Evaluation of oat flour quality using MixoLab®

J. Ng1 and L. Cato1
1Australian Export Grains Innovation Centre (AEGIC), Perth, WA, 6151, Australia

1. INTRODUCTION

In recent years, oats have received increased interest as a preferred breakfast food due to their nutritional value (e.g. high in soluble fibre, proteins, vitamins, minerals, unsaturated fatty acids and other nutrients). A significant amount of the dietary fibre of oat grains is β-glucan (mixed linkage (1-3)-(1-4)-β-D-glucan), a cell wall polysaccharide, which has been reported to reduce the concentration of serum cholesterol, lessen blood glucose levels, slow insulin response in the blood and maintain the balance of intestinal flora (Kraus et al. 2000). China has become one of the largest markets for Australian-grown oats over the past five years, importing 92,000 mt from Australia during 2013. This growing consumer awareness is prompting interest in, and the production of, an increased diversity of oat-based products including oat-based rice, beverages, snack bars and noodles in addition to the already established production of oatmeal breakfast product. Asian-style oat foods are a new and growing end use for Australian oats.

2. AIM

To study the rheological and thermal properties of oat dough using a MixoLab analyser (Chopin Technologies, Villeneuve la Carenne, France).

3. MATERIALS AND METHOD

Flour samples

Three commercial oat flour samples from Blue Lake Milling, namely Williams [W], Mitika [Mi] and a grist of Mitika and Echidna [M+E] and two wheat flour samples sourced from Allied Mills [AM] and Manildra [M] were used in this study. Wheat-oat blends were also tested in the study. All flour samples were analysed for proximate content amongst the flour samples studied (Fig. 2c).

MixoLab measurements

Mixing and pasting behaviour of 100% wheat flour, 100% oat flour samples and wheat-oats blends (40%:60%, 50%:50%, 60%:40% and 70%:30% by weight) were analysed using the MixoLab analyser. The MixoLab measures (in real time) the torque (Nm) produced by the passage of dough between the kneading arms, allowing the study of physio chemical behaviour. For the test protocol (Chopin+), 50g (adjusted for moisture content) of flour samples were placed in the MixoLab analyser bowl and tested at optimum water addition. The mixing speed used was 75rpm. The settings used in the test were 8 minutes at 30°C with a temperature increase of 4°C/min until the mixture reaches 90°C, at which point there is a 8 minutes holding period at 90°C, after which the temperature was decreased at 4°C/min until 55°C, followed by 6 minutes of holding at 55°C. The flour samples were also tested at constant water addition with the same MixoLab settings.

Noodle making and assessment

White Salted Noodles (WSN) were made from flour, water (32%) and salt (4%) using the MixoLab settings. After reaching 90°C; at this point there is a 8 minutes holding period at 90°C, after which the test were 8 minutes at 30°C with a temperature increase of 4°C/min until the mixture content) of flour samples were placed in the MixoLab analyser bowl and tested at optimum water addition using the MixoLab analyser. The MixoLab measures (in real time) the torque (Nm) produced by the passage of dough between the kneading arms, allowing the study of physio chemical behaviour. For the test protocol (Chopin+), 50g (adjusted for moisture content) of flour samples were placed in the MixoLab analyser bowl and tested at optimum water addition. The mixing speed used was 75rpm. The settings used in the test were 8 minutes at 30°C with a temperature increase of 4°C/min until the mixture reaches 90°C, at which point there is a 8 minutes holding period at 90°C, after which the temperature was decreased at 4°C/min until 55°C, followed by 6 minutes of holding at 55°C. The flour samples were also tested at constant water addition with the same MixoLab settings.

Noodle making and assessment

White Salted Noodles (WSN) were made from flour, water (32%) and salt (4%) using are Othake noodle machine. The final noodle thickness was 2.5mm. Noodles were cooked for the optimum cooking time and firmness was measured using TA-XT2iPlus using AACC 66-50.01 (AACC, 2011).

5. CONCLUSIONS

• Weakening of the gluten network was observed with the addition of oat flour to wheat flour (decreasing the dough resistance to mixing) (Figs. 2a, b and c).

• Softer WSN (TA-XT2iPlus) firmness test results were observed with the addition of oat flour to the wheat flour (Fig. 4).

• Further studies are required to understand the impact of oat flour on elastic properties of noodles and the role oat starch plays on end product quality.

• Further studies are required to study oat dough rheology using different combinations of temperature, mixing time and mixing speed.

REFERENCES


