

Flavor and structure variation in oat porridge from cultivar-pure flakes from 2019

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FOOD CHEMISTRY

Introduction

More than 40 oat cultivars are grown in Finland. Besides the cultivar, also the crop year, growth location and weather conditions effect the properties of the crop. The goal of this study is to investigate the relation between flavor and structure of different oat batches.

Materials and methods

The oat flakes in this study originate from a larger OatHow consortium project. Each batch contains flakes from one cultivar only. All flakes originate from the crop year 2019 and were processed under equal conditions in the same mill. The flakes were studied as a porridge made to water. First, viscosity and thixotropy of each cultivar were measured. It was followed by the analysis of the volatiles by extracting them with headspace-solid phase microextraction and identifying them by gas chromatography-mass spectrometry. Further, a sensory evaluation will be conducted using a trained panel to investigate perceived differences between oat flake porridges.

Rheology

- Anton Paar MCR 102e – rheometer
- Viscosity and thixotropy

Volatiles

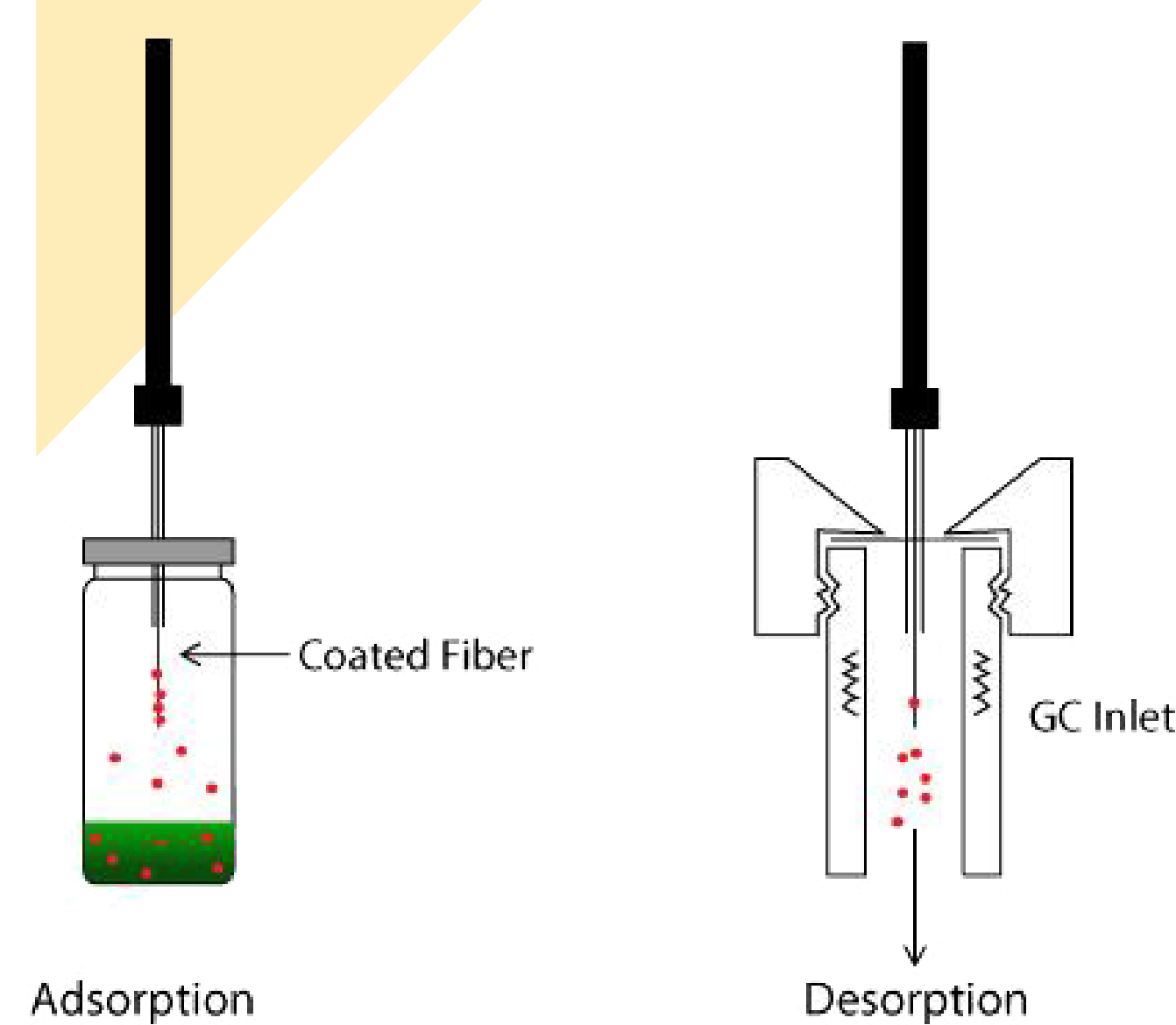
- HS-SPME-GC-MS
- Fresh flakes
- Stored flakes (6 months, RT)

