SLUTRAPPORT/FINAL REPORT
NR. 2026-219

Ulla Kidmose:

Sund aldring: Ældres opfattelse af mejeriprodukter

Healthy Ageing: Elderly's perception of dairy products



Mejeribrugets
ForskningsFond

November 2026

Final report

for collaborative projects funded via the Danish Dairy Research Foundation (DDRF)

1. Title of the project

Danish: Sund aldring: Ældres opfattelse af mejeriprodukter

English: Healthy Ageing: Elderly's perception of dairy products

2. Project manager

Associate Professor Ulla Kidmose, ulla.kidmose@food.au.dk; +4520865197; Aarhus University, Department of Food Science, (AU-FOOD), Agro Food Park 48, 8200 Aarhus, Denmark.

3. Other project staff

Research Assistant: Marloes Dorien Schimmel, Aarhus University, Department of Food Science, (AU-FOOD), Agro Food Park 48, 8200 Aarhus, Denmark.

Senior Manager Sensory and Consumer Science Lisbet Bjerre Knudsen, Arla Foods, Agro Food Park 19, 8200 Aarhus, Denmark.

Sensory Scientist Anne Sjørup Bertelsen, Arla Foods, Agro Food Park 19, 8200 Aarhus, Denmark.

Senior Consumer Scientist Nikoline Hyldelund, Arla Foods, Agro Food Park 19, 8200 Aarhus, Denmark.

4. Sources of funding

DDRF: 335.700 DKK

AU-FOOD: 251.700 DKK

Arla Foods: 84.000 DKK

5. Project period

Project period with DDRF funding: February 2024 – September 2024

Revised, if necessary: September 2024 – July 2025

6. Project summary

Danish:

Projektets overordnede formål er at undersøge, hvordan sensoriske egenskaber, herunder mundfølelse og tekstur, samt kognitive barrierer og holdninger blandt raske danske ældre i alderen 65-75 år påvirker accepten og forbruget af proteinrige mejeriprodukter. Til undersøgelsen blev fire forskellige fermenterede mejeriprodukter med varierende proteinindhold udvalgt: yoghurt, ymer, en blanding bestående af 50 % ymer og 50 % skyr samt skyr. De fire produkters sensoriske profiler blev karakteriseret af et trænet sensorisk panel, mens den overordnede liking, tekstur-liking samt vurderinger af passende cremethed, tykkelse, mundudtørrende fornemmelse og synkebesvær blev evalueret af 57 deltagere over 65 år. Derudover besvarede deltagerne et spørgeskema om deres subjektive og objektive viden om proteiners betydning for muskulatur og velbefindende samt om deres proteinindtag.

Resultaterne viste, at de fire undersøgte mejeriprodukter havde forskellige teksturprofiler, som påvirkede de ældre deltageres oplevelse af tekstur og mundfølelse. Skyr opnåede lavere score for tekstur-liking sammenlignet med blandingen af skyr og ymer. Resultaterne fra Just-About-Right (JAR)-analysen viste, at hovedparten af deltagerne vurderede skyr som for cremet, for tyk, for mundudtørrende og for vanskelig at synke, mens blandingen af skyr og ymer i højere grad blev vurderet til at have passende niveauer for disse egenskaber. Resultaterne indikerer således, at flere teksturrelaterede egenskaber udgør væsentlige barrierer for ældres indtag af fermenterede mejeriprodukter med et højt proteinindhold.

Spørgeskemaundersøgelsen viste desuden, at deltagernes proteinindtag generelt var lavere end det anbefalede niveau for denne aldersgruppe. På trods af det lave proteinindtag angav deltagerne et begrænset oplevet behov for kostmæssige ændringer. Der blev ikke fundet sammenhænge mellem proteinindtag og deltagernes subjektive eller objektive viden om ernæring/protein eller deres følelsesmæssige oplevelser i forbindelse med indkøb af fødevarer. Derimod rapporterede deltagere med et højt proteinindtag signifikant højere grad af velbefindende og livstilfredshed sammenlignet med deltagere med et lavt proteinindtag. Disse resultater tyder på, at emotionelt og psykologisk velbefindende i højere grad er associeret med det samlede proteinindtag end med individuel ernæringsviden.

Den viden og indsigt, der er opnået gennem projektet, kan formidles til både raske ældre danskere og relevante myndigheder med henblik på at øge bevidstheden om betydningen af et tilstrækkeligt proteinindtag for opretholdelse af sundhed og livskvalitet samt fremhæve visse fermenterede mejeriprodukters rolle som værdifulde proteinkilder. Desuden kan mejerivirksomheder anvende denne viden til at udvikle og optimere højproteinholdige mejeriprodukter målrettet ældre forbrugere. Særligt kan fokus på forbedrede teksturegenskaber bidrage til, at produkterne i højere grad imødekommer ældres sensoriske præferencer og dermed øger deres accept og anvendelse blandt raske ældre.

