Schweizerische Eidgenossenschaft
Confédération suisse
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Federal Department of Economic Affairs,
Education and Research EAER

Agroscope

Fermentation against *Bacillus cereus* in Plant-Based Foods

World Food Safety Day:
Innovation CATALYSEs Food Safety, Bridging Science & Practice
08.06.2026

Verena Looser

Case study – Melting plant-based alternative made from fermented sunflower oilseed cake

Innovation project supported by

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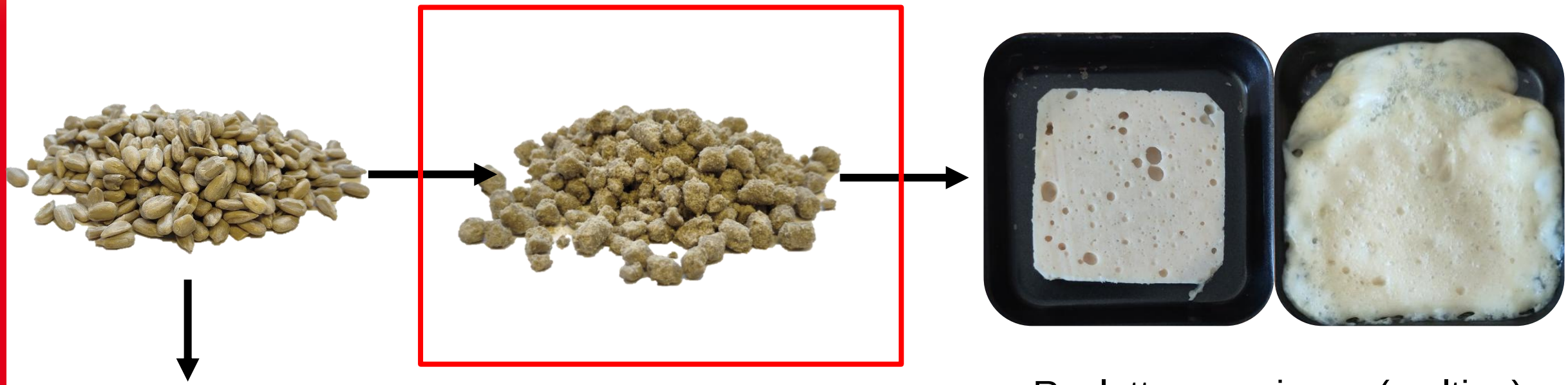


sunflower seed oil

Raclette experience (melting)
unique flavour (not an imitation)