Sensory evaluation

- Trained panel
- Organized in April-May



Anton Paar MCR 102e rheometer



The principle of headspace-SPME

Results

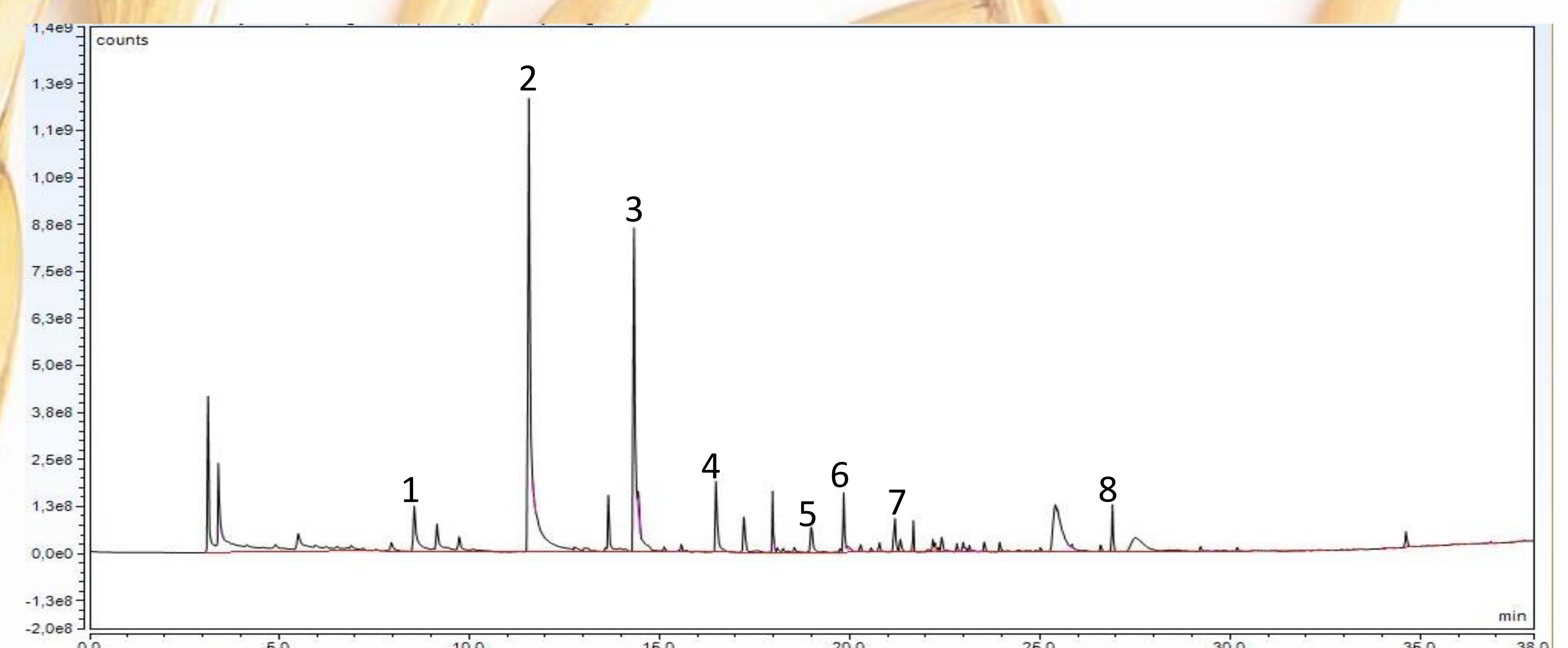


Fig. 1. An example chromatogram of a porridge made from stored flakes. The peaks number 3 (4-methyl-2-pentanol) and 8 (neryl acetate) are internal standards.