English:

The overall aim is to investigate how sensory attributes, including mouthfeel and texture, as well as cognitive barriers and attitudes among healthy Danish older adults aged 65-75 years, influence the acceptance and consumption of protein-rich dairy products. The following four different fermented dairy products with various protein content have been selected for the study: Yoghurt (4.3 g protein/100 g), Ymer (Danish concentrated fermented milk) (5.6 g protein/100 g), a 50:50 mix of ymer og skyr (7.8 g protein/100 g), and skyr (10.0 g/100 g). The sensory profile of the four dairy products was assessed using a trained, sensory panel and the overall liking, texture liking and just about right creaminess, thickness, water drying sensation and

difficulty to swallow of the four products were evaluated by 57 participants aged > 65 years. Moreover, the participants conducted a survey with questions about subjective and objective knowledge about protein and the effect on their muscles and well-being as well as data on their actual protein intake.

The results showed that the four tested dairy products have different textural profiles that affect the perception of texture and mouth feeling among the older participants. Skyr had a lower texture liking compared to the mix of skyr and ymer. The Just about Right (JAR) data revealed that most of the participants found skyr too creamy, too thick, too mouth drying and too difficult to swallow in contrast to the 50:50 mix which had just about right properties for these attributes. Hence, several texture attributes are important barriers for consumption of high-protein dairy products among the older participants. The survey showed that the participants had a lower protein intake than required for this group of consumers. Despite the low protein intake, they all reported a low perceived need for dietary improvement, and differences in protein intake between the participants did not influence their subjective or objective nutrition knowledge, nor the emotional experience during grocery shopping. In contrast, participants with high protein intake showed significantly greater well-being and life satisfaction compared to the participants with low protein consumption. These findings suggest that emotional and psychological well-being may be more strongly associated with total dietary protein intake than subjective and objective knowledge.

The knowledge and understanding obtained in the project can be disseminated to healthy older Danish adults as well as to the authorities to increase awareness of the importance of adequate protein intake for maintaining health and well-being, and to highlight the role of certain fermented dairy products as valuable sources of dietary protein. Furthermore, dairy manufacturers can utilize these insights to design and develop high-protein dairy products targeted at older consumers, with improved textural properties that better meet their sensory preferences and thereby enhance product acceptance among healthy older adults.

7. Project aim

Danish:

Det overordnede formål er at opnå indsigt i, hvordan sensoriske egenskaber, så som mundfølelse og tekstur, kognitive barrierer og holdninger blandt danske sunde ældre i alderen 65-75 år påvirker deres accept og indtag af proteinholdige mejeriprodukter samt hvordan det er relateret til deres præference for tekstur og deres opfattelse af vigtigheden af proteiner som en del af deres kost.

English:

The overall aim is to investigate how sensory attributes, including mouthfeel and texture, as well as cognitive barriers and attitudes among healthy Danish older adults aged 65-75 years, influence the acceptance and consumption of protein-rich dairy products. Furthermore, the study seeks to examine how these factors are associated with texture preferences and perceptions of the importance of protein in the diet.

8. Background for the project

In the process of ageing, muscles play a significant role, as progressive changes occur naturally in the composition of muscles: muscle fibers become smaller, and the specific muscle fibers responsible for strength (type II) decrease proportionally, leading to a loss of muscle mass, quality, and strength. This condition is

known as sarcopenia and represents a major health concern among the elderly (Evans & Lexell, 1995; Keller & Engelhardt, 2013; Larsson et al., 2019). Most studies assume a relatively stable lean muscle mass until the age of 40 and slow but continuous loss in lean mass thereafter, which is accelerated by age 70 years (Mitchell et al., 2012; Nilwik et al., 2013; Tieland et al., 2018). The muscles have different major functions, as they play a crucial role in the uptake and processing of glucose after a meal, accounting for 70-80% of this process. Consequently, reduced muscle mass lowers total energy expenditure, increasing fat accumulation, even with a consistent dietary pattern. As a result, loss of muscle mass and increased fat accumulation are elevated risks of various medical conditions, including obesity, hyperlipidemia, hypertension, cardiovascular diseases, type 2 diabetes, and osteoporosis (Bauer et al., 2013). Additionally, since muscles are essential for performing daily activities, and maintaining functional capacity and mobility, muscle loss can lead to a higher risk of falls, fractures, loss of independence, and reduced quality of life and well-being (Liao et al., 2017).

