 (2023), 1029616 (2024). It was also reported that camel milk is mainly traded informally without processing.

25. Overall, camel milk powder was reported to be the form of camel milk that is the most produced and traded internationally, including in Central Asia. The industrial zone of Turkestan in Kazakhstan alone is reported to produce more than 200 tonnes of dry camel milk, which is exported to China, including the special administrative areas of Macau, and Hong Kong[5]. Since 2021, Kazakhstan is exporting camel milk powder to Belorussia, China, Russia, USA, with quantities going from 25.843 tonnes to 189.592 tonnes.

26. In Kenya, small quantities of whole camel milk powder (less than 2,000 kg) were reported to be exported to Kazakhstan in 2024.

27. Infant formula produced from camel milk is another high value processed product of great interest, with its unique compositional attributes related to the absence of **β-lactoglobulin** which contributes to making this breast milk substitute much closer to human milk.

Economic value of camel milk products

28. The high economic value of camel milk stems from several factors such as the limited supply, the specialized farming conditions, the labor and handling costs, the processing challenges and distribution costs, as well as the increasingly reported health benefits.

29. Although identified as a niche market, the trade of camel milk is reported to be progressing consistently across several markets from Europe, the United States and countries in Africa and the Middle East (Seifu, E., 2023).

[5] https://dairynews.today/global/news/camel-milk-powder-from-turkestan-region-is-exported-to-china-macau-and-hong-kong.html Accessed on October 25th, 2024

30. The increasing interest in this commodity has led to multiple attempts of documented adulteration, where camel milk powder was reported[6] to be diluted with bovine milk powder at export markets, prior to being used in several product formulations.

31. The **absence of a standard** that can support the **attestation of authenticity** of products represents a hindrance **to the development of the commodity** and may possibly contribute to these food fraud attempts.

32. An international standard under the auspices of the Codex Alimentarius Commission, would support:

- maintaining the integrity of the camel milk products supply chain by enabling a standard of authenticity;
- better dissemination of the knowledge about camel milk products supporting their broader uptake in various markets;
- enabling improved guidance to producers about the specificities of camel milk product requirements that must be considered when applying the Codex dairy standards already in place, including any new set of conditions that would be specific to camel milk due to its unique attributes;
- countries using Codex as a foundation for their policies, and protection from unfair barriers and challenge protectionist practices when needed as Codex standards are officially recognized by the World Trade Organisation (WTO) as the go-to reference when trade disagreements arise on issues of food safety; and
- encouraging the countries to improve the legislative infrastructure related to camel milk, which is produced under diverse farming and camel breeding conditions.

Specificities and distinct characteristics of camel milk: nutritional value and lower allergenicity potential

33. Since ancient times, camel milk has been used as a food and /or as a food for special use, including in traditional medicine as a cure for several diseases (e.g. oedema, jaundice, tuberculosis, diabetes, asthma and leishmaniasis). These nutraceutical properties are mainly due to its naturally occurring bioactive components (Muthukumaran et al., 2023).

34. The general composition of camel milk varies depending upon the region, breed, season, and lactation stage. In fact, the variation in the composition of milk from different camel types, as in other species, are attributed to genetic (breed) and non-genetic factors (physiological stage, feeding management practices, health status, sampling conditions) (Konuspayeva, 2020; Liu, et al., 2023). Seasonal variations may also play a role in camel milk composition, even for camels from the same species and regions (Al haj & Al Kanhal, 2010). The primary compositional characteristics of camel milk pertain to its protein, fat, lactose, minerals, and vitamin content profiles.

Proteins

35. Caseins in camel milk were reported to account for 61.8-88.5% (Ho et al., 2022) or 52-87% (Seifu, 2023) of the total protein – versus 82% in cow and buffalo milk, 78% in sheep and goat milk, 52% in mares' milk, and 33% in human milk (Konuspayeva, 2020). Camel milk contains a high percentage of β-casein (65% of total caseins) (Ho et al., 2022) – versus approximately 39% in bovine milk (Seifu, 2023). The **abundance of β-casein** is similar **to what is found in human milk** and is known to contribute to easier digestibility, as these proteins are less resistant to peptide hydrolysis than αS-casein (Ho et al., 2022). αS1-casein, αS2-casein, and κ-casein constitute 21, 10, and 3.5% of the total caseins in camel milk, respectively (Ho et al. 2020). Clotting difficulties of camel milk during cheese processing are attributed to the low proportion of κ-casein (Konuspayeva, 2020) – lower than that of bovine milk (13%; Seifu, 2023). In addition, camel milk contains higher numbers of large micelles than bovine milk (Seifu, 2023). The casein micelle diameter of camel, goat and bovine milks is 380 nm, 260 nm, and 150 nm, respectively (Seifu, 2023). The differences in micelle size and casein fractions have technological implications (Seifu, 2023).

36. Whey proteins in camel milk (20-25% of the total proteins) (Seibu, 2023) are characterized by a high content of α-lactalbumin and lactoferrin, **and the absence of β-lactoglobulin (a major allergen in**

[6] Industry Input during the International Symposium on Camel Milk Products hosted by the United Arab Emirates from 24-25 September 2024.

bovine milk) (Konuspayeva, 2020; Ho et al., 2022). Whey acidic protein (WAP) and peptidoglycan-recognition protein (PGRP) – potentially bioactive proteins – are present in camel milk but not in bovine milk (Al haj & Al Kanhal, 2010; Konuspayeva, 2020; Ho et al., 2022).

37. Amino acid composition of camel milk and bovine milk casein fractions is quite similar; however, camel milk contains less cysteine and more proline (Ho et al., 2022).

Lipids

38. Compared with bovine and human milk fats, camel milk fat contains only small amounts of short-chain fatty acids (C4–C12), but a higher concentration of long-chain fatty acids (C14-C18) (Al haj & Al Kanhal, 2010; Konuspayeva, 2020; Ho et al., 2022), with palmitic acid C16:1 content accounting for 10.13% of total fatty acids (TFA), which is much higher than that of cow or goat's milk (Liu et al., 2023).

39. While the ratio of saturated/unsaturated fatty acids is similar for camel milk and bovine milk (67.7 and 69.9, respectively), the proportion of unsaturated fatty acids is higher in camel Milk (Konuspayeva, 2020). Thus, camel milk has a better atherogenic index (associated with the onset of coronary heart disease) than bovine milk (Konuspayeva, 2020). However, the scope of the original study reporting these results (Faye et al., 2008) is limited (31 samples, Dromedary and Bactrian camels, collected in different seasons, in Kazakhstan). Also, camel milk was found to be relatively richer in conjugated linoleic acid compared to human and bovine milk (1.23, 0.42 and 0.65g/100g fat, respectively) (Konuspayeva, 2020).

40. The average diameter of milk fat globules has been reported as 2.99 µm for camel, 3.2 µm for goat, 3.78 µm for sheep, 3.95 µm for bovine, and 8.7 µm for buffalo milk (Ho et al., 2022). As small fat globules are more vulnerable to lipolytic enzymes, camel and goat milk may be more easily digested (Ho et al., 2022). However, this leads to some technological processing difficulties for some applications like in butter making (Seifu, 2023).

Lactose

41. Lactose content in camel milk is similar to that of bovine milk (Ho et al., 2022). Lactose concentration variations in camel milk are considered among the major reasons for the reported differences in its taste (Ho et al., 2022). Due to seasonal differences and differences in camel breeds and feed, there are some variations in lactose concentration in camel milk, there are also some differences in lactose concentrations in milk for different animal species due to the same reasons.

42. Despite similar lactose content, low lactose intolerance of camel milk compared to bovine milk has been reported (Konuspayeva, 2020; Ho et al., 2022). One possible reason is camel milk's lower concentration of casomorphin, which contributes to reduced intestinal motility, thus exposing lactose to lactase action over a longer period (Ho et al., 2022). Another explanation may be the high content of L-lactate in raw camel milk – 100 times higher than in bovine milk (Ho et al., 2022).

Minerals

43. Ash content in camel milk is similar to that in bovine milk, but much higher than in human milk (Ho et al., 2022). Some values (in mg/100 g) reported in the literature might be averaged as follows: calcium 111.4; magnesium 6.7; phosphorus 81.2; sodium 57.8; potassium 156.3, while the corresponding concentrations in bovine milk are 119.9, 13.4, 95.0, 49.7, and 147.0, respectively (Ho et al., 2022). The concentrations of these minerals are much lower in human milk: 32.4, 3.4, 14.0, 16.0, and 51.8 mg/100 g, respectively (Ho et al., 2022). It is noteworthy to mention that iron concentration in camel milk was reported to be six times higher than in bovine milk (Ho et al., 2022).