Verena.Looser@agroscope.admin.ch

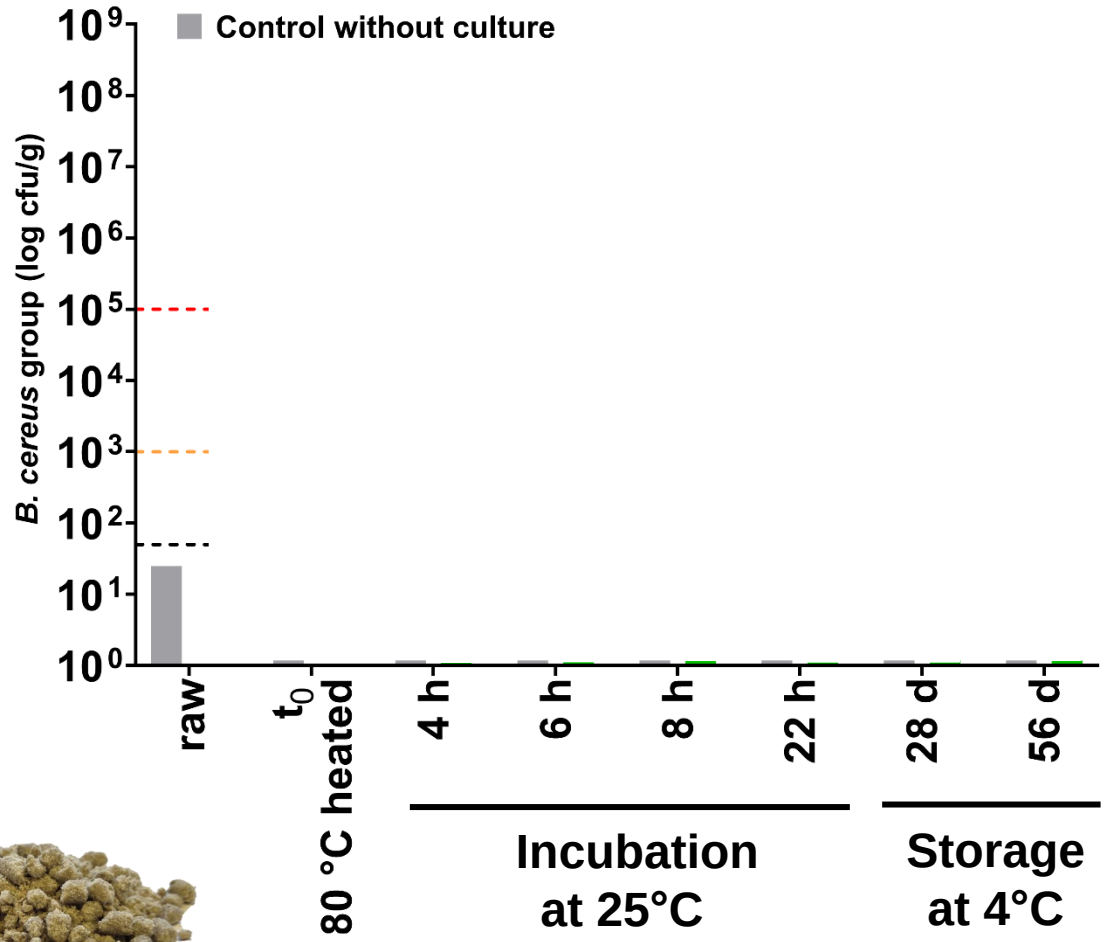
Image source: Agroscope

Bacillus cereus group

- **Spore-forming** bacteria
- > 10^5 CFU/g *B. cereus* potentially produce heat-resistant toxins in food or in the small intestine in quantities that cause symptoms of illness
- < 1000 CFU/g considered safe
- Soil, the primary reservoir of *Bacillus spp*., makes plant ingredients prone to such contamination

Source: Kyrylenko et al., 2023, Int J Food Microbiol.; Aktualisierte Stellungnahme Nr. 048/2020 des BfR vom 30. Oktober 2020

Bacillus cereus contamination in raw press cake was below the quantification limit



40% press cake in water

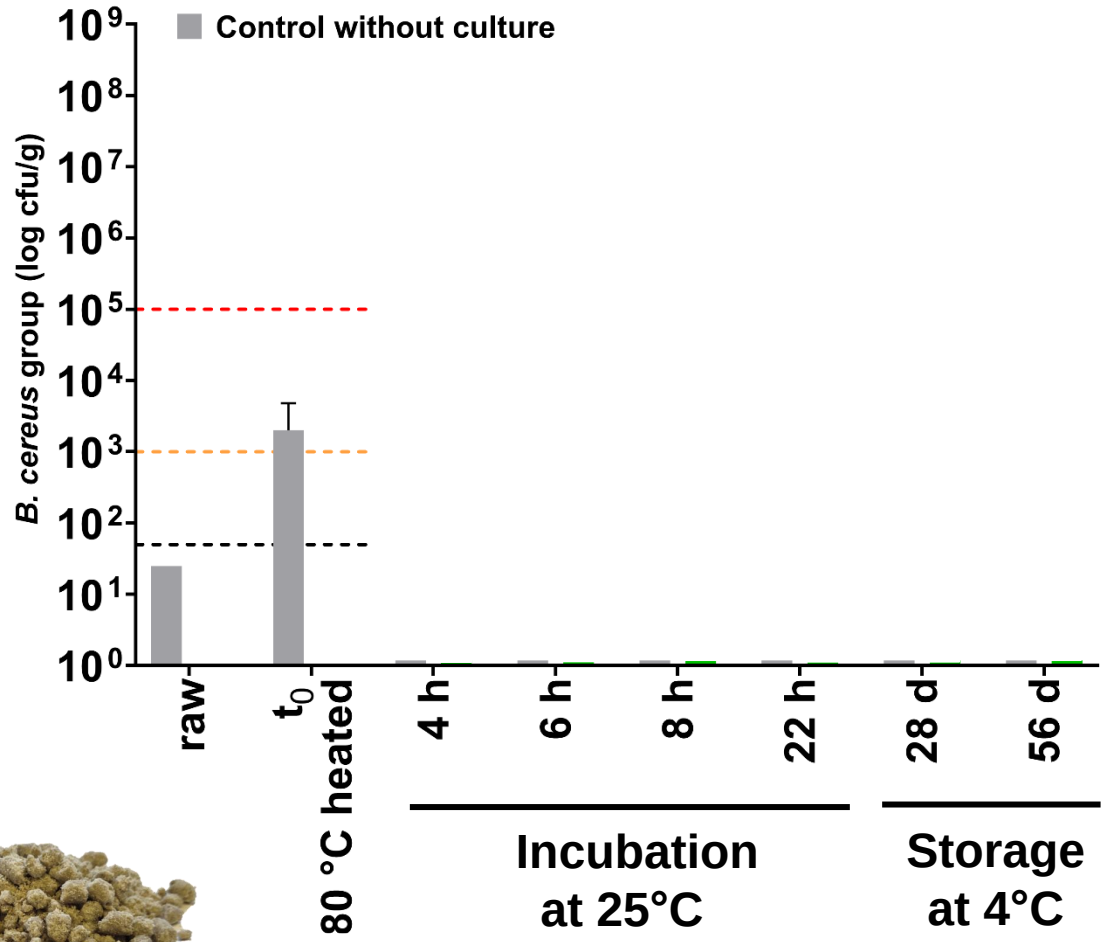
Toxin formation > 10^5 CFU/g

Considered safe < 1000 CFU/g

Quantification limit 50 CFU/g
(<50 = 25)

Source: Agroscope; Looser et al., 2026, Future Foods

Increased *B. cereus* after heat treatment



40% press cake in water

80 ± 3°C, 3min

Toxin formation > 10^5 CFU/g

Considered safe < 1000 CFU/g

Quantification limit 50 CFU/g
(<50 = 25)