Dairy products are known to be good sources of proteins, calcium, and vitamin D for muscle and bone health and maintenance. Dairy products contain high-quality, milk-derived proteins, containing essential amino acids and high leucine levels, which are the most important amino acids to optimally stimulate muscle synthesis, lean mass, and muscle strength. In addition, the bioavailability of dairy proteins is high, meaning that a high proportion of the protein is absorbed from the food and incorporated into proteins in the body and therefore maintains muscle mass (Devries & Phillips, 2015; Phillips & Martinson, 2019).

Numerous clinical studies have been conducted to establish the mechanisms of ageing and muscle maintenance, the relationship between daily protein intake (e.g., source, time, distribution) pattern, and other clinically relevant endpoints and interventions for sarcopenia (Bauer et al., 2013; Burd et al., 2013; Evans & Lexell, 1995; Keller & Engelhardt, 2013; Larsson et al., 2019; Liao et al., 2017; Mitchell et al., 2012; Nilwik et al., 2013; Phillips & Martinson, 2019; Tieland et al., 2018). However, little attention has been paid to how to promote, achieve, and sustain healthy food choices among vulnerable, high-risk seniors.

Flavor, taste, and texture are some of the sensory cues that are very important for our food choices, including the elderly's food choices. Oral processing behavior seems to be an important determinant of texture perception and preferences (Sarkar et al., 2021). Human oral processing of food in the mouth is a complex process, involving various oral operations, including first bite, chewing, transportation, bolus formation, and swallowing (Sukkar et al., 2018). The steps involved in the oral processing of food are influenced by many different food- and human-related factors, including the nature and composition of the food, as well as the rheological, textural, and mouth-feeling properties of the food. The human related factors comprise chewing frequency, muscle activity, bolus breakdown, saliva incorporation and saliva composition (Drago et al., 2011; Szczesniak, 2002). Moreover, individual oral processing might be related to their texture preference (Jeltema et al., 2016). The ageing population experiences a decline in muscle mass, oral function, and coordination, that potentially will influence their oral processing behavior. An alteration of the oral processing among the older population also contributes to increased difficulty in the eating process and earlier reported satiation and satiety (Benelam, 2009; Sarkar, 2019). Hence, alteration of the oral processing behavior among the older population compared to the young ones, might ultimately affect their texture liking and mouth-feeling perception of the food and result in low intake of high-protein food. To our knowledge, the effect of oral processing behavior of dairy products among healthy elderly on their texture liking and perception of mouth feeling has not been investigated and might be different compared to young subjects since their oral processing has changed significantly during their lifetime. If optimal texture liking and mouth feeling sensation of palatable high-protein dairy products can be identified for the healthy older

population, this can be used to promote consumption of high-protein dairy products that will positively impact the sensory pleasure associated with eating among the elderly. Hence, this strategy has the potential for combatting sarcopenia among the healthy older population in the future.

Investigating the cognitive aspect of low protein consumption among elderly could be another strategy to increase the protein intake among the healthy older population. There is a lack of studies about healthy elderly's considerations, comprehensions, and beliefs about their own protein intake and how it will impact their health and well-being. Many healthy elderly might be convinced that their protein intake is adequate or that they find many high-protein products that are not very palatable or too satiating why they have a low intake of such products.

Understanding and revealing elderly's texture preference, optimal mouth feeling sensation of high protein dairy products as well as their cognitive barriers for such products can contribute to increasing the protein intake among the healthy elderly population resulting in healthy ageing. Moreover, this fundamental knowledge can help the dairy industry to design, develop or reformulate high protein dairy products with tailored texture targeting healthy elderly.

References

Bauer, J., Biolo, G., Cederholm, T., Cesari, M., Cruz-Jentoft, A. J., Morley, J. E., Phillips, S., Sieber, C., Stehle, P., & Teta, D. (2013). Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group. Journal of the American Medical Directors Association, 14(8), 542-559.

Benelam, B. (2009). Satiation, satiety and their effects on eating behaviour. Nutrition Bulletin, 34(2), 126-173.

Burd, N. A., Gorissen, S. H., & Van Loon, L. J. (2013). Anabolic resistance of muscle protein synthesis with aging. Exercise and Sport Sciences Reviews, 41(3), 169-173.

Devries, M. C., & Phillips, S. M. (2015). Supplemental protein in support of muscle mass and health: advantage whey. Journal of Food Science, 80(S1), A8-A15.

