

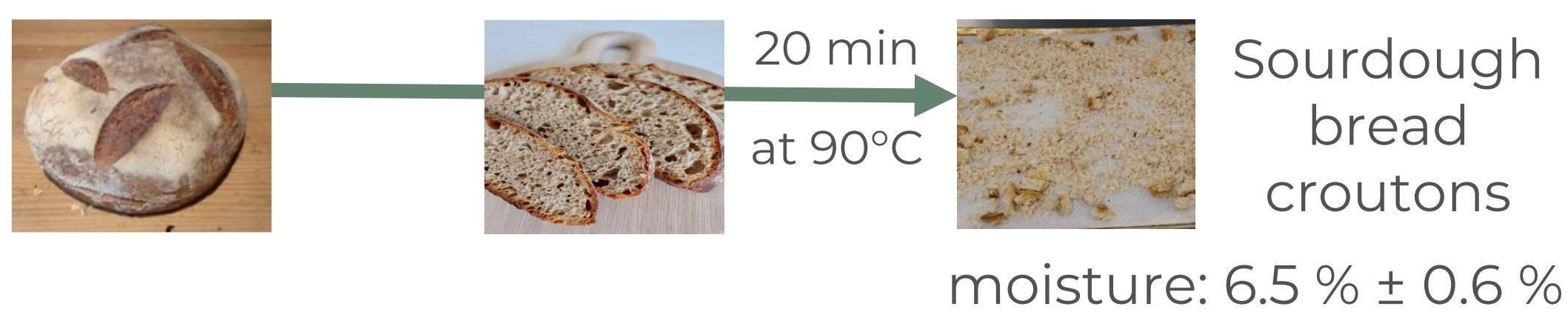
1. BACKGROUND

In Flanders, approximately 25% of all bread and bakery products are lost each year. Today, these bread losses go to cattle feed or biogas production, although in most cases this bread is still suitable for human consumption. By valorising these unavoidable bread losses in beer, breweries can contribute to the reduction of food losses. The aim of this study is to investigate whether the losses of sourdough bread that occur during bread production can be used for the production of sour beers. Specifically, sourdough bread was used as an adjunct in wort production. Sourdough cultures, collected in bakeries, were used for the fermentation of the wort obtained. Three different sourdough cultures, based on rye, spelt and wheat, were tested at three different fermentation temperatures (16°C, 22°C and 30°C) with Safbrew's ale yeast S-04 as the reference.