Vitamins

44. Camel milk is known for **higher vitamin C** (Ho et al., 2022), and vitamin D (Konuspayeva, 2020) content than bovine milk – while bovine milk contains more vitamin A (Ho et al., 2022). Camel and bovine milks contain similar levels of vitamins B1 and B6 (Ho et al., 2022). Data for other vitamins is limited and varied.

Conclusion

45. While differences exist in the composition of camel milk and camel milk products as a result of species variations as well as the diversity of the geographic areas where camels are raised, it is possible to establish general trends for levels of key macronutrients that characterize camel milk products.

46. The above-described nutritional characteristics may in fact be used for the purposes of defining camel milk and camel milk products in the context of product standardization. However, the most suitable characteristics to note are the higher content in **β-casein** (around 65%) and **the absence of β-lactoglobulin (a major allergen in bovine milk).**

47. This latter characteristic is **a key feature that enables the specific identification of camel milk products and their distinction from possibly adulterated products**. The only other milk where **β-lactoglobulin** is absent is human milk, the least likely to be used as the source of adulteration of camel milk products. These unique compositional features make camel milk one of the closest dairy commodities to human milk and make camel milk products heavily sought after by consumers. These attributes make camel milk products more vulnerable to **adulteration**, primarily through dilution and substitution with bovine milk.

48. In conclusion, the review of the characteristics of camel milk supports the **amenability of these products to standardization** at the global level, based on key characteristics that support determination of authenticity of camel milk products.

Challenges faced by the camel milk production sector

Current standards at the national and regional level

49. At the regional level, the Gulf Cooperation Council (GCC)-Standardization Organization (GSO) adopted a standard for pasteurized camel milk (GSO 1970:2021); raw camel milk being included in the GSO raw milk standard (GSO 174:2021).

50. At the national level, Tunisia standardized raw camel milk destined for further processing (NT 14.261:2009). Kenya adopted standards for raw whole camel milk (DKS 2061:2016), pasteurized camel milk (DKS 2062:2016) and fermented camel milk (DKS 2707:2016). Morocco also adopted a

national standard for pasteurized camel milk (NM 08.4.300:2016). China adopted a standard for powdered camel milk (RHB 903—2017) and Kazakhstan adopted in 2015 a standard for camel milk processing (ST RK 166-2015) and in 2019 a standard for powdered camel milk (ST RK 3386-2019).

51. In Pakistan, the minimum composition requirements for packaged full fat, low fat and skimmed milk among which is camel milk (pasteurized or UHT), are included in the Packaged Liquid Milk Standard (PS: 5344-2022) published in 2022.

52. **Table 2** summarizes the regional and national standardization attempts for camel milk and select key features included in these standards.

53. While exploring the international regulatory framework, major producing countries such as Ethiopia and Mali were found to have no national standards for camel milk, neither raw nor processed. Among existing standards, there was no specific standard for raw camel milk except in Kenya, while some requirements for raw camel milk have been included in the general raw milk standards in some countries, such as the Gulf countries and the EU. Also, the species of camel has not been specified, with the exception of the GSO and Emirati standards.

54. Upon reviewing the existing national standards for camel milk, the main noticeable difference identified is in the minimum percentage of fat required in pasteurized camel milk, especially in the whole milk category, where it ranged from the highest level in the GSO standard (min 3%) to the lowest in the Kenyan standard (min 2%).

55. The other specifications and requirements in these standards are similar including requirements for drug residues, pesticide residues, and microbial limits, where Codex standards are often stated as the reference.

56. None of the national standards **currently focusses on authenticity determination** of camel milk products nor do they address the vulnerabilities associated with fraudulent activities targeting camel milk products.

57. Other efforts of standardization were also reported to be underway under the auspices of the **African Organization for Standardization (ARSO)**.

Table 2: Summary of regional and national standards for pasteurized camel milk.

63. Criteria	**62. UAE**	**61. GSO**	**60. Kenya**	**59. Morocco**	**58. Pakistan**
66. Type of camel milk targeted in the standards	▪ Pasteurized camel milk ▪ Raw camel milk included in raw milk standard	▪ Pasteurized camel milk ▪ Raw camel milk included in raw milk standard	▪ Raw whole camel milk ▪ Pasteurized camel milk ▪ Fermented camel milk	65. Pasteurized camel milk	**64. Pasteurized or UHT**
68. Pasteurized camel milk standards	▪ UAE.S/GSO 1970 :2010(PCM) ▪ UAE.S GSO 174:2021 (RM)	▪ GSO 1970: 2021 (PCM) ▪ GSO 174:2021 (RM)	▪ DKS 2062: 2016	▪ NM 08.4.300:2016	**67. PS: 5344-2022**
74. Scope for pasteurized camel milk standards	73. Pasteurized camel milk from *Camelus dromedarius* (Arabian camel	72. Pasteurized camel milk from *Camelus dromedarius* (Arabian camel	71. Pasteurized camel milk from any kind of camels (one	70. Pasteurized camel milk from any kind of camels (one	**69. Packaged liquid milk to be offered for direct consumption.**

		s – One hump camel)	s - One hump camel)	or two humps)	or two humps)	
75. Summary of compositional requirements for pasteurized camel milk						
82. Milkfat 83. (% min)	81. Whole milk	80. 2.5	79. 3	78. 2	77. 3	**76. 3.5**
	89. Low Fat Milk	88. 2-1	87. 3 - 0.5	86. 1	85. -	**84. 2**
	95. Skimmed Milk	94. 0.5	93. 0.5	92. 0.5	91. -	**90. 0.5**
101. **Solids not fat** (% min)		100.8	99. 8	98. 6	97. 10	**96. 8.5**
108. Total acidity (Expressed as % of lactic acid), max		107.0.18 %	106.0.18 %	105.0.17 % to 0.21 % (Raw)	103.0.18 % 104.	**102. No values**
109. Microbiological Limits for pasteurized camel milk						
115. Total Bacterial Count Max. limit		114.100000 (CFU/ml)	113.100000 (CFU/ml)	112.30000 (CFU/ml)	111. No values	**110. <50000 (CFU/ml)**
121. Total Coliform Count Max. limit		120.10 (CFU/ml)	119.10 (CFU/ml)	118.10 (CFU/ml)	117. No values	**116. 10 (CFU/ml)**
122. European Union (EU): There is no specific regulation concerning the specifications of camel milk. instead, there are regulations on products of animal origins, under which raw camel milk may be placed. (for example, plate count at 30 °C (per mL) ≤ 1,500,000).						

123. While Codex standards either developed by CCMMP, such as the *Standard for milk powders and cream powder* (CXS 207-1999) or by other relevant horizontal committees such as the *Code of hygienic practice for milk and milk products* (CXC 57-2004) exist and could have some application for camel milk products, they need to be considered for possible updates to account for the specificities of camel milk.

124. In particular, the heat sensitivity of camel milk and other processing challenges, related to the composition of the product: the differences in protein composition and colloidal structure of camel milk from cow's milk, the absence of β-lactoglobulin, the low κ-casein content, high proportion of β-casein, larger casein micelles and smaller fat globules contribute **to the difficulty of making dairy products** from camel milk using the same technologies as for bovine milk. some of the challenges of camel milk processing include poor stability of the milk during UHT treatment, impaired rennetability, formation of weak and fragile curd during coagulation, longer fermentation time, and low thermal stability of the milk during drying. These challenges make the **review of existing standards for dairy products, both national and international necessary,** to ensure their suitability for camel milk production requirements, with the opportunity to develop updates, amendments, or new standards, as may be required.

125. This matter was further emphasized in the scientific literature where, for example Seifu, E., 2023 highlighted that the lack of dedicated guidance for camel milk may lead to the adherence to unsuitable pasteurization practices, noting that temperatures above 80°C would cause separation issues in camel milk. Mohamed et al., 2022, highlighted a lack of standards or legislation specifically designed for camel milk. Therefore, there is a need for camel milk standard which includes product specifications and detailed guidance such as heat treatments. The current standards used for pasteurization of other milk species are applied for camel milk. This is not suitable for camel milk pasteurization because camel milk whey proteins are more heat-resistant than those in cow's milk, therefore pasteurization of camel milk needs slightly higher temperatures (more than 72˚C) or longer times (more than 15 seconds) to ensure adequate pathogen reduction in addition to enzymes inhibitions

126. Konuspayeva et al., 2022 noted that the emergence of the online trade of camel milk also raises the need for regulation to control sales in markets where there are no quality standards.