Drago, S. R., Panouillé, M., Saint-Eve, A., Neyraud, E., Feron, G., & Souchon, I. (2011). Relationships between saliva and food bolus properties from model dairy products. Food Hydrocolloids, 25(4), 659-667.

Evans, W. J., & Lexell, J. (1995). Human aging, muscle mass, and fiber type composition. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 50 (Special_Issue), 11-16.

Jeltema, M., Beckley, J., & Vahalik, J. (2016). Food texture assessment and preference based on mouth behavior. Food Quality and Preference, 52, 160-171.

Keller, K., & Engelhardt, M. (2013). Strength and muscle mass loss with aging process. Age and strength loss. Muscles, Ligaments and Tendons Journal, 3(4), 346.

Larsson, L., Degens, H., Li, M., Salviati, L., Lee, Y. I., Thompson, W., Kirkland, J. L., & Sandri, M. (2019). Sarcopenia: aging-related loss of muscle mass and function. Physiological Reviews, 99(1), 427-511.

Liao, C.-D., Tsauo, J.-Y., Wu, Y.-T., Cheng, C.-P., Chen, H.-C., Huang, Y.-C., Chen, H.-C., & Liou, T.-H. (2017). Effects of protein supplementation combined with resistance exercise on body composition and physical function in older adults: a systematic review and meta-analysis. The American Journal of Clinical Nutrition, 106(4), 1078-1091.

Mitchell, W. K., Williams, J., Atherton, P., Larvin, M., Lund, J., & Narici, M. (2012). Sarcopenia, dynapenia, and the impact of advancing age on human skeletal muscle size and strength; a quantitative review. Frontiers in Physiology, 3, 260.

Nilwik, R., Snijders, T., Leenders, M., Groen, B. B., van Kranenburg, J., Verdijk, L. B., & van Loon, L. J. (2013). The decline in skeletal muscle mass with aging is mainly attributed to a reduction in type II muscle fiber size. Experimental Gerontology, 48(5), 492-498.

Phillips, S. M., & Martinson, W. (2019). Nutrient-rich, high-quality, protein-containing dairy foods in combination with exercise in aging persons to mitigate sarcopenia. Nutrition Reviews, 77(4), 216-229.

Sarkar, A. (2019). Oral processing in elderly: Understanding eating capability to drive future food texture modifications. Proceedings of the Nutrition Society, 78(3), 329-339.

Sarkar, A., Soltanahmadi, S., Chen, J., & Stokes, J. R. (2021). Oral tribology: Providing insight into oral processing of food colloids. Food Hydrocolloids, 117, 106635.

Sukkar, S. G., Maggi, N., Travalca Cupillo, B., & Ruggiero, C. (2018). Optimizing texture modified foods for oro-pharyngeal dysphagia: a difficult but possible target? Frontiers in Nutrition, 5, 68.

Szczesniak, A. S. (2002). Texture is a sensory property. Food Quality and Preference, 13(4), 215-225.

Tieland, M., Trouwborst, I., & Clark, B. C. (2018). Skeletal muscle performance and ageing. Journal of Cachexia, Sarcopenia and Muscle, 9(1), 3-19.

9. Sub-activities in the entire project period

The Healthy Ageing project comprises three main tasks:

- *Task 1: Sensory profile of protein dairy products* (month 1-3).

- *Task 2. Consumer acceptance and perception of protein dairy products* (month 4-8).

- *Task 3. Cognitive barriers and belief for high protein dairy products* (month 4-8).

The timeline for the three tasks is shown in Table 1.

Table 1. Updated Gantt chart for the Healthy Ageing project

Tasks / Quarter	Q3 2024	Q1 2025	Q2 2025
Task 1: Sensory profile of protein dairy products		M1*	
Task 2. Consumer acceptance and perception of protein dairy products		M2	
Task 3. Cognitive barriers and belief for high protein dairy products		M3	
Dissemination	D1, D2	D5	D3, D6

*The milestones and deliverables that have been completed

Original Milestones (M):

M1 (linked to T1). The most important descriptors for mouth-feeling and texture for dairy products have been identified objectively. Month 3.

M2 (linked to T2). An acceptance test of high protein dairy products and how it relates to healthy elderly's texture preferences and optimal mouth-feeling sensations has been conducted. Month 7.

M3 (linked to T3). Elderly's comprehension and belief about protein intake and the effect on their health and well-being have been explored. Month 7.

Original Deliverables (D):

D1. A report about mouth-feeling and texture descriptors for dairy products.

D2. An ethical application about the acceptance test and focus group interview.

D3. Protocol for semi-structured focus group interview.

