Evaluation of Black Sea flour quality using the Mixolab®

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1. INTRODUCTION

Australian wheat production is around 25 million tonnes (5-year average). This represents around only 3% of the world's wheat but accounts for 10-15% of the world's approximately 100 million tonnes annual global wheat trade. Australia is in a good position to supply wheat for the ever increasing demand from Asia. Most of Australian wheat exported to the Asian markets is used for the production of different types of Asian noodle products. In addition, Australian wheat is highly regarded for Asian noodle product quality.

Traditionally, Australia's largest competitors to the Asian markets have been the USA and Canada. Recently, however, countries from the Black Sea region, in particular Russia but also Ukraine and to lesser extent Kazakhstan, have also entered the market and are competing for significant wheat market share particularly in South East Asia (SEA).

Noodle appearance is the first critical judgment made by the consumer when evaluating noodle quality. Noodle appearance evaluation is based on noodle colour, brightness, appearance of specks and colour stability (discolouration). Another important aspect of noodle quality is eating quality of noodles or noodle texture. Both starch and proteins play an important role in defining eating quality of noodles.

The **objective** of this study was to evaluate quality of wheat samples from the Black Sea region particularly with aspect to starch quality for noodle making.

2. MATERIALS AND METHODS

Wheat samples

Ten (10) samples from Black Sea were imported and milled to 74% flour extraction. Four (4) samples were from each Russia and Ukraine and two (2) samples were from Kazakhstan. Four (4) Australian samples were used for comparison purposes. Australian samples were APH, AH (from the East Coast of Australia) and APW and ANW from Western Australia.

MixoLab

The MixoLab is a device developed for the quality control of cereals. It measures dough and flour quality by exposing a sample to predetermined heating and cooling cycles while placing the sample under a strain field. The flour samples were run on the MixoLab (Chopin Technologies, France) according to the standard Chopin heating profile. The initial block temperature was 30°C. Water absorption was determined as the percentage of water required for the dough to produce a torque of 1.1 Nm, and the appropriate amount of water was applied to each of the flours.

Automated Solvent Retention Capacity Test (SRC)

Chopin SRC automated test (based on AACC I Approved Method 56-11) was used to measure four key quality parameters in one single test:

- Water absorption with the water solvent SRC
- Glutenin functionality with the lactic acid SRC
- Pentosan functionality with the sucrose SRC
- Damaged starch functionality with the sodium carbonate SRC.

3. RESULTS AND DISCUSSION

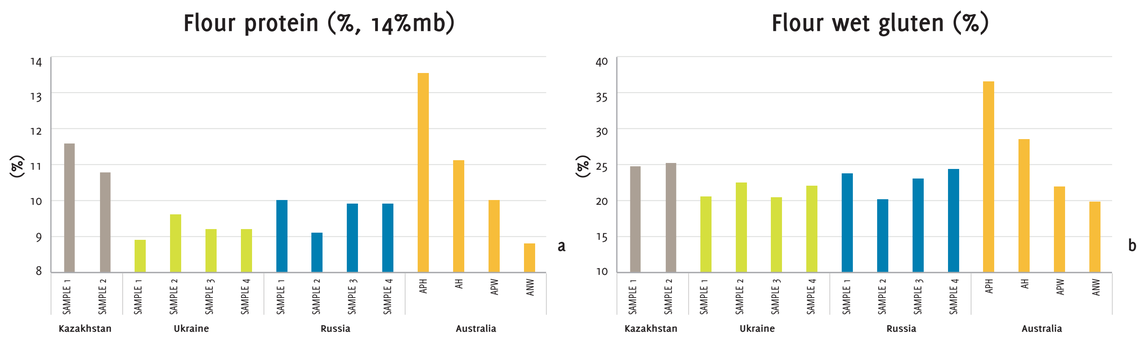

Fig 1. Flour protein content (a), flour wet gluten (b), SRC GPI (c) and water absorption (d) of the Black Sea and Australian wheat flour samples