Source: Agroscope; Looser et al., 2026, Future Foods

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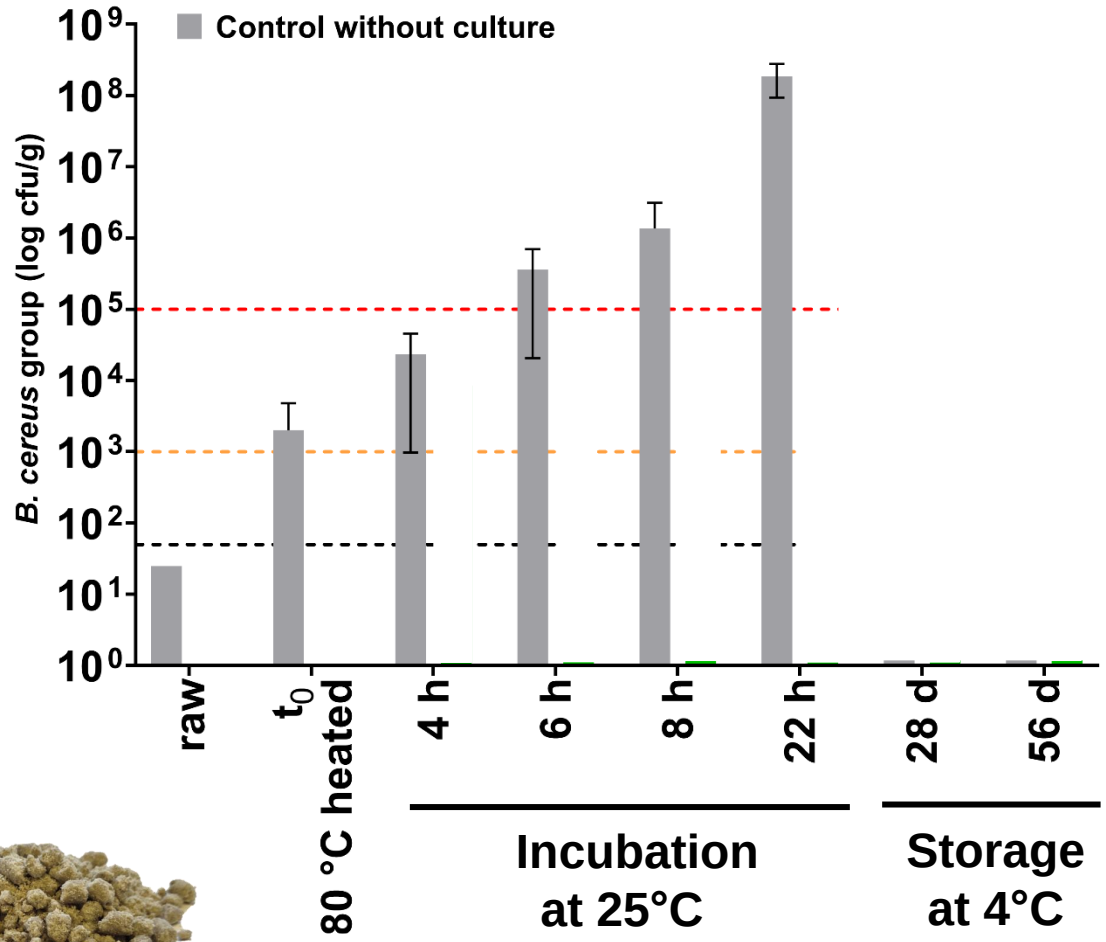
Potential toxin forming counts > 10^5 CFU/g after 6h at 25°C