D4. A popular paper/interview for AU newsletter, a magazine targeting elderly or a newspaper.

D5. A report on the findings for Arla Foods.

D6. A draft of a scientific paper for a peer-reviewed journal.

10. Deviations

There have been no financial deviations during the project period.

There have been a few scientific deviations related to the original deliverables and timetable. D3. Protocol for semi-structured focus groups interview was done in Q2 2025 instead of Q1 2025. There has been no interview for AU newsletter or a popular paper (D4). However, the popular paper for Mælkeritidende will replace the popular paper/interview.

11. Project results

As mentioned in section 9, there were three tasks in the Healthy Ageing project. The results achieved in the different tasks are described below.

Task 1. Sensory profile of protein dairy products (month 1-3).

The aim for task 1 was to create an in-depth sensory profile of the texture and mouthfeel attributes of different fermented dairy samples. Task 1 was conducted in January 2025 at iSense lab, Department of Food Science, Aarhus University. A screened and trained panel of eight assessors evaluated four different samples of dairy products with various protein content using a General Descriptive Analysis (GDA). The four dairy samples were yoghurt, ymer, a 50:50 mix of ymer and skyr, and finally skyr. The intensity of different appearance-, texture- and mouthfeel attributes were evaluated on a 15-cm line scale from 0 = very low intensity to 15 = very high intensity. Hence, differences in the sensory profile between the four tested products can be measured objectively and be related to the protein content and elderly's liking for the products.

The results from the descriptive analysis are shown in Table 2. Skyr and a mix of skyr and ymer had a higher intensity of astringency and thickness compared to yoghurt and ymer. Skyr was the most stable product

compared to the three others and was more mouth drying and chalky compared to ymer and yoghurt. In contrast, yoghurt had the lowest intensity of fattiness and was the most fast-dissolving compared to the other three products and has a lower fatty mouthcoating compared to ymer.

Table 2. Mean scores showing significant effects of the attribute intensities. Samples include commercially available natural products in Denmark, stepwise increased in protein content and different in fat content (presented in g/100 gram): yoghurt, ymer, mixed sample (50% ymer + 50% skyr), and skyr. The case letters denote significant differences in mean scores for the attributes.