Developing a Codex standard for camel milk

127. Developing Codex texts including a possible Codex standard that covers pasteurized camel milk products would align with the increasing interest in camel milk consumption and trade. This is due to the distinct characteristics of camel milk products, encompassing interesting and unique compositional attributes when compared to other dairy products, as well as increasingly well documented nutritional benefits, positioning them as one of the most valuable food sources for people residing in arid and semi-arid regions.

128. β-lactoglobulin, one of the main milk allergens and a highly prevalent protein found in whey products, is naturally absent from camel milk. This feature makes camel milk and its products closer to human milk, with a lower allergenic potential, and places such products in high market demand.

129. Such demand for camel milk products has been shown to increase outside of the historically known regions that produce and consume these products, i.e., outside of Asia and the Near East, with exports reaching European and North American markets, where it is currently attracting increasing interest.

130. The unique attributes of camel milk products coupled with the increased interest and trade opportunities make these products subject to illicit manufacturing and false representation practices leading to consumer deception and fraud; thus, threatening the integrity of this valuable commodity's supply chain.

131. A global standard covering the specificities of camel milk products and offering guidance on their conditions of production and characterization, that account for the unique attributes of these products, while leveraging existing Codex standards on milk and milk products, would contribute to the protection of this important commodity from fraudulent activities when traded internationally.

132. An international standard would also support the development of a thriving dairy sector in regions of the world where production continues to follow traditional methods and would therefore benefit from more standardized conditions of production, in line with Codex standards for milk and milk products, which would be further adapted to accommodate some of the technological challenges stemming from specificities of camel milk products.

133. This will not only align with the Codex mandate of protecting consumers' health and enabling fair practices in the food trade but would also support economic and human development in various regions of Africa, Asia, and the Near East, where camel milk production is known to be prevalent and abundant.

134. This discussion paper offers an analysis of the current environment of camel milk production, the specificities of these products, the challenges faced by production and trade of camel milk products and how Codex standards may offer mitigation measures for these challenges, in addition to, enablers for the sector's development.

135. This paper references material gathered from published information, in the scientific literature including data and information shared during the International Symposium on Camel Milk Products , hosted by the United Arab Emirates, in Abu Dhabi from 24-25 September 2024. This Symposium witnessed participation from various countries of the Near East, Africa, Central Asia, and Europe. The discussion paper also incorporates valuable feedback from informal consultations with a broad range of Codex contact points facilitated by the coordinators of all Codex regions: the Near East,

Africa, Europe, Latin America and the Caribbean and North America and the South-West Pacific. These consultations were carried out from September to November 2024.

What would new work on camel milk products under Codex achieve?

136. The development of new work under the auspices of the Codex Alimentarius Commission, would consider all avenues to address the specificities of camel milk including to adapt guidance available in existing Codex standards and offer the development of new standards, as deemed necessary. Of particular interest, a standard that would enable the producers and consumers to guarantee the authenticity of camel milk products and protect these products from adulteration and fraud practices, often resulting from international trade.

137. Similarly, existing standards on hygienic practices related to camel milk would be reviewed and updated to account for the specificities of camel milk commodities.

138. This work will pursue the ultimate goal to help harmonize camel milk production conditions, where needed, and will reflect positively on the global trade of camel milk products.

139. Efforts of standardization would also account for the diversity in regional practices, resulting from geography (spanning from African countries such as Ethiopia, Kenya, Mali and Somalia, through the Eastern Mediterranean and GCC countries such as the United Arab Emirates and Saudi Arabia, reaching Asia, North America and the South-West Pacific), seasonality, species and other variations.

140. Efforts will be made to ensure any updates to existing standards, or the development of new provisions apply equally to camel milk originating from the species *Camelus dromedarius* (one-humped) and/or *Camelus bactrianus* (Two-humped) camels.

141. Up-to-date guidance from Codex on conditions of production and determination of authenticity of camel milk products will undoubtedly contribute to protect consumers and help ensure that manufacturers apply adapted best practices in dairy production, enable a larger proportion of the camel milk products to enter formal global trade and encourage small scale producers to contribute to the camel milk supply chain.

142. It is proposed that the work is primarily focused on quality characteristics of camel milk products hence it may be most appropriate for such work to be carried out under the oversight of CCMMP.

143. The outputs of the new work proposed would consist of proposed updates to existing standards of CCMMP, and the proposal of a new standard that would address the specificities of camel milk products with an emphasis on authenticity. Aspects related to hygienic practices, presence of contaminants, labelling, and methods of analysis and sampling will be considered in accordance with the standards developed by the relevant Codex horizontal committees.

144. Charting this path forward of Codex work associated with camel milk products would be carried out in conjunction with the current efforts underway by the Codex Committee on Residues of Veterinary Drugs in Food (CCRVDF) to progress in the development of dedicated maximum residue levels (MRLs) for veterinary drugs in camelid tissues, including to explore the application of the extrapolation approach and other avenues to derive such MRLs. This work was initiated subsequent to a proposal[7] developed and tabled by Jordan, Morocco, AIDMSO and IUFoST at CCRVDF26.

Steps Achieved based on CAC47 Recommendations

145. During its 47th meeting, the Codex Alimentarius Commission (CAC47), recommended that the UAE, as the proponent of the proposal and New Zealand (as host country of CCMMP) work together to conduct a gap analysis on the current existing Codex horizontal and vertical standards.

146. The implementation of the recommendations started in March 2025 and continued until July 2025 with a series of virtual Meetings leading to the development of the Gap Analysis (See Appendix II) as well as the review of discussion paper and the project document.

147. The reviewed standards were as follows:

[7] Update of the project on extrapolation of maximum residue limit for veterinary drugs to one or more species-camelids: CCRVDF 27 Meeting

- *Standard for milk powders and cream powder* (CXS 207-1999)
- *Standard for fermented milks* (CXS 243-2003)
- *Standard for milkfat products* (CXS 280-1973)
- *Standard for butter* (CXS 279-1971)
- *General standard for the use of dairy terms* (CXS 206-1999)
- *Code of hygienic practice for milk and milk products* (CXS 57-2004)
- *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997)
- *General standard for contaminants and toxins in foods and feeds* (CXS 193- 1995)
- *General principles of food hygiene* (CXC 1-1969)
- *General standard for food additives* (CXS 192-1995)
- *General standard for the labelling of pre-packaged foods* (CXS 1-1985)
- *General standard for the labelling of non-retail containers of foods* (CXS 346-2021)
- *Recommended methods of analysis and sampling* (CXS 234-1999)

Conclusion

148. During the last years, the food market witnessed an increased interest in camel milk among the consumers due to its health attributes especially the absence of β-lactoglobulin (a major allergen in bovine milk). Noting that camel milk is available for consumers under many forms such as pasteurized, powder, fermented as well as the derivate products such as yogurt, ghee and ice cream. The cheese derived from camel milk is also considered a well-known product that is traditionally prepared in some countries.

149. Such demand for camel milk products has been shown to increase outside of the historically known regions that produce and consume these products such as Asia and the Near East, with exports reaching European and North American markets, where it is currently attracting increasing interest.

150. The distinctive characteristics of camel milk products make them more vulnerable to adulteration, primarily through dilution and substitution with bovine milk.

151. According to statistics issued by FAO (2023), the production of raw camel milk knows an interesting increase during the last decade. Despite the high demand and increased production, the trade on camel milk is maintained at national level with few export circuits. It was noticed that at national level, a huge part of the production is informally traded within the country. At international level, exporters are facing technical challenges in providing the requirements set by the importers. Some of the challenges are related to the diversification of the conditions of production.

152. Based on the consultations done with Codex regions, many Members expressed their interest in developing a camel milk standard based on the information on the commodity, trade aspects and also the challenges faced by producers and exporters while adhering to codex procedures in this matter.