3. RESULTS AND DISCUSSION (CONTINUED)

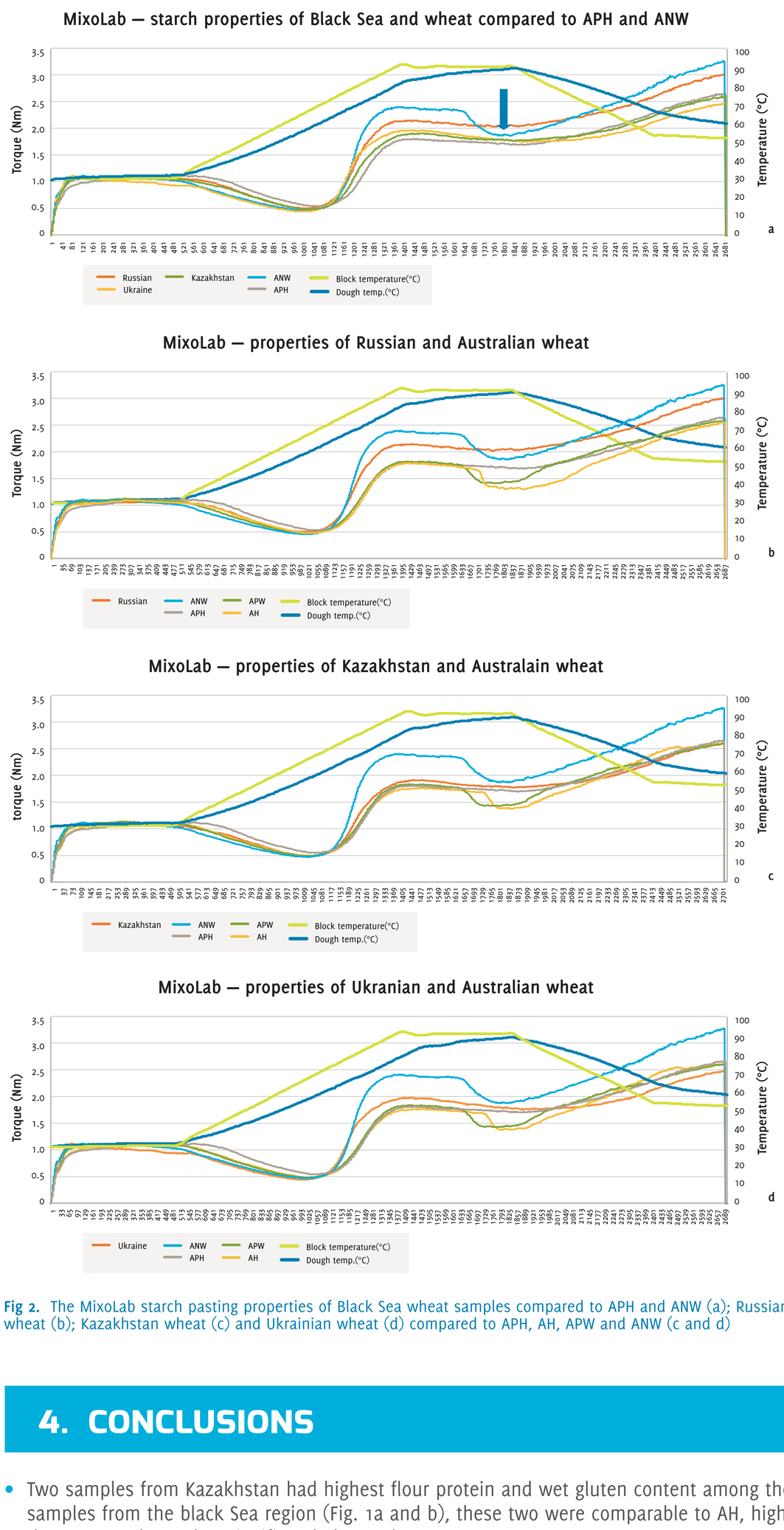

Fig 2. The MixoLab starch pasting properties of Black Sea wheat samples compared to APH and ANW (a); Russian wheat (b); Kazakhstan wheat (c) and Ukrainian wheat (d) compared to APH, AH, APW and ANW (c and d)

4. CONCLUSIONS

- Two samples from Kazakhstan had highest flour protein and wet gluten content among the samples from the black Sea region (Fig. 1a and b), these two were comparable to AH, higher than APW and ANW but significantly lower than APH.
- Two samples from Kazakhstan also had highest water absorption among the Black Sea samples, but lower than any of the Australian samples studied here (Fig. 1d).
- However, the GPI (gluten performance index, indicator of gluten functionality) was quite high for all Black Sea samples studied (Fig. 1c).
- MixoLab — characteristics of protein network indicate strongest mixing properties of APH compared to any other samples evaluated (Fig. 1a, b, c and d).
- MixoLab — characteristics of starch pasting showed unique feature of 'cooking stability' (previously reported to be linked with the flour swelling volume and eating quality of Japanese Udon noodles, Cato & Mills 2008) (Fig. 1a).
- Russian wheat flour samples had highest starch gelatinisation among the Black Sea samples and only lower when compared to ANW (Fig. 1a and b).

References

- Cato & Mills (2008) Evaluation of the MixoLab for assessment of flour quality. Food Aust: 60:577–581.

Acknowledgements

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