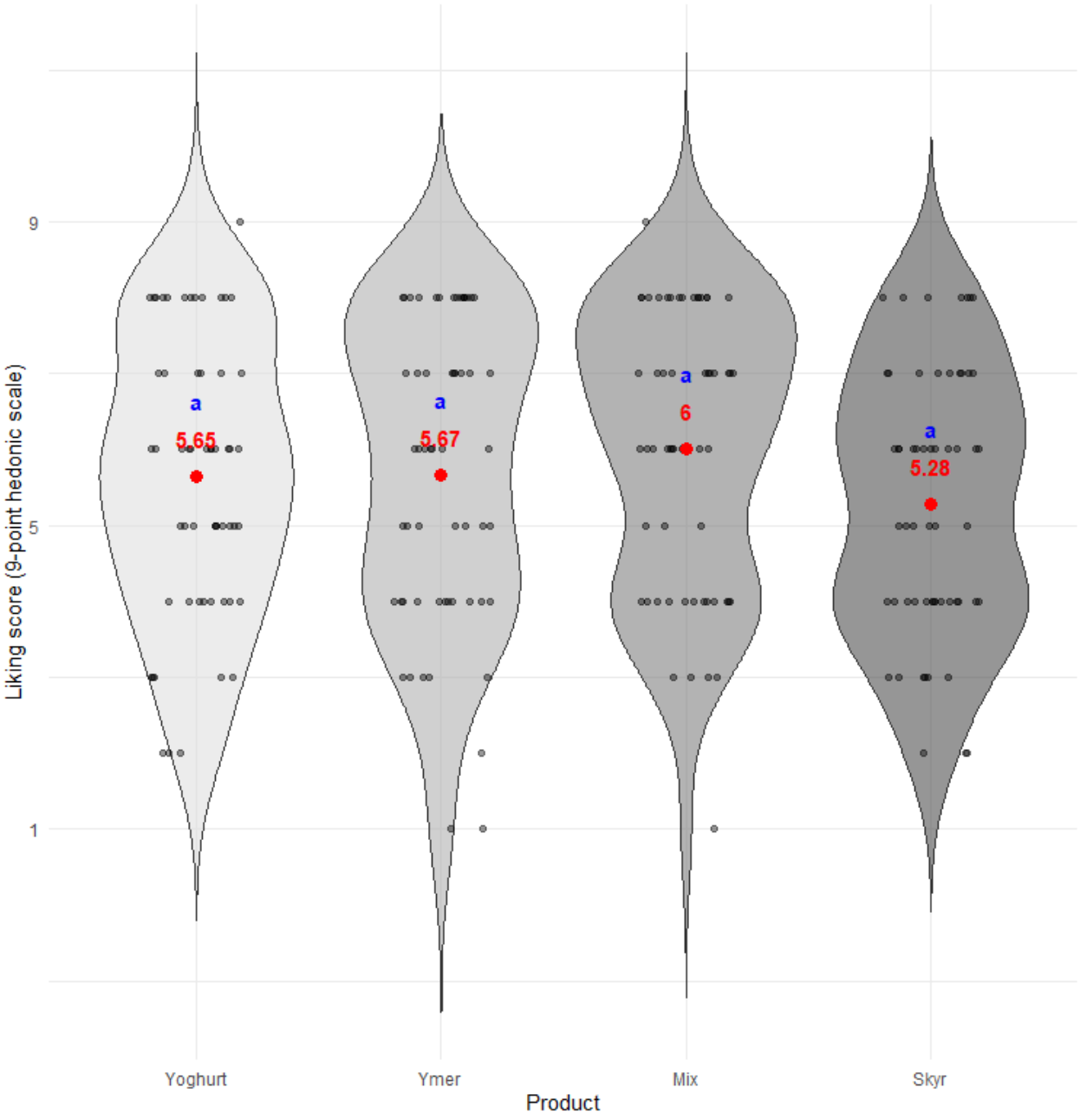
	p-value	**Yoghurt** Protein: 4.3 Fat: 1.5	**Ymer** Protein: 5.6 Fat: 3.5	**Mixed** Protein: 7.8 Fat: 1.9	**Skyr** Protein: 10.0 Fat: 0.2
Appearance					
Stability	$p < 0.001$	0.7 ± 0.9^{c}	7.5 ± 3.2^{b}	8.0 ± 3.6^{b}	12.5 ± 3.2^{a}
Texture					
Astringency	$p < 0.001$	4.0 ± 4.5^{b}	6.0 ± 3.2^{b}	10.1 ± 3.6^{a}	10.1 ± 4.4^{a}
Thickness	$p < 0.001$	0.6 ± 0.8^{d}	5.2 ± 3.0^{c}	8.0 ± 2.3^{b}	13.1 ± 1.6^{a}
Fattiness	$p < 0.001$	1.1 ± 1.2^{b}	6.5 ± 3.7^{a}	6.4 ± 2.8^{a}	8.9 ± 4.0^{a}
Fast dissolving	$p < 0.001$	14.3 ± 1.1^{a}	11.0 ± 2.3^{b}	8.9 ± 2.7^{b}	3.6 ± 3.1^{c}
Mouth feel					
Mouth-drying	$p < 0.001$	4.5 ± 4.2^{b}	5.4 ± 4.3^{b}	8.4 ± 3.9^{ab}	9.8 ± 3.7^{a}
Fatty mouthcoating	$p < 0.05$	2.6 ± 3.6^{b}	6.5 ± 3.9^{a}	5.1 ± 3.5^{ab}	5.9 ± 4.1^{ab}
Chalkiness	$p < 0.001$	4.2 ± 3.2^{b}	4.3 ± 3.1^{b}	6.6 ± 4.2^{ab}	9.0 ± 4.1^{a}

The rheology and tribology of the four samples were measured at Arla Foods. The sensory attribute thickness was related to the rheological and tribological measurements (data not shown).

Task 2. Consumer acceptance and perception of protein dairy products (month 4-8).

The aim of task 2 was to investigate how healthy elderly's texture preferences and optimal mouth-feeling sensations affect the acceptance of high protein dairy products. This task was carried out in autumn 2024. In total, 57 healthy older consumers between 65-74 participated in a consumer study, where they evaluated their liking of the same four samples that were used in the descriptive analysis. They evaluated texture and mouthfeel attributes using a 5 point Just-About-Right (JAR) scale as well as their overall- and texture liking on a 9-point hedonic scale (1 = dislike extremely, 9 = like extremely).

The study showed that there were no significant differences in overall liking between the four dairy products (Figure 1). However, the mix and skyr samples differed significantly in texture liking. The JAR data showed that approx. 50% of the participants found skyr too creamy and too difficult to swallow, almost 60 % found skyr too mouth drying and 70 % evaluated it as too thick in contrast to the mix, where the majority of the participants found it just about right regarding creaminess, swallowing and thickness (data not shown). The JAR data seems to reflect the sensory profile of skyr and mix, respectively.