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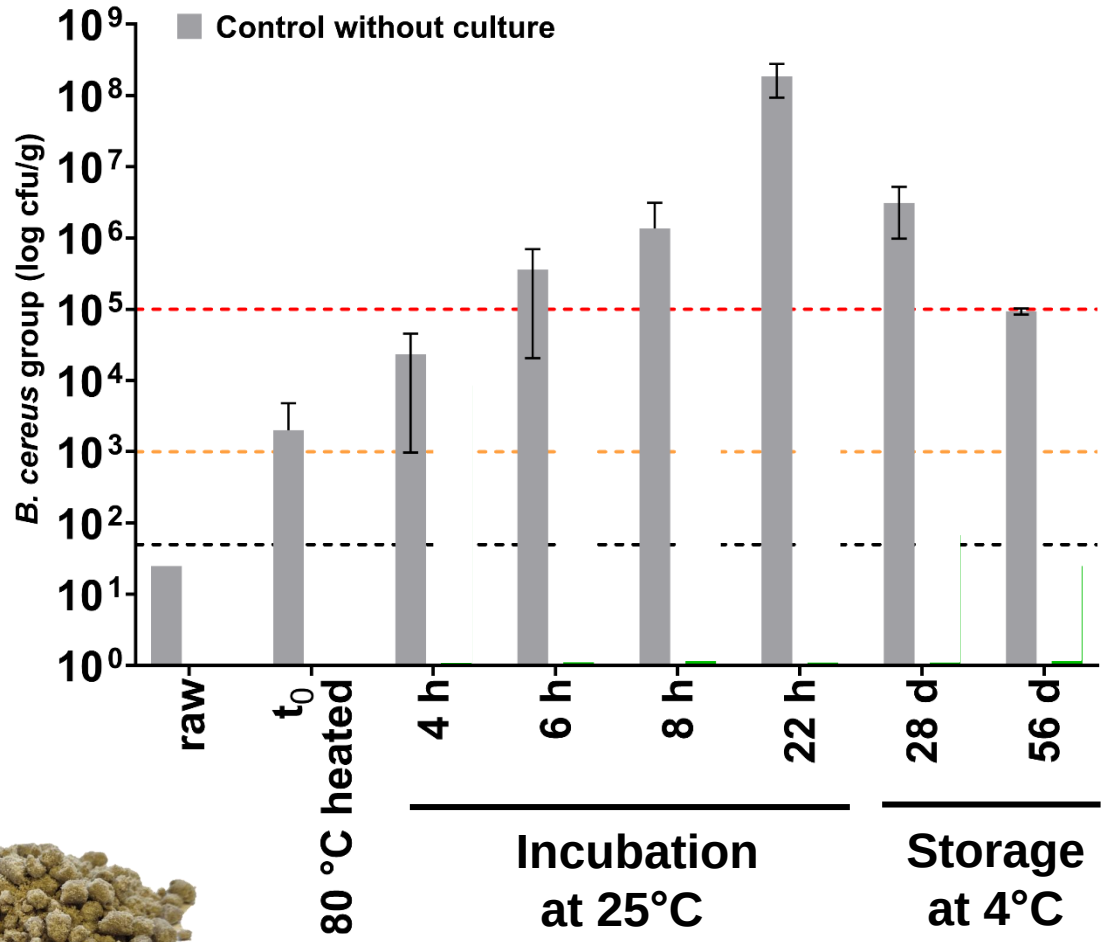
Decrease during storage at 4°C



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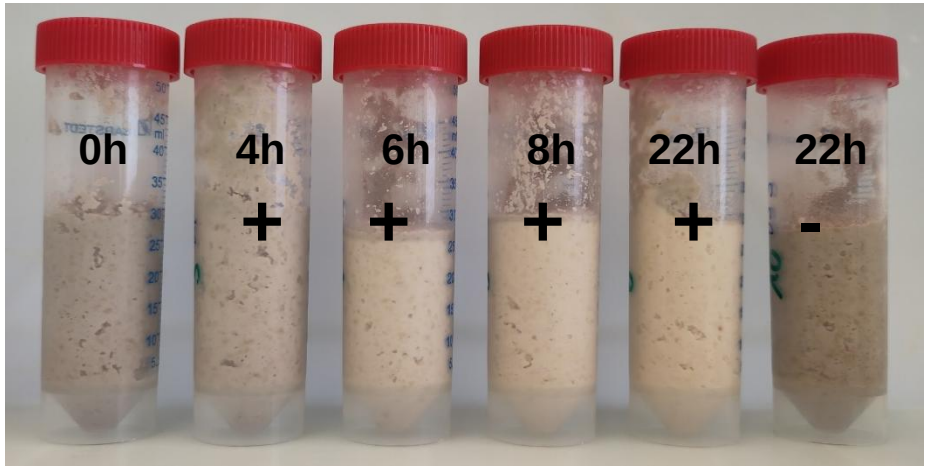
Source: Agroscope; Looser et al., 2026, Future Foods

Lactic acid fermentation of sunflower press cake

Lactococcus lactis spp.-based starter culture

Liebefeld Kulturen®
La culture suisse
con • avec • mit Agroscope

- Unable to degrade available sugar sucrose
- Addition of glucose necessary → enables adjustment of desired pH-value
- During fermentation buttery aroma (diacetyl) is produced
- Improved colour by fermentation