#	compound	odor description*
1	pentanal	fermented, bready, nutty
2	hexanal	green, fatty, leafy, grassy
4	1-pentanol	fermented, bready, fusel
5	1-hexanol	pungent, alcoholic, green
6	nonanal	waxy, fatty, green, fresh
7	1-octen-3-ol	earthy, green, mushroom

Oat porridge viscosity variation between different flakes

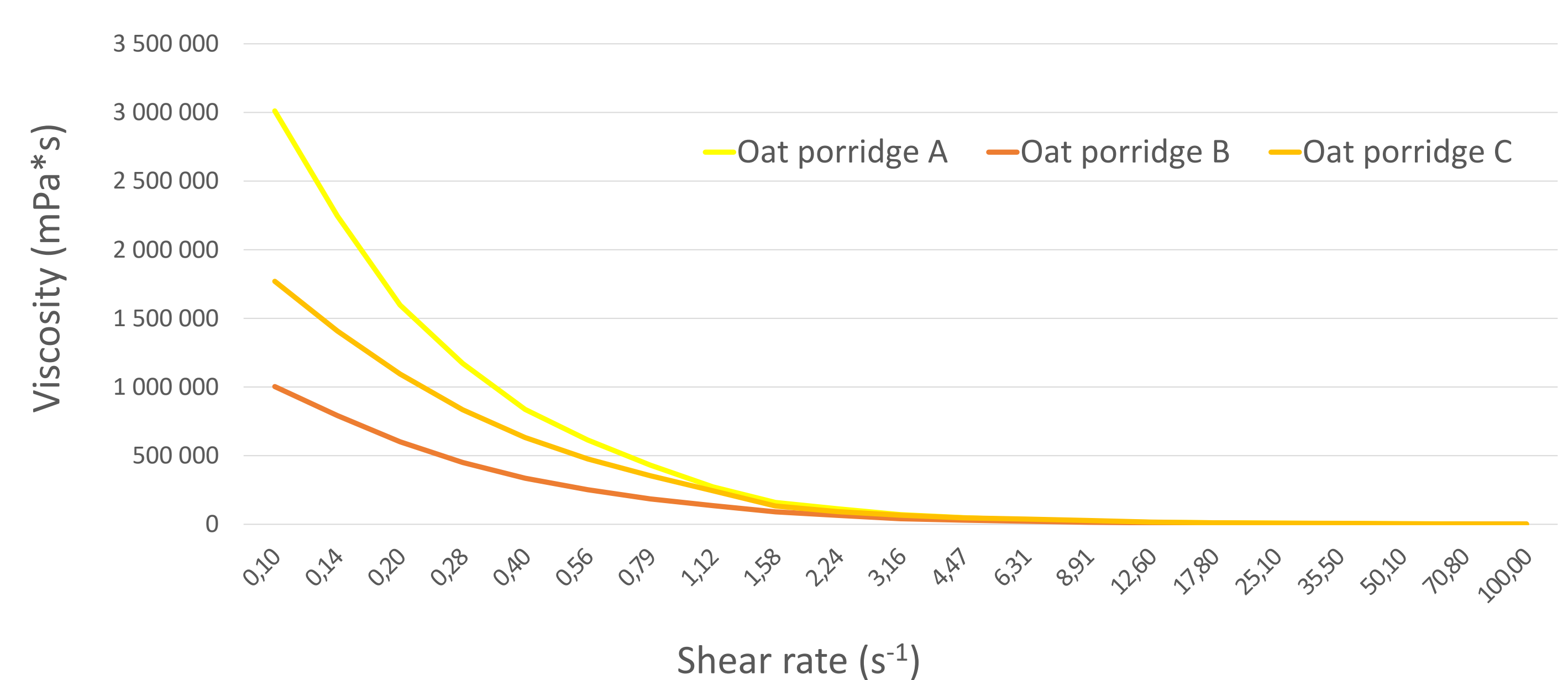


Fig. 2. There is a great variation in viscosity between oat porridges made from different flakes using the same cooking method. Differences in the structure of each porridge were also visible during the cooking. Additionally, the shear-thinning behaviour of oat porridge is very apparent.

