

Black Sea wheat flour quality: dough rheology and bread quality in the south east asian context

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1. INTRODUCTION

Australian wheat export accounts for 10–15% of the world's approximately 100 million tonnes annual global wheat trade. Around 70% of all Australian wheat exports is destined for Asian markets. In South East Asian (SEA) markets significant amount of Australian wheat is used in baking grists. Most commonly used baking systems in most SE Asian countries are sponge and dough (S&D) for industrial scale baking and no time dough (NtD) in the so called small – medium baking enterprises. 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).

While Australian wheat is preferred in export markets for Asian style noodles, same cannot be said when it comes to baking. Historically, SE Asian markets have preferred the North American wheat particularly for the S&D baking. However, Australian wheat is often blended with high protein North American wheat to meet requirements of the bakers in SEA.

Bread loaf volume, along with fine cell structure and soft crumb are main quality traits required by the SE Asian bread consumers.

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

2. MATERIALS AND METHODS

Wheat samples

Ten (10) wheat samples were imported from the Black Sea region; four from each Russia and Ukraine and two from Kazakhstan. Four samples grown in 2014–15 on the East Coast of Australia (NSW) were used for comparison purposes (APH, AH, APW and ASW). All samples were milled to 74% flour extraction.

Dough rheology

Full recipe bread doughs were mixed using Dough Lab (Perten Instruments), while the dough rheology was done using the Warburton's stickiness dough rig.

Baking

- Sponge & Dough (S&D) ratio of sponge to dough 60:40%
- No time Dough (NtD)

Both baking methods followed a typical Indonesian style recipe.

Bread quality

Bread **volume** was measured using the Bread Volume Analyser (BVM) (Perten Instruments).

Internal properties of loaf bread were assessed for **crumb firmness** by TA-XT2iPlus (Stable Micro Systems, UK) and **crumb structure** by C-Cell (Calibre Control International, Ltd., UK).