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第二部分

关于制定巴氏杀菌驼乳标准的项目文件

由阿拉伯联合酋长国编写

1. 标准的目的与范围

本项工作的目的是制定一项针对巴氏杀菌驼乳的国际标准，以体现其作为乳制品的特殊性，重点强调其**真实性**并**防止掺假可能性**。

拟议标准还将**参考**相关食典文本，如乳和乳制品法典委员会制定的文本（例如《乳制品术语使用通用标准》（CXS 206-1999[1]））以及其他横向委员会制定的文本（例如《乳和乳制品卫生操作规范》（CXC 57-2004）），**整合关于**巴氏杀菌驼乳**生产条件的参考指南**。

鉴于驼乳制品与其他乳制品相比所具有的**鲜明特征**，拟议标准将**明确**与所参考的食典标准中现行指南之间的**重大差异**（**如有**）。

该标准适用于按照预期用途用作直接食用人类食品的**巴氏杀菌驼乳**。该标准旨在规范源自单峰骆驼（*Camelus dromedarius*）或双峰骆驼（*Camelus bactrianus*）品种的巴氏杀菌驼乳。

本标准的目标是参考或参照现行食典文本并作出相应修订，保护巴氏杀菌驼乳免受**记录在案的掺假行为**侵害，修订内容涵盖以下方面：

- 真实性标准；
- 保障消费者健康和维护公平食品贸易的安全、质量、检测方法及标签方面的基本要求。

该标准旨在通过确保巴氏杀菌驼乳符合既定的真实性、安全和质量要求，增强消费者对这种产品的信心。

产品定义

本节的重点是通过**明确界定**巴氏杀菌驼乳与其他乳制品的**区别**，提供关于如何确认**巴氏杀菌驼乳真实性**的**参考指南**。

建议本节将**不含β-乳球蛋白**作为巴氏杀菌驼乳区别于其他乳制品的主要界定因素，为生产者和消费者提供**明确的真实性判定标准**。

2. 相关性和及时性

驼乳制品的产量、贸易和消费持续增长，2023 年达到 4,117,710 吨（粮农组织统计数据库 2023[8]），多个国家从事驼乳制品生产，包括中国、埃塞俄比亚、肯尼亚、马里、尼日尔、巴基斯坦、沙特阿拉伯、索马里、阿拉伯联合酋长国（阿联酋）和乌兹别克斯坦。虽然生产者与消费者之间的非正式活动仍占主导地位，但在一些主要生产国（如肯尼亚和沙特阿拉伯），驼乳制品贸易已涵盖多种产品，如巴氏杀菌驼乳、浓缩超高温灭菌驼乳、驼乳黄油、驼乳奶酪、驼乳酸奶、驼乳粉、驼乳冰淇淋以及巧克力风味驼乳粉。

世界上许多国家都在生产巴氏杀菌驼乳。据报道，该产品是阿联酋的主要驼乳制品，以上述多种形式在全国各地进行销售，并出口到世界各地，市场延伸至中国、欧盟及美国 [9]。其他生产国包括沙特阿拉伯和巴基斯坦。

随着驼乳制品日益受到关注，多起掺假事件被曝光。据报道[9]，出口市场曾出现驼乳粉被牛乳稀释后用于多种产品配方的情况。此类欺诈行为若未得到有效防范和遏制，将危及驼乳制品供应链的完整性，从而损害该生产部门的发展。

联合国将 2024 年定为“国际驼科动物年”，旨在聚焦“驼科动物被忽视的潜力及其对 90 余国粮食和营养安全、经济增长及社会文化遗产的贡献”。

发展驼乳生产部门，为生产者提供更多指导，并提升其初级产品的附加值，将改善数百万人的生计，并促进整体经济与人类发展（Seifu，2023）[10]。

该部门的发展还将有助于减少主要生产国因生产条件不足而造成的潜在粮食损失[10]。

阿联酋通过提交相关提案，积极推动在食典委内形成支持驼乳制品标准化的势头，最新提案提交于 2023 年 9 月 18-22 日在意大利罗马粮农组织总部召开的粮农组织/世卫组织近东协调委员会第十一届会议。

此外，作为对 2024 国际驼科动物年的贡献，阿联酋于 2024 年 9 月 24-25 日主办了国际驼乳制品研讨会[11]，国际专家在会上探讨了驼乳制品的当前发展态势、市场潜力及产品标准化需求。

这些举措营造的势头，驼乳生产部门发现和表达的对产品标准化的迫切需求，以及驼乳制品对粮食安全和可持续发展目标（主要是可持续发展目标 1“无贫困”和可持

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[8] 粮农组织数据统计库（2023）。https://www.fao.org/faostat/zh/#data/QCL

[9] 2024 年 9 月 24-25 日由阿拉伯联合酋长国主办的国际驼乳制品研讨会期间举行的产业意见征询环节。

[10] Seifu，E。2023。《驼乳制品：创新、局限和机遇》。《食品生产、加工和营养》 5:15。https://doi.org/10.1186/s43014-023-00130-7

[11] 国际驼乳制品研讨会:https://gforss.org/2024/09/20/2024_camelmilkworkshop/

续发展目标3“良好健康和福祉”）的贡献潜力，有力说明了这项关于驼乳制品食典国际标准的新工作提案的及时性和相关性。

3. 需要考虑的主要方面

不含β-乳球蛋白很可能成为该产品的主要界定因素，使**生产者和消费者**能够**判定**巴氏杀菌驼乳的**真实性**。

该标准旨在成为巴氏杀菌驼乳的“**食典参考标准**”，通过参考或参照食典文本进行制定，在必要情况下作出修订，以体现巴氏杀菌驼乳的技术特性。标准内容涵盖：

- **真实性标准；**
- 一份**综合清单**，其中包含与安全、质量、检测方法和标签方面基本要求相关的**规定**，**参考现行食典文本**，并按照为支持这项新工作而进行的**差距分析**所确定的，针对巴氏杀菌驼乳的技术特性进行明确说明。

总体目标仍然是保障消费者健康，维护公平食品贸易。

因此，拟议新食典文本将包括一个**关于**巴氏杀菌驼乳**生产条件的指导性文件**库，**参考**相关食典文本，如乳和乳制品法典委员会制定的文本（例如《乳制品术语使用通用标准》（CXS 206-1999[1]））以及其他横向委员会制定的文本（例如《乳和乳制品卫生操作规范》（CXC 57-2004）），同时指出与其他乳制品相比，因巴氏杀菌驼乳的鲜明特性而需要作出的差异化规定。

必要时，建议采用分析和采样方法来支持该产品的任何特定特性，特别是用于**真实性测试**。

4. 对照《确定工作重点的标准》开展的评估

以下标准对制定巴氏杀菌驼乳标准具有重要意义：

a- 保护消费者健康、食品安全、确保公平食品贸易，并考虑到已经明确的发展中国家需求

具体说明**巴氏杀菌驼乳真实性规定**的标准，将遏制并有助于防范当前针对该产品并因其经济价值提升而引发的欺诈行为。该标准不仅将支持此类规定的制定，还将就如何确定是否符合规定提供指导，如明确相关分析方法：

- 驼乳及其制品与其他乳制品的主要区别在于**不含β-乳球蛋白（牛乳中的主要过敏原）**，且**β-酪蛋白**含量较高（约65%）。
- 前一种特性是**识别驼乳制品的关键特征，可将其与可能掺假的产品区分开来**。唯一不含**β-乳球蛋白**的其他乳类是母乳，其作为驼乳制品掺假来源的可能性最低。这些独特的成分特征使驼乳成为最接近母乳的乳制品之一，也使得驼乳

制品备受消费者追捧。这些特性使驼乳制品更易遭受**掺假**，主要通过稀释和用牛乳替代的方式。

- 因其独特特性，驼乳**价格高于**牛乳，**单价可达牛乳的三倍**。用牛乳制品稀释驼乳制品以牟取非法利益的行为在市场上屡见不鲜。
- 制定巴氏杀菌驼乳标准将有助于防范欺诈行为，这与食典委防止此类欺诈行为的目标相一致。

针对巴氏杀菌驼乳的标准将提供关于乳制品食典准则适用性的指导性文件库，同时明确考虑到巴氏杀菌驼乳的特殊性所产生的相关差异。这将有助于更加一致地应用安全与质量要求，从而增强消费者健康保护：

- 驼乳的热敏性、与牛乳不同的蛋白质组成和胶体结构、不含 β-乳球蛋白、κ-酪蛋白含量低、β-酪蛋白比例高，导致酪蛋白胶粒较大而脂肪球较小，因此可能难以制作多种乳制品。
- 驼乳加工面临的挑战包括超高温处理过程中稳定性差、凝固过程中形成的凝乳易碎、发酵时间较长、干燥过程中热稳定性低。部分报告 [10] 强调，缺乏针对驼乳的专项指南可能导致采用不当巴氏杀菌工艺，同时指出 80°C 以上温度会引发驼乳分离问题。
- 对现行食典指南进行差距分析，并根据驼乳的特殊性进行调整，将促使在拟议驼乳制品标准中引用相关食典文本，同时说明任何需要进行调整的规定（如有），以便识别驼乳制品的特殊性。

b- 各国的产量和消费量以及各国之间的贸易量和贸易格局

拟议标准旨在通过**确定巴氏杀菌驼乳的真实性**，将其纳入统计范围内。下文介绍了驼乳生产和贸易的现状，并概述了可能在当地、区域和全球范围内生产、加工和交易的各类产品。