2. EXPERIMENTAL

Pretreatment of the bread

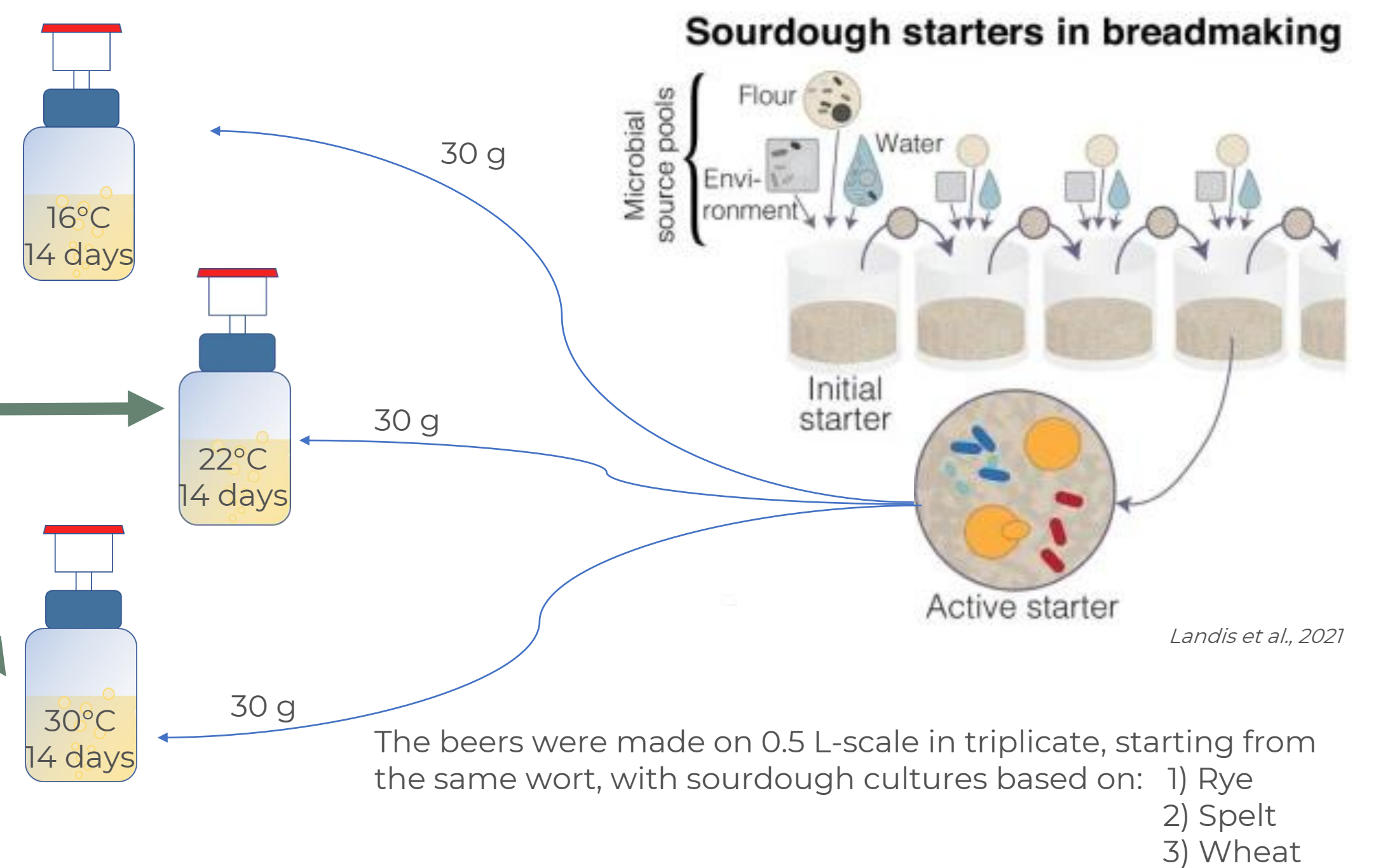


Sourdough cultures



- Sourdough is an ancient natural raising agent obtained by spontaneous fermentation: yeasts, lactic acid bacteria (LAB), and acetic acid bacteria (AAB) in the starter produce CO₂ that leavens the bread.
- Sourdough cultures based on different flours: 1. Rye, 2. Spelt, 3. Wheat

Beer production



3. RESULTS & DISCUSSION

- The use of bread had a negative impact on wort filtration:

20% sourdough bread: >3h
100% barley malt: ±1h
40% barley: ±1h45

→ Wort: 13.6°P – 10 EBU – pH 5.5

- Culture ratio after 1 day of fermentation

	LAB 10 ⁶ CFU/ml	Yeast 10 ⁶ CFU/ml	Ratio LAB/Yeast
Reference: Safale S04	-	4.91	
Rye	6.69 ± 2.25	2.30 ± 0.64	2.9
Spelt	13.65 ± 2.95	1.45 ± 0.31	9.5
Wheat	0.06 ± 0.01	1.29 ± 0.07	0.1

Wort and final beer properties

- After fermentation, including maturation at 4°C for 7 days:



- Sensory:

After analysis, the biological triplicates of the respective sour beers were mixed and refermented in the bottle.

Aromas of smoked meat, fruity and sour notes were observed in the different sourdough beers. The beers differed in flavour and appearance both from the reference and from each other.

4. CONCLUSION & PERSPECTIVES

The wort obtained with 20% sourdough croutons was suitable for beer brewing although wort filtration was a challenge. In combination with different sourdough cultures, all beers could be classified as 'sour beer' based on the total titratable acids (TTA > 2.7 g lactic acid/L). Fermentation temperature appeared to be an important parameter that did not affect every sourdough culture in the same way. The colour of sourdough beers differed from each other: rye sourdough beer (darkest) > spelt sourdough beer > wheat sourdough beer. Sourdough can diversify the beer market, but more research is needed to deliver beers with consistent quality.

5. ACKNOWLEDGEMENTS

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