3. RESULTS AND DISCUSSION

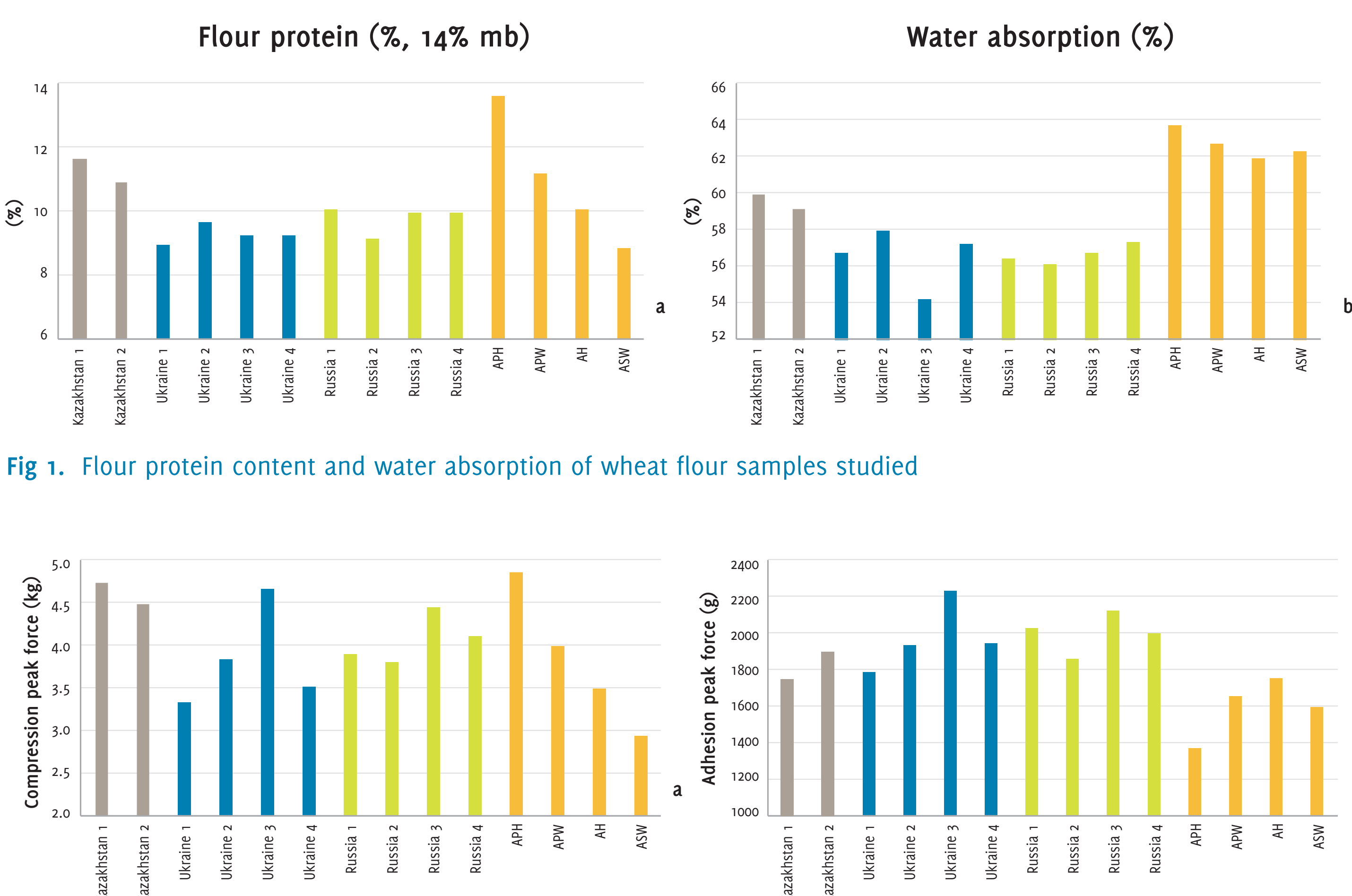


Fig 1. Flour protein content and water absorption of wheat flour samples studied

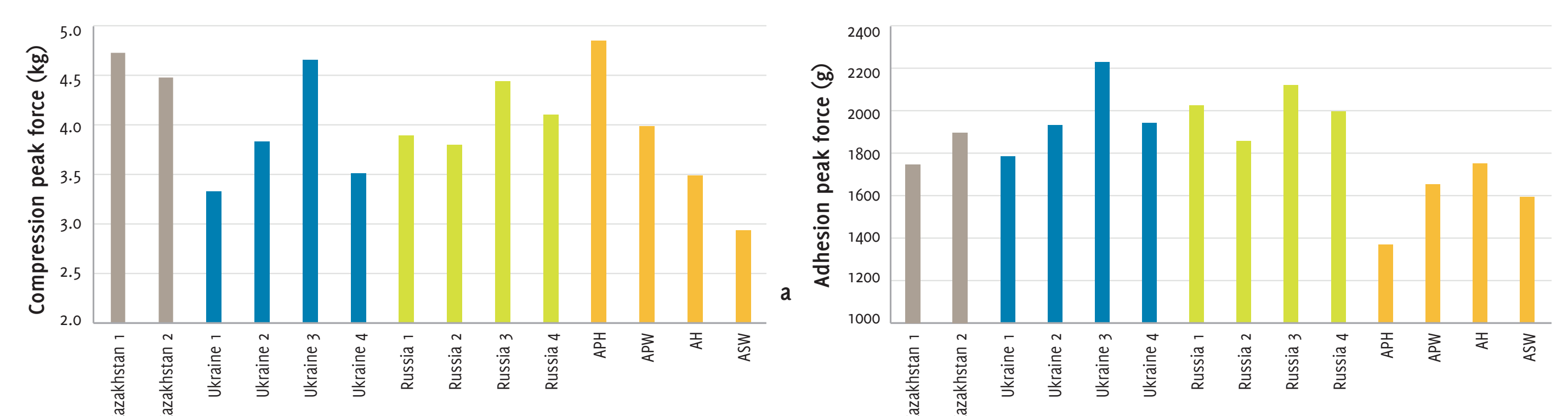


Fig 2. Dough compression (softness) and adhesion (stickiness)