巴氏杀菌驼乳是全球交易量最大的驼乳形式之一，因此亟需联合国粮食及农业组织（粮农组织）通过其官方通信系统协助提供该商品的生产、消费和贸易数据。

尽管驼乳制品的贸易规模尚需进一步数据佐证，但其贸易量正在**持续增长**，为全球驼乳生产者**提供了巨大潜力**，使其能够从该商品及其所有衍生品/制品的更高价值中获益。因此，驼乳贸易将有利于提高无数农村生产者的收入水平，而他们主要生活在低收入和中等收入国家。如果通过食典标准中的明确定义来有效防范该商品的掺假行为，此类效益将进一步增强。

粮农组织发布了 1961 年至 2023 年的驼乳统计数据。自 1961 年以来，驼乳产量的年增长率估计为 6.5%（Konuspayeva 等，2023）。

根据粮农组织统计数据库 [8]，肯尼亚是全球生驼乳最大生产国，其次为索马里、巴基斯坦、马里、埃塞俄比亚、沙特阿拉伯、尼日尔和阿联酋。2023 年，全球驼乳产量达 4,117,710 吨。2013 年至 2023 年间，全球驼乳产量持续增长 0.89%，从 3,679,284 吨增至 4,117,710 吨。

2016 至 2023 年间，生驼乳总产量呈现温和增长态势。值得注意的是，肯尼亚、索马里和巴基斯坦在驼乳产量方面始终保持领先地位。与马里、埃塞俄比亚、沙特阿拉伯、尼日尔和阿拉伯联合酋长国等其他前十位生产国相比，前三位国家的生驼乳产量存在显著差异（表 1）。

表 1：2023 年生驼乳产量（单位：吨）（粮农组织，2023）

国家	**产量（吨）**
肯尼亚	1026467
索马里	993501.6
巴基斯坦	956000
马里	293333
埃塞俄比亚	226519.6
沙特阿拉伯	136003.3
尼日尔	107504.5
阿联酋	89367.78
苏丹	60853.16
乍得	36066.57

参加国际驼乳制品研讨会的生产部门专家与代表指出，**阿联酋巴氏杀菌驼乳**年**产量**逾 7,000 吨，其中 1,800 吨出口至中国、欧盟及美国。其余产品则供当地消费或在近东区域内交易。

突尼斯共和国提供的数据**显示**，其**巴氏杀菌驼乳年产量**达到 5 吨。同样，根据阿联酋出口数据，其驼乳粉年出口量达 330 吨，相当于 3,300 吨液态乳。

根据**阿曼苏丹国**提供的数据，2023 年其生驼乳产量较 2022 年翻倍，从 1,149.7 吨增至 2,367.15 吨。2024 年前九个月产量达 3,755 吨，呈现显著增长态势。阿曼主要向沙特阿拉伯王国出口生鲜液态乳。2023 年出口总量达 2,367 吨。

驼乳产业被视为**蒙古经济**中富有活力并具有推动力的支柱。据蒙古官方数据，2021 年至 2023 年间，来自双峰骆驼的生乳产量从 1 万吨增至 1.3 万吨。与此同时，据同一

数据来源，发酵驼乳产量在过去五年间显著增长，从 2019 年的 9.1 吨攀升至 2023 年的 106.5 吨。

在**巴基斯坦**，目前仅有一家驼乳制品生产企业，其巴氏杀菌驼乳月产量达 330 吨，用于生产乳粉、奶酪等产品（与 ELC 生物技术公司曾展开讨论）。

c- 国家立法的多样化及其对国际贸易构成的明显或潜在障碍

国际标准制定领域已存在多项国家和区域层面制定的标准。

如讨论文件所述，现有国家或区域标准均未聚焦于驼乳制品的**真实性测定**，也未涉及针对驼乳制品的**欺诈活动相关的漏洞**，由此形成的空白可以通过食典标准予以填补。

表 2 总结了驼乳的国际标准化尝试及相关标准中包含的若干关键特征。

在区域层面，海湾阿拉伯国家合作委员会（海合会）标准化组织通过了巴氏杀菌驼乳标准（GSO 1970:2021）；生驼乳则纳入了海合会标准化组织生乳标准（GSO 174:2021）。

在国家层面，突尼斯制定了用于深加工的生驼乳标准（NT 14.261:2009）。肯尼亚通过了关于全脂生驼乳（DKS 2061:2016）、巴氏杀菌驼乳（DKS 2062:2016）及发酵驼乳（DKS 2707:2016）的标准。摩洛哥也通过了巴氏杀菌驼乳国家标准（NM 08.4.300:2016）。中国通过了驼乳粉标准（RHB 903—2017），哈萨克斯坦于 2015 年通过了驼乳加工标准（ST RK 166-2015），并于 2019 年通过了生驼乳标准（ST RK 3386-2019）。

在巴基斯坦，驼乳（巴氏杀菌或超高温灭菌）制成的全脂、低脂及脱脂包装乳的最低成分要求被纳入 2022 年颁布的《包装液态乳标准》（PS:5344-2022）。

在研究国际监管框架的过程中，发现埃塞俄比亚和马里等主要生产国并未制定生驼乳和加工驼乳国家标准。现有标准中，除肯尼亚外均无生驼乳专项标准，但一些国家（如海湾国家和欧盟）的通用生乳标准中纳入了部分生驼乳要求。此外，除海合会标准化组织和阿联酋标准外，对骆驼品种均未作具体规定。

主要差异在于巴氏杀菌驼乳的最低脂肪含量要求，尤其是在全脂乳类别中，海合会标准化组织标准规定的水平最高（最低 3%），肯尼亚标准则最低（最低 2%）。

这些标准的其他规格要求相似，包括药物残留、农药残留及微生物限量等方面的要求，其中食典标准常被列为参照依据。

目前各国标准均未**侧重于**驼乳制品的**真实性测定**，也未涉及与针对驼乳制品的欺诈行为相关的漏洞。

表 2：巴氏杀菌驼乳区域和国家标准概要

标准		**阿联酋**	**海合会标准化组织**	**肯尼亚**	**摩洛哥**	**巴基斯坦**
巴氏杀菌驼乳标准		▪ UAE.S/GSO 1970 :2010（PCM）	▪ GSO 1970: 2021 (PCM)	▪ DKS 2062: 2016	▪ NM 08.4.300: 2016	PS: 5344-2022
巴氏杀菌驼乳标准适用范围		来自阿拉伯骆驼/单峰骆驼（*Camelus dromedarius*）的巴氏杀菌驼乳	来自阿拉伯骆驼/单峰骆驼（*Camelus dromedarius*）的巴氏杀菌驼乳	来自任何品种骆驼（单峰或双峰）的巴氏杀菌驼乳	来自任何品种骆驼（单峰或双峰）的巴氏杀菌驼乳	供直接食用的包装液态乳
巴氏杀菌驼乳成分要求概要						
乳脂（最低百分比）	全脂乳	2.5	3	2	3	3.5
	低脂乳	2-1	3 - 0.5	1	-	2
	脱脂乳	0.5	0.5	0.5	-	0.5
非脂乳固体（最低百分比）		8	8	6	10	8.5
总酸度（以乳酸百分比表示），最高值		0.18 %	0.18 %	0.17 %-0.21 %（生乳）	0.18 %	无值
巴氏杀菌驼乳微生物限量						
细菌总数最大限值		100000 (CFU/ml)	100000 (CFU/ml)	30000 (CFU/ml)	无值	<50000（CFU/ml）
大肠菌群总数最大限值		10 (CFU/ml)	10 (CFU/ml)	10 (CFU/ml)	无值	10 (CFU/ml)
欧洲联盟（欧盟）		目前尚无针对驼乳规格的具体法规，但存在针对动物源性产品的法规，生驼乳可归入其范畴内。				

d- 国际或区域市场潜力

在肯尼亚以及沙特阿拉伯等其他主要驼乳生产国，驼乳产业在交易量和利益相关方数量上均由非正规贸易主导[12]。然而，随着驼乳产业化进程的加快推进，各类产品应运而生，涵盖巴氏杀菌乳、风味乳、乳粉、酥油、饮用酸奶、奶酪、黄油及冰淇淋。

阿联酋生产的巴氏杀菌驼乳以上述多种产品形式在全国各地销售，并出口到世界各地，市场延伸至中国、欧盟及美国。

新标准预期成效在于确定**巴氏杀菌驼乳的真实性**，增强**消费者**信任度，从而促进驼乳制品发展与合法贸易。

参考关键食典文本制定的巴氏杀菌驼乳生产条件综合指南，将为驼乳生产者提供指导，使其依据食典指南建立循证生产体系。这将转化为更高价值的产品和全球巴氏杀菌驼乳贸易的增长，从而对区域和国际贸易做出积极贡献，对非洲和亚洲多个发展中国家的经济和社会产生积极影响。

e- 商品标准化的可行性

巴氏杀菌驼乳在成分上显示出独特属性，尤其是在蛋白质、脂质、维生素和矿物质方面。此外，这种高价值商品因其潜在的营养保健特性而受到认可，如含有乳铁蛋白、免疫球蛋白、α-乳白蛋白和血清白蛋白等成分，因此成为非正规交易的对象，更易遭受掺假。