- Fermentation inhibited growth of spore-forming *Bacillus cereus*

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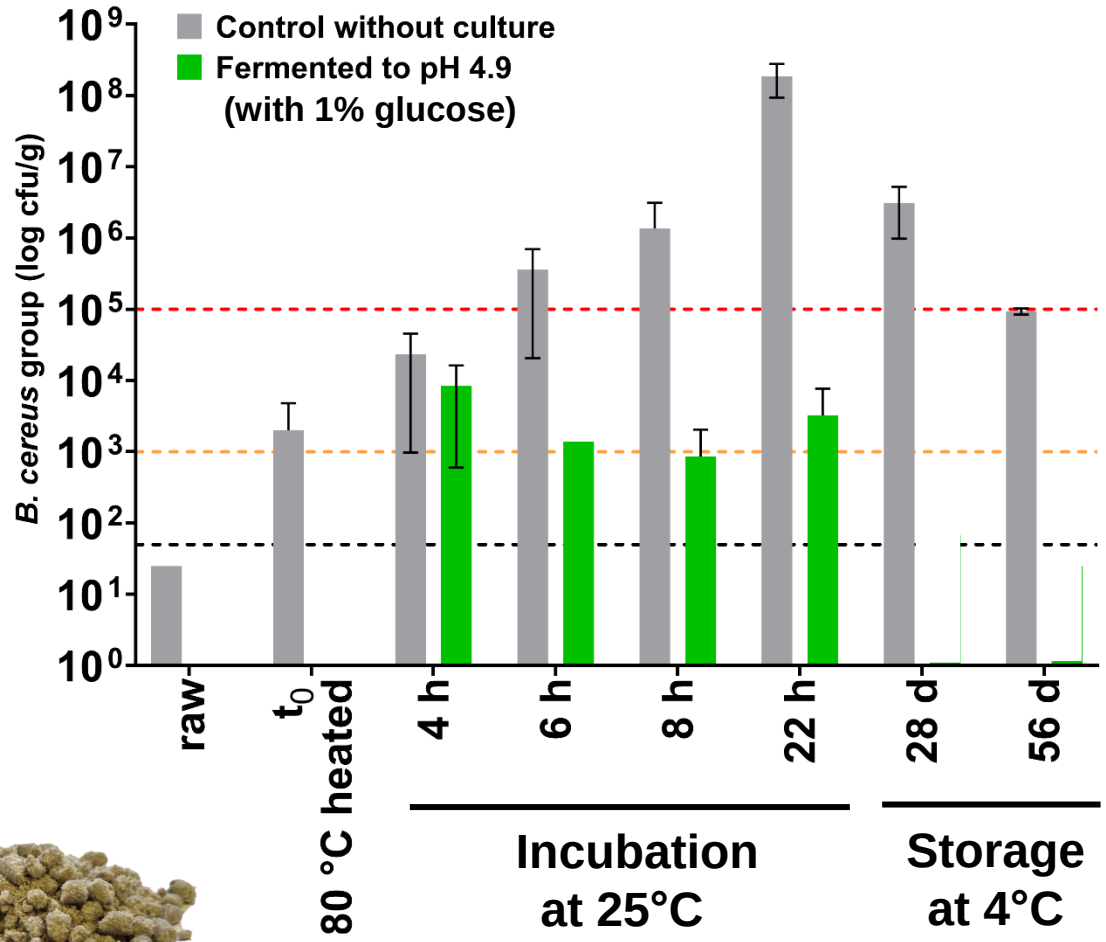
Image source: Agroscope

Inhibition of *Bacillus cereus* growth during fermentation to pH 4.9



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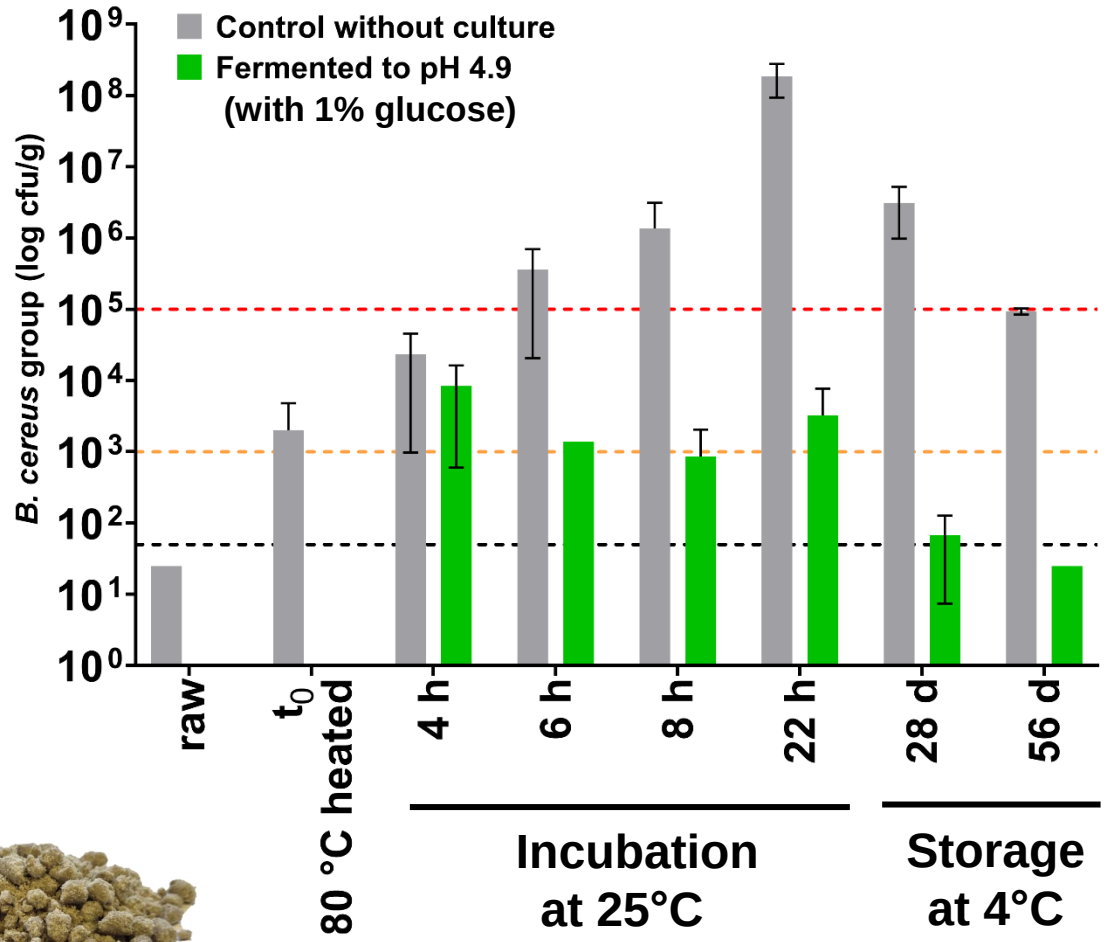