3. RESULTS AND DISCUSSION (CONTINUED)

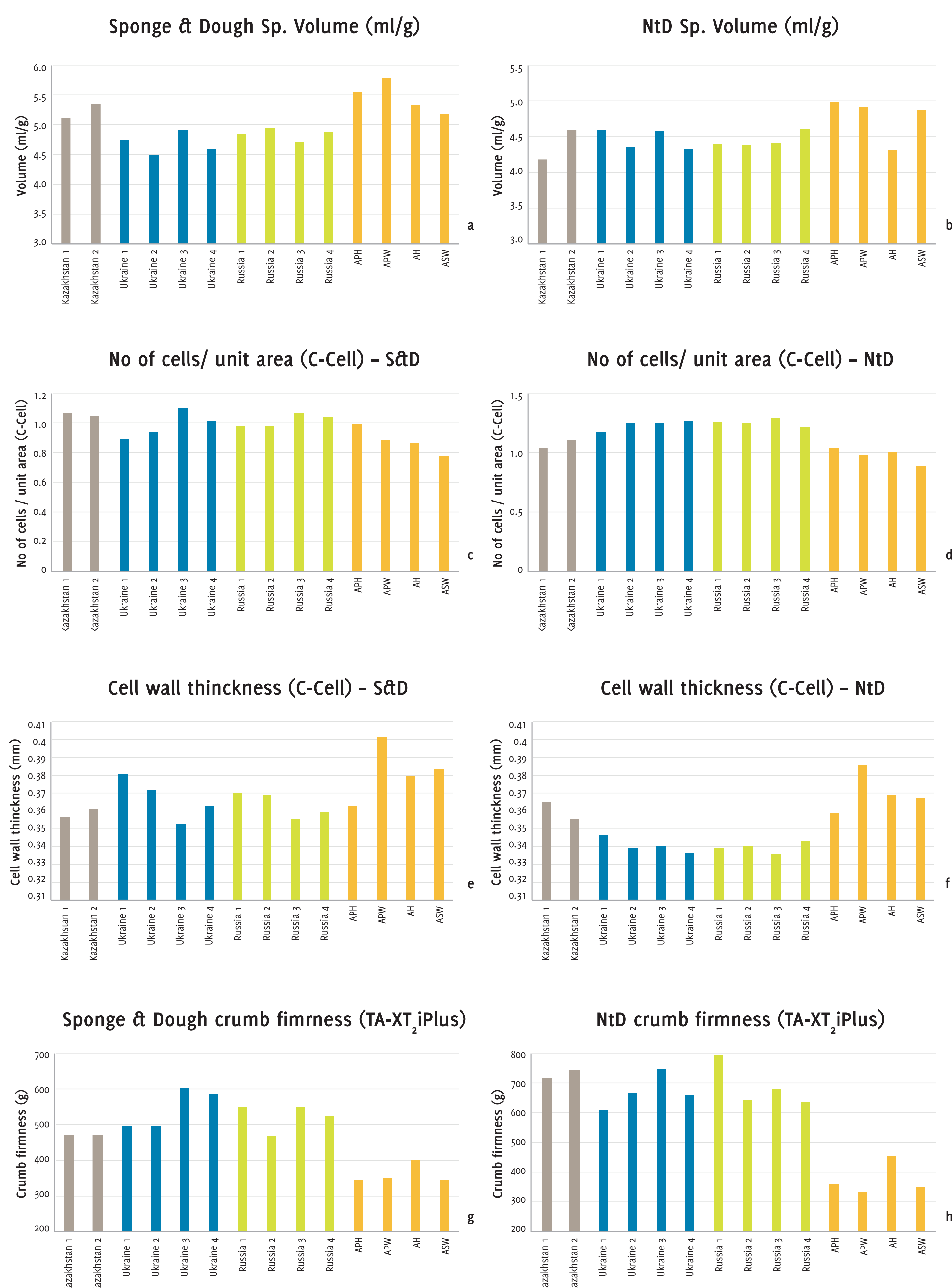


Fig 3. Bread volume S&D and NtD (a and b); crumb structure number of cells per unit area (c and d) and cell wall thickness S&D and NtD (e and f); crumb firmness S&D and NtD (g and h)

4. CONCLUSIONS

Protein and wet gluten content of wheat flour along with water absorption are regarded as critical quality traits of any wheat considered for baking in many SE Asian markets. Among the Black Sea wheat samples studied here, the two wheat samples from Kazakhstan had highest flour protein and water absorption (Fig. 1 a and b). Overall, four Australian samples had better (higher) water absorption (Fig. 1b). On average apart from APH doughs made from Australian wheat samples were slightly softer than Black Sea samples (Fig. 2 a and b). In both baking systems studied here four Australian samples on average had higher specific volume and softer crumb, both desired quality features for SE Asian loaf bread quality (Fig. 2 a, b, g and h). However, the total number of cells per unit area of bread slice was slightly lower for Australian samples along with thicker cell walls indicating slightly coarser and open crumb structure (Fig. 2 c, d, e and f).

Further studies are underway, to understand performance of Black Sea and Australian wheat in different SE Asian baking recipes (particularly those containing high levels of sugar).

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