虽然因骆驼品种差异及饲养地域多样性导致巴氏杀菌驼乳成分存在差异，**但可以确定构成其特征的关键宏量营养素含量的总体趋势**。

巴氏杀菌驼乳最显著的特征是**不含β-乳球蛋白（牛乳中的主要过敏原）**，该特征可作为该商品的定义参数，此外其**β-酪蛋白**含量较高（约 65%）。

不含β-乳球蛋白是识别巴氏杀菌驼乳的关键特征，可将其与可能掺假的产品区分开来。唯一不含**β-乳球蛋白**的其他乳类是母乳，而母乳作为巴氏杀菌驼乳制品掺假来源的可能性最低。

对巴氏杀菌驼乳特征的研究表明，基于有助于测定巴氏杀菌驼乳真实性的关键特征，**该产品**具备全球**标准化可行性**。

拟议标准将综合考虑生产条件多样性与季节性因素，**制定巴氏杀菌驼乳成分标准清单**。

[12] Musinga, M.、Kimenye, D.、Kivolonzi, P.，2008。《肯尼亚驼乳产业》。资源筹措中心。

拟议标准将侧重于界定和列举有助于防范欺诈的特征，以及通过将食典横向标准（如卫生、包装和标签标准）应用于该商品，为生产条件和商业化提供更多指导，并将促进为该产品的生产和贸易创造更好的受控条件。

f- 现行或拟议通用标准对主要消费者保护和贸易问题的覆盖范围

虽然横向食典标准、食典乳和乳制品通用要求可能适用于巴氏杀菌驼乳的部分方面，但仍需制定**巴氏杀菌驼乳真实性标准**，以便防范针对此类商品的欺诈行为。

拟议巴氏杀菌驼乳标准还将通过**援引**适用于该产品的**相关食典文本**，整合各类安全和质量要求，同时强调因技术原因需要关注的任何偏差（**如有**），为生产者和贸易商提供更好的指导。

g- 标准涵盖的产品

该标准适用于源自单峰骆驼（*Camelus dromedarius*）或双峰骆驼（*Camelus bactrianus*）的巴氏杀菌驼乳。

巴氏杀菌驼乳是指通过一次或多次挤奶获得的泌乳期骆驼正常乳腺分泌物，未经任何添加，且经过国际公认的巴氏杀菌工艺处理，该工艺可消除所有致病微生物及大部分其他微生物。

h- 其他国际组织在此领域已开展的工作

尚未发现适用于该商品的全球性标准。然而，海合会标准化组织等区域性政府间组织已制定巴氏杀菌驼乳标准，即 GSO 1970:2021《乳和乳制品——巴氏杀菌驼乳》。另有报告称，**非洲标准化组织**主导的标准化工作亦在推进中。

5. 与食典战略目标的相关性

根据上述信息可得出结论，拟议标准符合食典委《2020-2025 年食典战略计划》中概述的标准：

目标 1——及时应对当前、新发和重要问题。本标准将满足以下需求：推广对农村社区产生影响的商品，助力减少浪费，支持主要产自发展中国家的商品增值，从而减少饥饿并提升创收潜力。

目标 2——根据科学和食典风险分析原则制定标准。特别是具体目标 2.1，始终根据食典风险分析原则运用科学建议。拟议标准及其制定依据和过程将基于现有实证和收集的数据。

目标 3——认可并运用食典标准，扩大影响力。特别是具体目标 3.3，认可并促进食典标准的使用和影响。

拟议标准响应了生产部门提出的**明确需求**，旨在**支持**驼乳制品（特别是巴氏杀菌驼乳）的**真实性测定**。保护巴氏杀菌驼乳的真实性将有助于规范其市场准入渠道，从而减少可能由欺诈活动造成的贸易中断。因此，该标准将有助于保护这种高价值产品，促进驼乳衍生食品多元化开发投资机遇，使低收入和中等收入国家农村社区的生产者获得更好的经济社会前景，这些可以明确归因于预期标准产生的影响。

该标准的制定也与将 2024 年定为国际驼科动物年的目标直接契合。该标准的制定与颁布将有助于人们进一步认识到驼科动物对人类生计的重要性和贡献。骆驼作为一种产乳和产肉的物种，是全球干旱地区和山区牧场生态系统中数百万家庭（其中多数为牧民）的重要生计来源。

6. 提案与其他现行食典文件的关系

拟议新国际标准将参考综合主题委员会以及乳和乳制品法典委员会制定的相关横向标准及关联文本，具体如下：

关于驼乳的安全性，将酌情参考下列文本：

- 《食品及饲料中污染物和毒素通用标准》（CXS 193-1995）
- 《食品卫生通用原则》（CXC 1-1969）
- 《乳和乳制品卫生操作规范》（CXC 57-2004）
- 《食品微生物标准制定和应用原则与准则》（CXG 21-1997）

与标签相关的问题将由以下文件涵盖：

- 《预包装食品标签通用标准》（CXS 1-1985），具体问题将在工作过程中予以考虑。

该标准将基于并补充现行商品文本，如：

- 《乳制品术语使用通用标准》（CXS 206-1999）
- 《分析和采样建议方法》(CXS 234-1999)

7. 明确专家科学建议的要求和可用情况

现阶段无需提供科学建议。所有必需数据均可从公共领域获取。目前尚未发现需要向粮农组织或世卫组织寻求科学建议的具体安全问题。

8. 确定是否需要外部机构对该标准提供技术支持，以便可以根据完成新工作的拟议时间表制定计划

需要区域标准化组织（如非洲区域标准化组织、海合会标准化组织、阿拉伯工业发展、标准化和矿业组织）等政府间组织以及国际乳品联合会、国际食品科学技术联

盟等对标准制定具有利益关系的非政府组织提供意见。这些组织在食典委享有观察员地位，因此将被纳入标准制定过程。

9. 完成工作的拟议方法和时间表

在食品法典委员会批准新工作的前提下，预计相关附属机构需要两届会议来完成其工作。

APPENDIX II (English only)

Gap analysis of existing Codex texts with regard to food safety and quality provisions for camel milk and camel milk products

Prepared by New Zealand and the International Dairy Federation

1. Introduction

1. The discussion paper and project document (Appendix I) prepared by the United Arab Emirates (UAE) indicated interest in developing a Codex text to address i) authenticity and ii) standardized production and processing practices and product characteristics. This gap analysis started with the identification of relevant existing Codex texts, followed by expert forums (e.g. IDF expert groups) to determine their applicability to camel milk and whether there were any gaps between Codex texts and needs as they apply to camel milk.

2. New Zealand and the International Dairy Federation (IDF) conducted this gap analysis, with the participation of the UAE.

3. Section 1 examines whether the existing Codex texts and ongoing Codex work can be applied to protect camel milk products from adulteration in international trade. The gap analysis on authenticity included Codex texts in development, given the current work of the Codex Committee on Food Import and Export Inspection and Certification Systems (CCFICS).

4. Section 2 reviews 14 existing Codex texts, assessing whether they adequately account for the specific characteristics of camel milk and camel milk products.

5. The gap analysis indicated that the existing food safety and quality provisions in the Codex texts reviewed as part of this exercise were inclusive of camel milk or camel milk products and that there were Codex texts in existence that could be used to assist in protecting camel milk products from adulteration when traded internationally.

6. In general, the analysis did not identify any gaps except in one case relating to the classification of milk powders based on the fat content, it was noted that variations (seasonal or otherwise) in fat content of camel milk may mean that the resulting powder may not meet the criteria for whole milk powder and could be classified differently under the current Codex standard. However, this could be mitigated by standardization of fat content where necessary.

SECTION 1: REVIEW OF THE RELEVANCE OF EXISTING CODEX TEXTS TO THE PROTECTION OF CAMEL MILK PRODUCTIS FORM ADULTERATION IN INTERNATIONAL TRADE.

2. 1-Adulteration and Mislabeling

7. New Zealand conducted an exercise to assess whether Codex standards exist to assist in protecting camel milk products from adulteration when traded internationally.

Existing Codex Texts

8. Milk from all species is susceptible to fraud and adulteration.

9. Protection of milk and milk products from adulteration and mislabelling are covered through existing Codex texts. This includes the requirements for appropriate labelling when milk from different species is mixed.