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(<50 = 25)

Source: Agroscope; Looser et al., 2026, Future Foods

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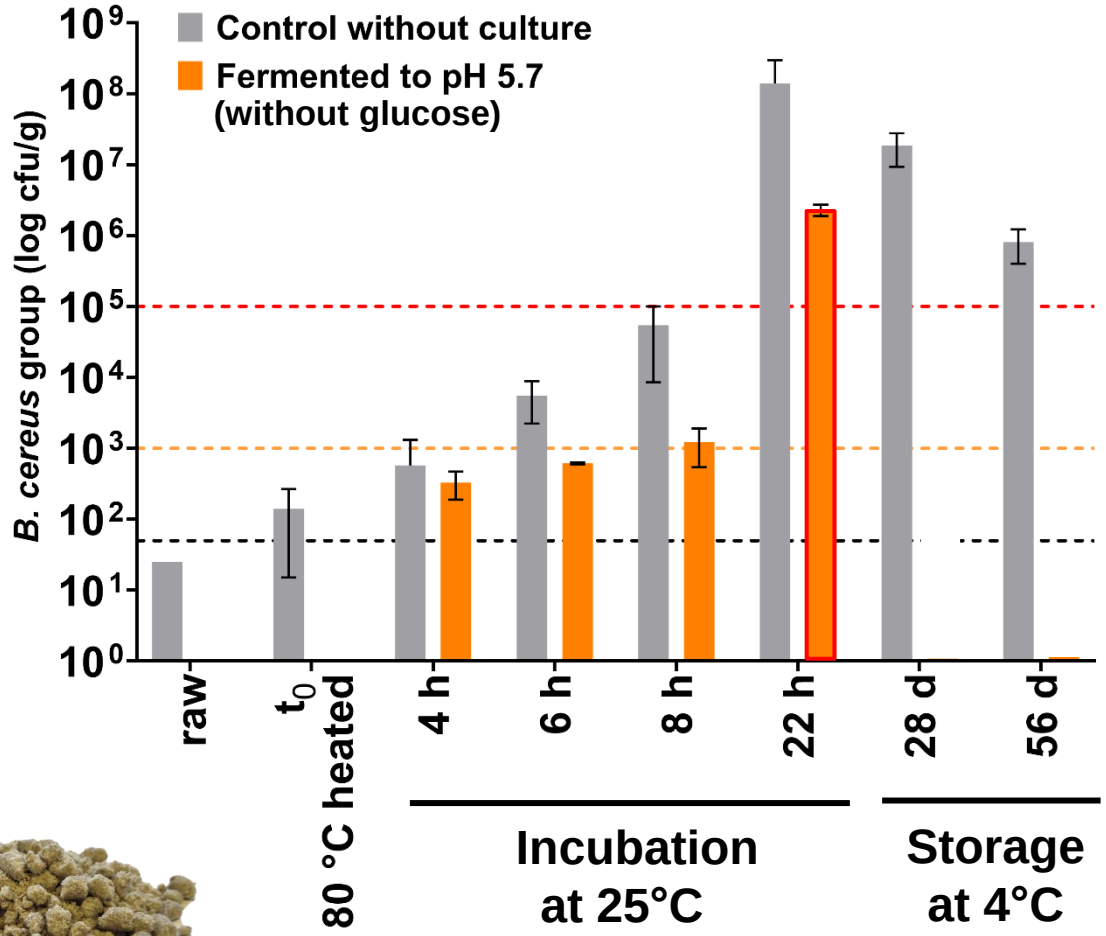
Insufficient inhibition during fermentation to pH 5.7 (without glucose addition)



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Quantification limit 50 CFU/g
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40% press cake in water **80 ± 3°C, 3min**

