Introduction

Depending on the specific application, sourdough preparations exhibit different characteristics concerning their gas formation activity. Italian sourdoughs, e.g., typically used for Panettone are intended to result in high gas formation rates, whereas French sourdoughs for extra-long proving are intended to release gas over corresponding prolonged time-periods at rather moderate rates.

In this study, 5 different sourdoughs were examined for their gas formation properties, applying a Gas Volume Monitor from abiotec AG. This measurement device, originally designed for Nestlé Research Center in Lausanne for the purpose of sensitive measurements of gas formation from chilled yeast doughs, allows detailed insights concerning gas formation kinetics.

For this experiment, chilled sourdough stock samples were refreshed (subcultivated) according to their specific prescriptions. Samples, 100 g each, were filled into the measurement units (see picture beside), tightly closed and thermostated to 27 °C in a waterbath, before monitoring of generated gas volumes was started.

Results

Primary results of gas formation over 30 hours (Fig. 2) show significant differences in the amount and the periods of gas formation for each of the 5 sourdough samples:

Sourdoughs Helvetia and Wikinger exhibit the largest and fastest gas formation during the first 15 hours. Durum and Buckwheat sourdoughs show significantly reduced time periods of gas formation, thus leading to less final gas volumes.

Levain Liquide shows a sustained gas production, however, over a prolonged period of about 25 hours, thus leading to a rather high final gas volume.

For a more detailed kinetic analysis, display of data as specific rates of gas formation over time was used (Fig. 3):

Buckwheat sourdough develops a short, almost peak-like activity during the first hours with a maximum at about 2.6 h.

Durum has a similar high maximum at 3.3 h, however, starts at a higher rate and exhibits a broader curve width.

Activity of Levain Liquide is low and stable during the first 5 hours and doubles during the following 15 h in a linear mode. Shortly after the maximum, the rate drops rather sharp.

In contrast, Wikinger and Helvetia develop from the very beginning higher gas formation activities: Wikinger exhibits the highest activity, however, dropping rather fast after reaching its maximum; whereas Helvetia produces gas at relative high rates over a more prolonged time period, finally resulting in the highest total amount of gas. (For details, see table 1)

Conclusions

The measurement technique with the presented display of kinetic data offers an interesting potential for the detailed characterisation of sourdoughs with respect to their gas formation activities. Thus it may be successfully applied for the:

• development of new sourdough strains
• precise determination of limiting nutrient factors and the effective development of recipes
• elaboration/optimisation of effective processes for dough proving by developing suitable feeding strategies