10. The requirement for products sold as “camel milk” to be from camels, and to not be adulterated (e.g. mixed with other mammalian milks without appropriate labelling), is set out in the Codex *General Standard for the Use of Dairy Terms* (CXS 206-1999, GSUDT) and supplemented by the Codex *General Standard for the Labelling of Prepackaged Foods* (CXS 1-1985, GSLPF).

General Standard for the Use of Dairy Terms (CXS 206-1999):

2. DEFINITIONS

2.1 **Milk** is the normal mammary secretion of milking animals obtained from one or more milkings without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing.

4. APPLICATION OF DAIRY TERMS

4.1 General requirements

4.1.1 The name of the food shall be declared in accordance with Section 4.1 of the *General Standard for the Labelling of Pre-packaged Foods* (CXS 1-1985).

4.1.2 A word or words denoting the animal or, in the case of mixtures, all animals from which the milk has been derived shall be inserted immediately before or after the designation of the product. Such declarations are not required if the consumer would not be misled by their omission.

General Standard for the Labelling of Pre-Packaged Foods (CXS 1-1985):

3. GENERAL PRINCIPLES

3.1 Pre-packaged food shall not be described or presented on any label or in any labelling in a manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect.[i]

4. MANDATORY LABELLING OF PRE-PACKAGED FOODS

The following information shall appear on the label of pre-packaged foods as applicable to the food being labelled, except to the extent otherwise expressly provided in an individual Codex standard:

4.1 *The name of the food.*

4.1.1 The name shall indicate the true nature of the food and normally be specific and not generic:

CCFICS Draft Guidelines on the Prevention and Control of Food Fraud

11. In addition to these existing Codex texts, CCFICS is developing Guidelines on the Prevention and Control of Food Fraud. These guidelines could be a more appropriate avenue to address concerns around product adulteration.

12. The purpose/scope of these draft guidelines are:

2. PURPOSE / SCOPE

8. The purpose is to provide guidance to competent authorities and FBOs on the prevention, detection, mitigation, and control of food fraud to help protect the health of consumers, and to ensure fair practices in food trade, including, as appropriate, feed for food producing animals. Aspects related to food fraud are already addressed through many existing Codex texts; this guidance is intended to support or supplement existing Codex texts by providing additional guidance specific to food fraud that can be considered within NFCS. Issues related to intellectual property are not included in this document.

13. CAC47 (2024) recommended these guidelines be adopted at Step 5. The draft Guidelines on the Prevention and Control of Food Fraud can be found in REP24/FICS Appendix II.

SECTION 2: REVIEW OF EXISTING CODEX TEXTS TO ASSESS WHETHER THEY ACCOUNT FOR THE SPECIFIC CHARACTERISTICS OF CAMEL MILK COMMODITIES.

14. IDF conducted an exercise to assess whether existing Codex texts account for the specific characteristics of camel milk commodities.

15. The Codex texts that were assessed are:

- *Standard for milk powders and cream powder* (CXS 207-1999)
- *Standard for fermented milks* (CXS 243-2003)
- *Standard for milkfat products* (CXS 280-1973)
- *Standard for butter* (CXS 279-1971)
- *General standard for the use of dairy terms* (CXS 206-1999)
- *Code of hygienic practice for milk and milk products* (CXS 57-2004)
- *General standard for the labelling of pre-packaged foods* (CXS 1-1985)
- *General standard for the labelling of non-retail containers of foods* (CXS 346-2021)
- *General principles of food hygiene* (CXC 1-1969)
- *General standard for food additives* (CXS 192-1995)
- *Principles and guidelines for the establishment and application of microbiological criteria related to foods* (CXG 21-1997)
- *General standard for contaminants and toxins in foods and feeds* (CXS 193-1995)
- Codex maximum residue limits for pesticides and extraneous maximum residue limits
- *Recommended methods of analysis and sampling* (CXS 234-1999)[13]

Camel Milk Composition (vs Cow Milk Composition)

	Camel milk* (references in Annex 1)	Cow milk
Fat	2.0 – 5.0%	3.0 – 4.0%
Protein	2.5 – 4.0%	3.0 – 4.0%
Total Casein	~80% of total protein	~80% of total protein
α-casein	~22% of total casein	~40% of total casein
ß-casein	~65% of total casein	~30 - 35% of total casein
κ-casein	3.0 – 4.0% of total casein	12 -15% of total casein
Total whey protein	~20% of total protein	~20% of total protein
ß-Lactoglobulin	Absent	50 - 60% of whey protein
Lactose	4.2 – 5.0%	~4.5%
Water	~86-88%	~87%

*Values are approximate and may vary based on species (Dromedary vs Bactrian); breed, region of production, water availability, type and nutrition value of feed/forage, climatic conditions, and environmental conditions.

[13] CXS 234-1999 was agreed to be included. CXS 234 lists international recognized and validated methods per provision, and per commodity standards. Most methods listed are expected to be applicable for milk and milk products from all species. However, an IDF/ISO action team will review the applicability of existing key methods for key provisions to non-cow milk.