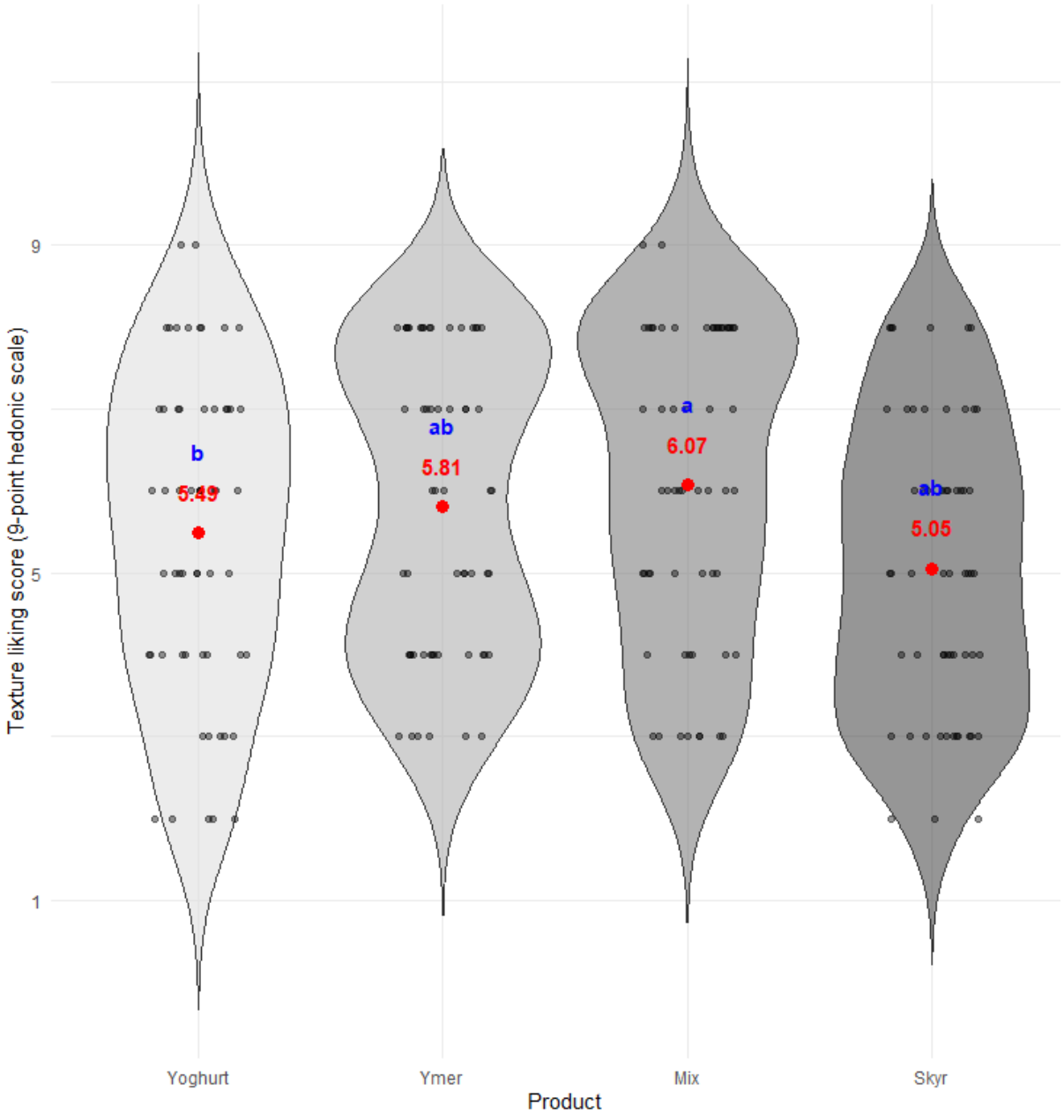


Figure 1. Over-all and texture liking of yoghurt, ymer, 50:50 mix of ymer and skyr, skyr (n=57).

Task 3. Cognitive barriers and belief for high protein dairy products (month 4-8)

The aim of task 3 was to investigate exploratory how cognitive barriers and belief among healthy elderly affect their intake of high protein dairy products and the importance of protein for their health and well-being. This study was conducted as a survey with healthy Danish older adults (n = 57; aged 65-74) and supported by focus group interviews. The results showed that the median estimated protein intake of the participants was 0.75 g/kg adjusted body weight/day, well below the recommended 1.0-1.2 g/kg/day for this

age group. Participants were categorized into lower (<0.8 g/kg/day protein) and higher (≥0.8 g/kg/day protein) protein intake groups. Despite the generally low protein intake, all participants reported a low perceived need for dietary improvement. There were no significant differences between the low and high protein groups in either subjective or objective nutrition knowledge, nor emotional experience during grocery shopping. In contrast, participants in the higher protein intake group showed significantly greater well-being, including greater life satisfaction ($p = 0.035$). These findings suggest that emotional and psychological well-being may be more strongly associated with total dietary protein intake than subjective and objective knowledge. Although participants demonstrated some awareness that certain fermented dairy products are high in protein, these products remained underutilized, contributing only modestly to overall intake.