Source: Agroscope; Looser et al., 2026, Future Foods

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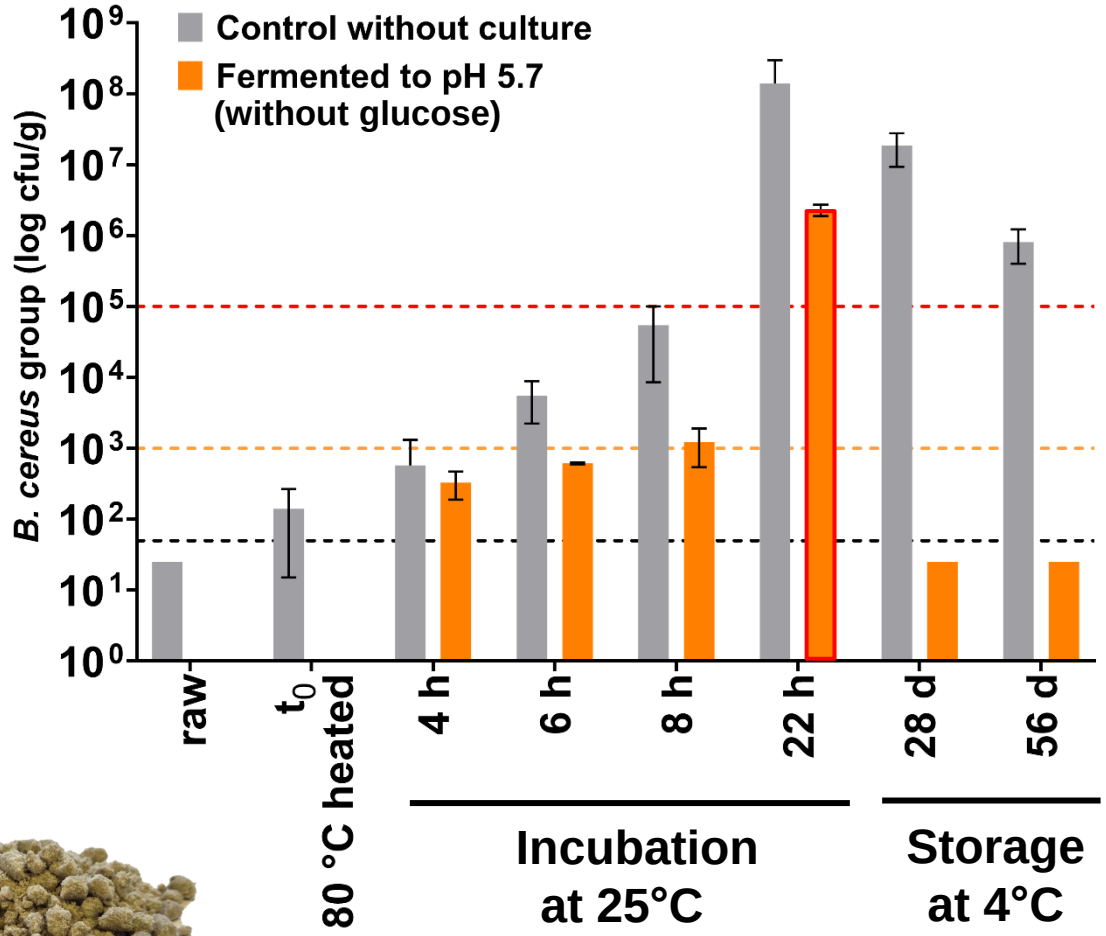
Strong decrease of *B. cereus* during storage – Risk underestimated by post-storage analysis



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Source: Agroscope; Looser et al., 2026, Future Foods

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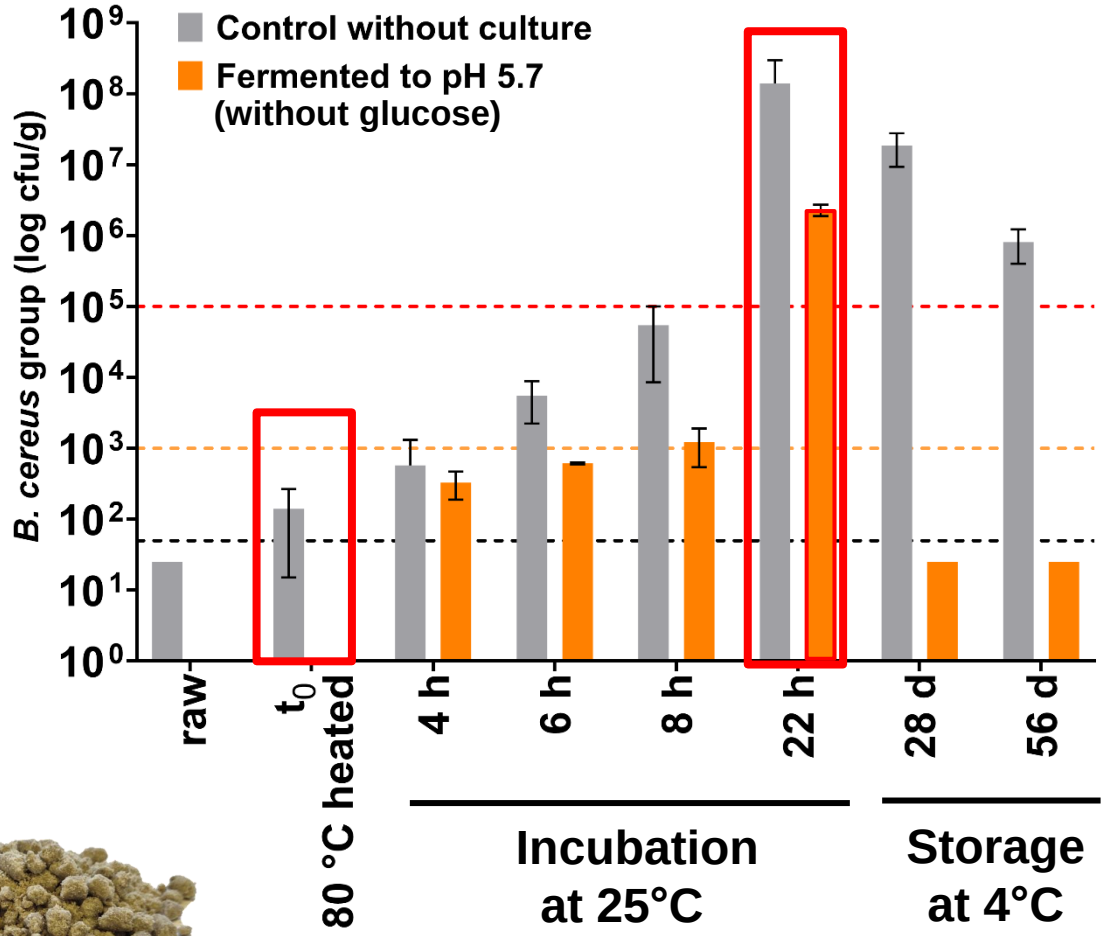
Monitoring *B. cereus* counts after heat treatment and fermentation is recommended