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
Standard for milk powders and cream powder	CXS 207-1999	Description of product	*Section 2 — Milk powders and cream powder are milk products which can be obtained by the partial removal of water from milk or cream.*	Yes	Camel milk and camel cream powders fit this definition technically.	No gap
		Composition of milk powders	Requirements for milkfat; – Whole milk powder: Minimum 26% and less than 42% m/m – Partly skimmed milk powder; More than 1.5% and less than 26% m/m – Skimmed milk powder: maximum 1.5% m/m – Cream powder: minimum 42% m/m	Partly	It covers all milkfat levels in milk powders from > 42 % fat in cream powder, through whole milk powder (< 42% to ≥ 26%), partly skimmed milk powder (< 26% to ≥ 1.5%) and skimmed milk powder (< 1.5% maximum). The only issue that might arise is if the camel milk used for manufacture has a low fat level (< 2.5%) (Nagy et al, 2018) as this might result in the resultant (whole milk) powder with < 26% fat being classified as partly skimmed camel milk powder.	IDF is not aware of any issues in international trade as regards the compositional requirements for fat content and protein levels as a percentage of total non-fat milk solids of camel milk powders. However, where camel milk with fat levels below 2.5% fat are used in the manufacture of whole camel powder, care should be taken that the fat levels in such powder do not fall below the minimum of 26% fat specified in the standard. Standardisation of fat content can be used if necessary to ensure this. Camel milk powders below 26% fat would fall into the category of partially skimmed camel milk powder.
			Requirements for milk protein in milk solids-not-fat; minimum 34% m/m for all.	Yes	Camel milk and camel cream powders fit this requirement	No gap
			Requirements for water; maximum 5% m/m for all.	Yes	Camel milk and camel cream powders fit this requirement	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
Standard for fermented milks	CXS 243-2003	Description of product	Fermented Milk, Concentrated Fermented Milk (Yoghurt, alternate culture yoghurt, acidophilus milk, Kefir, Kumys), Flavoured Fermented Milks, Drinks based on Fermented Milk	Yes	Process also applies to camel milk fermented products, which also cover: -Certain Fermented Milks are characterized by specific starter culture(s) used for fermentation as described in Section 2.1. -Starter microorganisms shall be viable, active, and abundant in the product to the date of minimum durability. -Other microorganisms than those constituting the specific starter culture(s) named above may also be added if so desired.	No gap
		Composition of fermented milks	Requirements for milk protein: min. 2.7% m/m applies to Fermented Milk, Yoghurt, Alternate Culture Yoghurt, Acidophilus Milk, and Kefir	Yes	Camel fermented milks can fit this requirement.	No gap
			Requirements for milk fat: less than 10% m/m in fermented milk, kefir and Kumys and less	Yes	Camel fermented milks can fit this requirement.	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
			than 15% m/m in yoghurt.			
			Labelled microorganisms: Min 10^6 (cfu/g, total) in fermented milk and yoghurt, alternate culture yoghurt and acidophilus milk	Yes	Camel fermented milks can fit this requirement.	No gap
		Labelling of fermented milks	Naming and claims on fermented milks	Yes	Fluid drinkable fermented camel milks are available using required started cultures. These would be in accordance with the general description of fermented milks in Section 2.1. Moreover, other fermented milks (and concentrated milks) may be designated with other variety names specified in the national legislation of the country of retail sale, or names existing in common usage, provided that such designations do not create an erroneous impression in the country of retail sale regarding the character and identity of the food.	No gap
Standard for milkfat products	CXS 280-1973	Description of product	*Anhydrous Milkfat, Milkfat, Anhydrous Butteroil and Butteroil are fatty products derived*	Yes	Process also applies to camel milk milkfat products.	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
			exclusively from milk and/or products obtained from milk by means of processes *which result in almost total removal of water and non- fat solids.* *Ghee is a product exclusively obtained from milk, cream or butter, by means of processes which result in almost total removal of water and non- fat solids, with an especially developed flavour and physical structure.*			
		Composition of milkfat products	Requirements for milkfat: Minimum 99.8% (m/m) in Anhydrous milkfat/Anhydrous butteroil. Minimum 99.6% (m/m) in Milkfat, Butter and Ghee	Yes	Composition milkfat targets are achievable in camel milkfat products	No gap
			Requirements for water: Minimum 0.1% (m/m) in Anhydrous milkfat/Anhydrous butteroil.	Yes	Composition water targets are achievable in camel milkfat products	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
Standard for butter	CXS 279-1971	Description of product	*Butter is a fatty product derived exclusively from milk and/or products obtained from milk, principally in the form of an emulsion of the type water-in-oil*	Yes	Camel milk butter can be produced by separating camel milk cream.	No gap
		Composition of butter	Requirement for Milkfat: Minimum 80% m/m	Yes	Camel milk butter can fit this requirement.	No gap
			Requirement for water content: Maximum 16% m/m	Yes	Camel milk butter can fit this requirement.	No gap
			Requirement for milk solids-not-fat content: Maximum 2% m/m	Yes	Camel milk butter can fit this requirement.	No gap
		Labelling of butter	Name - Section 7.1.: The name of the food shall be “Butter”. The name “butter” with a suitable qualification shall be used for butter with more than 95% fat	Yes	Camel milk butter can fit this requirement.	No gap
			Declaration of milkfat content - Section 7.2: *If the consumer would be misled by the omission, the milkfat content shall be declared in a manner found acceptable in*	Yes	Camel milk butter can fit this requirement.	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
			the country of sale to the final consumer, either (i) as a percentage by mass, or (ii) in grams per serving as quantified in the label provided that the number of servings is stated.			
General standard for the use of dairy terms	CXS 206-1999	Definition of milk	Section 2.1 takes into account the "*normal mammary secretion of milking animals obtained from one or more milkings either addition to it or extraction from it, intended for human consumption or for further processing*".	Yes	The definition applies to camels as they are milking animals.	No gap
		Use of dairy terms	Terms like milk, yoghurt, cheese	Yes	All the dairy terms are applicable as the term milk also include camel milk.	No gap
		Definition of milk product	*Section 2.2 —* "*product obtained by any processing of milk, which may contain food additives, and other ingredients functionally necessary for the processing*"	Yes	Since the definition of milk includes camels, the definition of milk products naturally follows.	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
		Use of the term "milk"	*Section 4.1.2 — "A word or words denoting the animal or, in the case of mixtures, all animals from which the milk has been derived shall be inserted immediately before or after the designation of the product. Such declarations are not required if the consumer would not be misled by their omission."*	Yes	The use applies to camels as they are milking animals.	No gap
		Use of dairy terms	Terms like "milk powder," "yoghurt," "cheese," etc., apply only to products derived exclusively from milk.	Yes	All the dairy terms are applicable as the term milk also include camel milk.	No gap
Code of hygienic practices for milk and milk products	CXC 57-2004	General principles	Overarching principles applying to the production, processing and handling of all milk and milk products	Yes	The following overarching principles apply to the production, processing and handling of all milk and milk products.	No gap
		Dispositions for milk from various species	Verification of pasteurization (1.2) (Annex II), Appendix B	Yes	Regarding the initial alkaline phosphatase concentration in milk, this section mentioned that the "pool" of alkaline phosphatase present in milk varies widely between different species and within	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
					species. Typically, raw cow's milk shows an activity much higher than goat's milk. As pasteurization results in a log reduction of the initial level, the post-pasteurization residual level will vary with the initial level in the raw milk. Consequently, different interpretation according to origin of the milk is necessary and, in some cases, the use of alkaline phosphatase testing to verify pasteurization may not be appropriate. The section also says that milk from different species of milking animals normally contains different levels of alkaline phosphatase. These differences should be taken into account when establishing criteria for phosphatase analysis and when establishing the effectiveness of alkaline phosphatase testing as a means to verify that pasteurization conditions have been properly applied. Therefore, this code of hygiene practices already acknowledges that testing alkaline phosphatase as verification of pasteurization might not be applicable from	

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
					milk for certain species. The code also suggests other methods could also be used to demonstrate that the appropriate heat treatment has been applied. Verification of pasteurisation should not be solely dependent on alkaline phosphatase analysis.	
General standard for the labelling of Pre-packaged foods	CXS 1-1985	General principles	Requirements of labelling	Yes	According to 3.1. "Pre-packaged food shall not be described or presented on any label or in any labelling in a manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect" – This regulatory provision clearly requires products sold as "camel milk" to be in fact authentically camel milk.	No gap
		The name of the food	The name shall indicate the true nature of the food and normally be specific and not generic	Yes	According to 4.1.1.1. "Where a name or names have been established for a food in a Codex standard, at least one of these names shall be used.", therefore dairy terms, according CXS 206-1999, apply to camel milk.	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
		List of ingredients	All ingredients must be listed in descending order by weight	Yes	According to 4.2.1.4., milk and products thereof are known to trigger food allergy and shall be always declared as allergenic foods using the specified name, in this case 'milk', in addition to or as part of the ingredient name when intentionally present in the food. This applies to camel milk and camel milk products.	No gap
		Country of origin	Shall be declared if its omission would mislead consumers	Yes	Fully applicable to camel milk and milk products	No gap
General standard for the labelling of non-retail containers of foods	CXS 346-2021	Identification of contents	Name of the food, lot identification	Yes	Applies fully to bulk camel milk shipments.	No gap
		Storage and handling instructions	Temperature, conditions indicated	Yes	Fully applicable to camel milk and milk products	No gap
		Documentation	Non-retail containers shall have documentation available	Yes	Fully applicable to camel milk and products. Critical for traceability, especially for export	No gap
General principles of food hygiene	CXC 1-1969	Objectives of food hygiene	Protect health, ensure safe food.	Yes	Fully applicable to camel milk and milk products	No gap
		Primary production	Hygienic practices at the farm level, including animal health, water quality, and milking hygiene.	Yes	Despite that camel farming systems may differ from other more animal milking systems, the general principles apply; primary production should be managed in a way that	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
					ensures that food is safe and suitable for its intended use	
		Processing	Hazard control during receiving, storage, manufacturing, and packaging.	Yes	Principles of food safety, critical control points, and hazard management apply equally.	No gap
		Control of operation	Monitoring and verification of hygiene and safety measures, including HACCP principles.	Yes	HACCP plans may need adaptation to camel milk properties but general control of operation is fully applicable.	No gap
		Product information and consumer awareness	Labels shall correctly inform consumers about the product and its storage.	Yes	Fully applicable to camel milk and milk products	No gap
		Transportation	Conditions shall protect milk from contamination and maintain required temperature.	Yes	Camel milk often transported in challenging climates but general principled apply.	No gap
General standard for food additives	CXS 192-1995	General principles on use of additives	Additives may only be used where technologically justified, safe, and not misleading to the consumer.	Yes	Fully applicable to camel milk and milk products	No gap
		Specific food categories	Category 01.0 -Dairy products and analogues, excluding products of food category 02.0	Yes	Same permitted additives apply to camel milk and milk products	No gap

Standard name	Reference	Provision/ requirement	Description of provision/ requirement	Already applicable to camel milk/camel milk products? (Yes/No /Partial)	Comments/Justification	Identified gap
			Category 02.0 – Fats and oil, and fat emulsions. This includes butter oil, anhydrous milkfat, ghee, butter, dairy fat spreads and blended spreads.	Yes	Same permitted additives apply to camel milk products	No gap
Principles and guidelines for the establishment and application of Microbiological criteria related to foods	CXG 21-1997	Definition of microbiological criterion	Microbiological criterion defines the acceptability of a food or a food lot based on the presence, absence, or number of microorganisms or their toxins/metabolites.	Yes	Fully applicable to camel milk and milk products.	No gap
General standard for contaminants and toxins in foods and feeds	CXS 193-1995	Maximum levels (MLs) for contaminants	MLs shall only be set for food in which the contaminant may be found in amounts that are significant for the total exposure of the consumer.	Yes	Fully applicable to camel milk and milk products. The MLs of Aflatoxin M1 and lead provided for milk apply for the whole commodity (milk, secondary milk products).	No gap
Codex maximum residue limits for pesticides and extraneous maximum residue limits	https://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/commodities/it/	Maximum Residue Limits		Yes	MRL applicable by commodities, category camel milk if needed (empty for now as are subsections for most other species).	No gap

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