In summary, the tested dairy products, yoghurt, ymer, a 50:50 mix of ymer and skyr and skyr have different textural profiles that affect the perception of texture and mouth feeling among the older participants. Skyr had a lower texture liking compared to the mix of skyr and ymer. The Just about Right (JAR) data revealed that the majority of the participants found skyr too creamy, too thick, too mouth drying and too difficult to swallow in contrast to the mix which had just about right properties for these attributes. Hence, several texture attributes are important barriers for consumption of dairy products among the older participants. In general, the participants had a lower protein intake than required for this group of consumers. Despite the low protein intake, they all reported a low perceived need for dietary improvement, and differences in protein intake between the participants did not influence their subjective or objective nutrition knowledge, nor emotional experience during grocery shopping. In contrast, participants with high protein intake showed significantly greater well-being and life satisfaction compared to the participants with low protein consumption. These findings suggest that emotional and psychological well-being may be more strongly associated with total dietary protein intake than subjective and objective knowledge. Thise results have been published by Schimmel et al. (2026) – see publication below.

12. The relevance of the results, including relevance for the dairy industry

The project has generated well-documented, novel scientific knowledge regarding the acceptance, attitudes towards, and consumption of protein-rich fermented dairy products among healthy older Danish adults, as well as the factors influencing their intake of such high-protein products. Consequently, valuable new insights have been obtained into older adults' perceptions, attitudes, knowledge, and consumption patterns related to high-protein fermented dairy products.

This knowledge and understanding can be disseminated to healthy older Danish adults as well as to the authorities to increase awareness of the importance of adequate protein intake for maintaining health and well-being, and to highlight the role of certain fermented dairy products as valuable sources of dietary protein. Furthermore, dairy manufacturers can utilize these insights to design and develop high-protein dairy products targeted at older consumers, with improved textural properties that better meet their sensory preferences and thereby enhance product acceptance among healthy, older adults.

13. Communication and knowledge sharing about the project

Papers in international journals:

Schimmel, M., Junge, J. Y., Hansen, E. B., Hyldelund, N. B. & Kidmose, U. (2026). Protein Intake and Well-Being in Healthy Danish Older Adults: The Limited Role of Nutrition, Perception, and Knowledge. Food Quality and Preference. 142, 105923. 10.1016/j.foodqual.2026.105923

Schimmel, M., Junge, J.Y., Hansen, E.B., Hyldelund, N.B. and Kidmose, U. Sensory and Expectation Based Determinants of Liking for Protein Varied Dairy Products among Healthy Older Adults. Draft. Will be submitted to Appetite in 2027.

Oral presentations at scientific conferences, symposiums etc.:
Kidmose, U., Schimmel, M., Sommer, C.N., Junge, J.Y. (2026). Does protein content affect the textural properties of fermented dairy products and texture perception in older adults? Poster at Eurosense Symposium, Oslo, Norway, 7-10 September 2026.

Oral presentations at meetings:

Ulla Kidmose. Raske ældres præferencer for fermenterede mejeriprodukter. Oral presentation at Mejeribrugets dag, Herning, Denmark, 11 March 2026.

Marloes Schimmel. Healthy Ageing – Elderly's perception of dairy products. Oral presentation at DDRF meeting, Skejby, Denmark, 30 October 2025.

Marloes Schimmel. Catch-up presentation. Oral presentation at internal meeting between Arla Foods and AU-FOOD, 24 January 2025.

14. Contribution to master and PhD education

As described in section 15, this project was a pre-study and based on the output, we have received granting for a joint PhD student between AU-FOOD and Arla Foods.

15. New contacts/projects

This present study was a pre-study that has formed the basis for the PhD application 'Healthy ageing: Acceptance of high-protein dairy products and behavior among healthy older adults – the influence of sensory cues, packaging, and individual background´, which has been funded by Arla Foods and Købmand Ferdinand Sallings Mindefond, respectively. The PhD study started November 2025. A master project has been affiliated to the PhD project from September 2025-June 2026.