Oat porridge thixotropy variation in one oat porridge

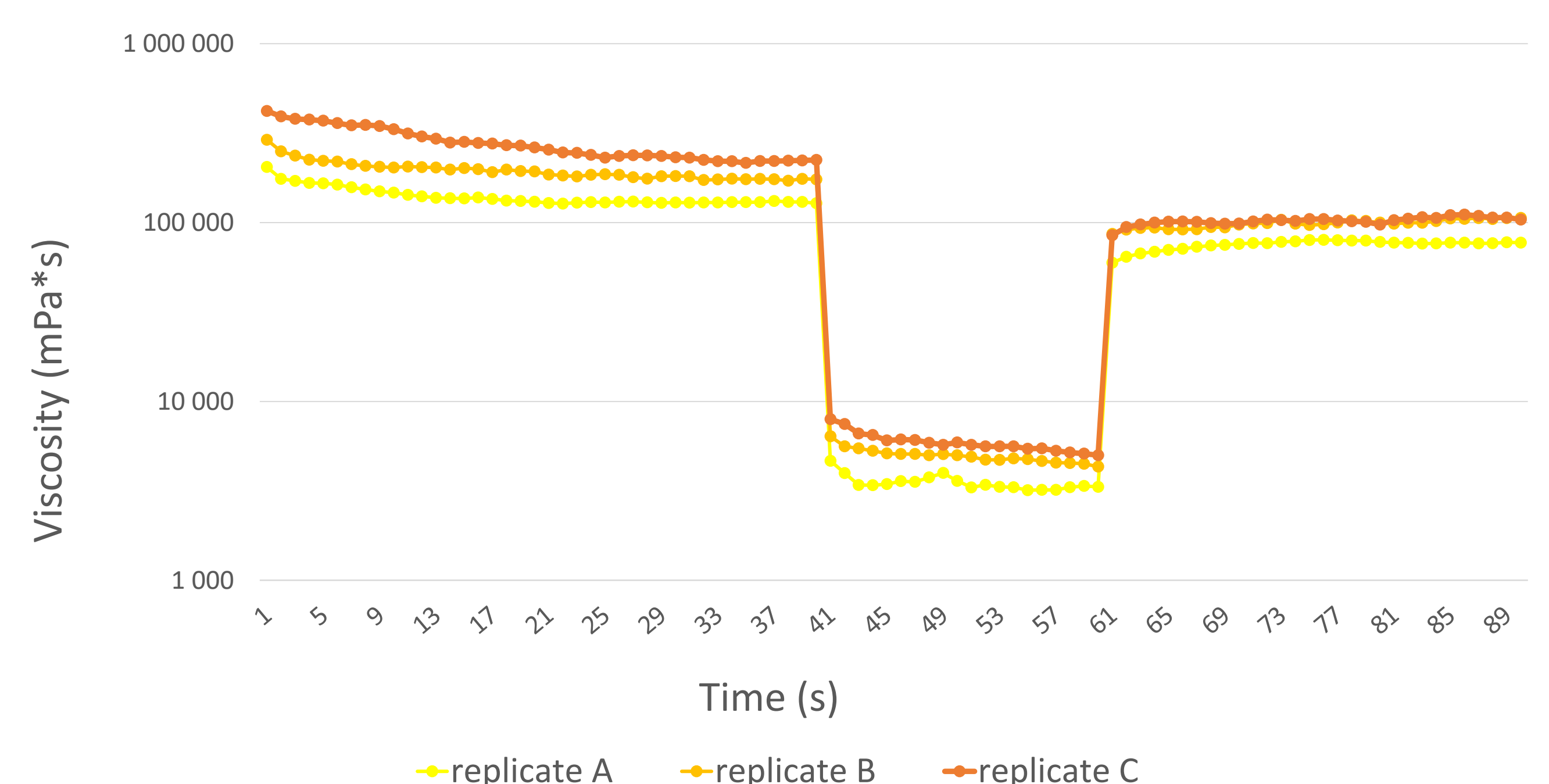


Fig. 3. Variation of thixotropy in one oat porridge batch in three sequential replicates. This figure represents the trend between replicates in the most of the samples. The structure recovery is fairly similar between the different oat flake batches.

Results

Oat porridge from stored flakes (6 months) contained more volatiles than porridge from fresh flakes. The stored samples contained more lipid oxidation products, such as aldehydes and some alcohols. All samples contained several heat-dependent compounds originated from processing and cooking, such as aldehydes (Fig. 1). Additionally, there were remarkable differences in viscosity between the oat flake batches (Fig. 2). Differences in thixotropy were lesser, but there is a trend in the structure recovery between the replicates of one cooking batch (Fig. 3).