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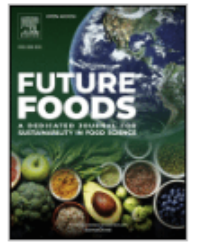
Agroscope

Future Foods
Available online 15 April 2026, 101017
In Press, Journal Pre-proof ? What's this?



Inhibition of *Bacillus cereus* growth by fermentation of sunflower seed oil press cake for cheese alternatives

Verena Looser, Gabriela Purtschert-Montenegro, Ueli von Ah, Dieter Weik, Elvira Wagner, Jörg Hummerjohann, Lotti Egger, Helena Stoffers, Emmanuelle Marie Arias, Jan-Erik Ingenhoff, Remo S. Schmidt, Hans-Peter Bachmann, Ghazal Nemati

Source: Looser et al., 2026, Future Foods

Highlights

- *B. cereus* contamination in raw press cake was below the quantification limit.
- Vegetative growth of *B. cereus* occurred after heat treatment of press cake.
- *B. cereus* growth was inhibited by lactic acid fermentation to pH 4.9.
- *B. cereus* decreased at one- and two-month storage at 4°C, without forming spores.
- Monitoring *B. cereus* counts after heat treatment and fermentation is recommended.

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Source: Looser et al., 2026, Future Foods

Project team and funding

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Département fédéral de l'économie,
de la formation et de la recherche DEFR
Agroscope
Haras national suisse HNS

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CATALYSE
Catalysing scientific innovation into food safety action

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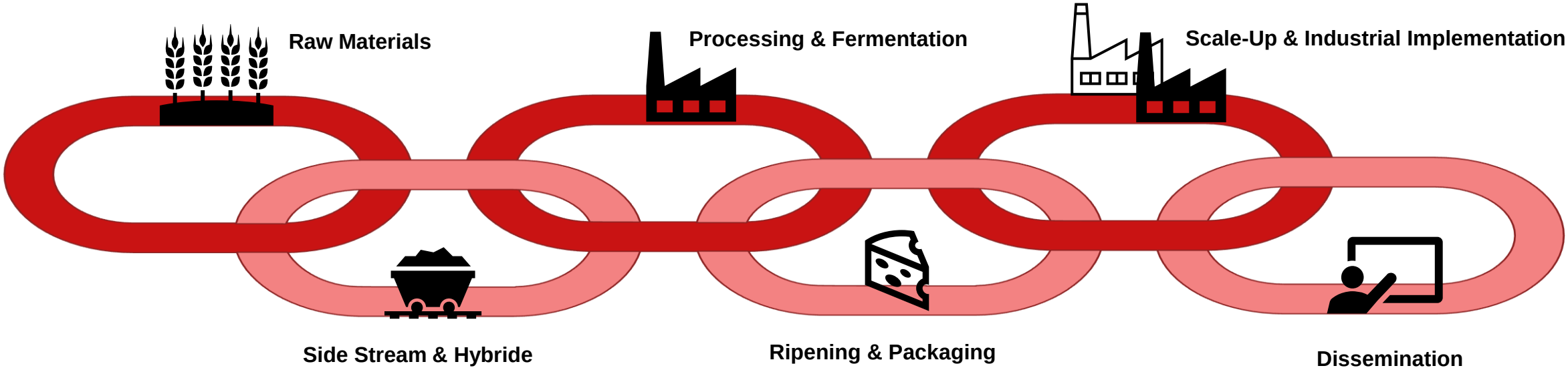
Elvira Wagner & Dieter Weik
Charlotte Egger & Andreas Bosshart
Lucie Tintrop, Simon Wacker & Doris Zbinden
Sébastien Dubois
Helena Stoffers
Jan-Erik Ingenhoff
Remo Schmidt
Hans-Peter Bachmann

Seiler Käserei AG
Ölmühle Florin AG

Future projects at Agroscope



Improving food safety in plant-based alternatives (SAFE-Reifka)

Platform for ripening plant-based cheese alternatives from local raw materials (ReifKA)

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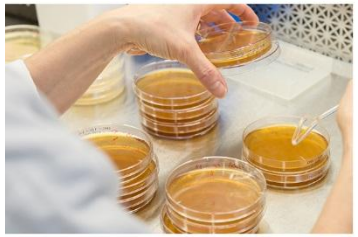


Thank you for your attention

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