

RHEOLOGICAL PROPERTIES OF ORANGE FLESHED SWEET POTATO, PUMPKIN AND WHEAT BLENDED FLOUR DOUGHS AND QUALITY CHARACTERISTICS OF BREADS

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INTRODUCTION

- Orange-fleshed sweet potato (OFSP) and pumpkin can improve the nutritional benefits and eating quality of wheat composite bread.
- However, incorporating these gluten-free flours can impact on the dough and bread quality properties.
- This study aimed to optimize wheat-OFSP-pumpkin dough and bread quality properties using a response surface methodology (RSM).

- Average OWA, DDT, stability and DOE ranged between 50.8-60.1%, 2.2-29.2 min, 6.0-50.0 min and 9.0-138.0 BU respectively.



Fig.2. Bread samples a b, c represent 80:10:10%, 60:30:10%, 40:20:40% wheat-OFSP-pumpkin flour bread baked at 150 °C for 21 min

MATERIALS & METHODS

- I-optimal (combined) design of RSM of the Design-Expert software version 11 (Stat-Ease Inc., Minneapolis, United States) was used for the experimental design.
- A total of 27 experimental trials were created with 5 lack of fit, 5 replications and a repeated central point.
- wheat flour (A) was replaced with OFSP (B) and pumpkin flour (C) in the limits of 10-50% and pumpkin 10-40% respectively.
- Baking temperature was 150-200 °C and baking time of 15-25 min.
- Bread preparations, dough and bread quality measurements were performed using International Association for Cereal Science and Technology standard methods.

RESULTS AND DISCUSSION

- OFSP and pumpkin flour significantly ($p < 0.001$) decreased optimum water absorption (OWA) and degree of softening (DOS) but increased dough development time (DDT) and stability time (Fig. 1).

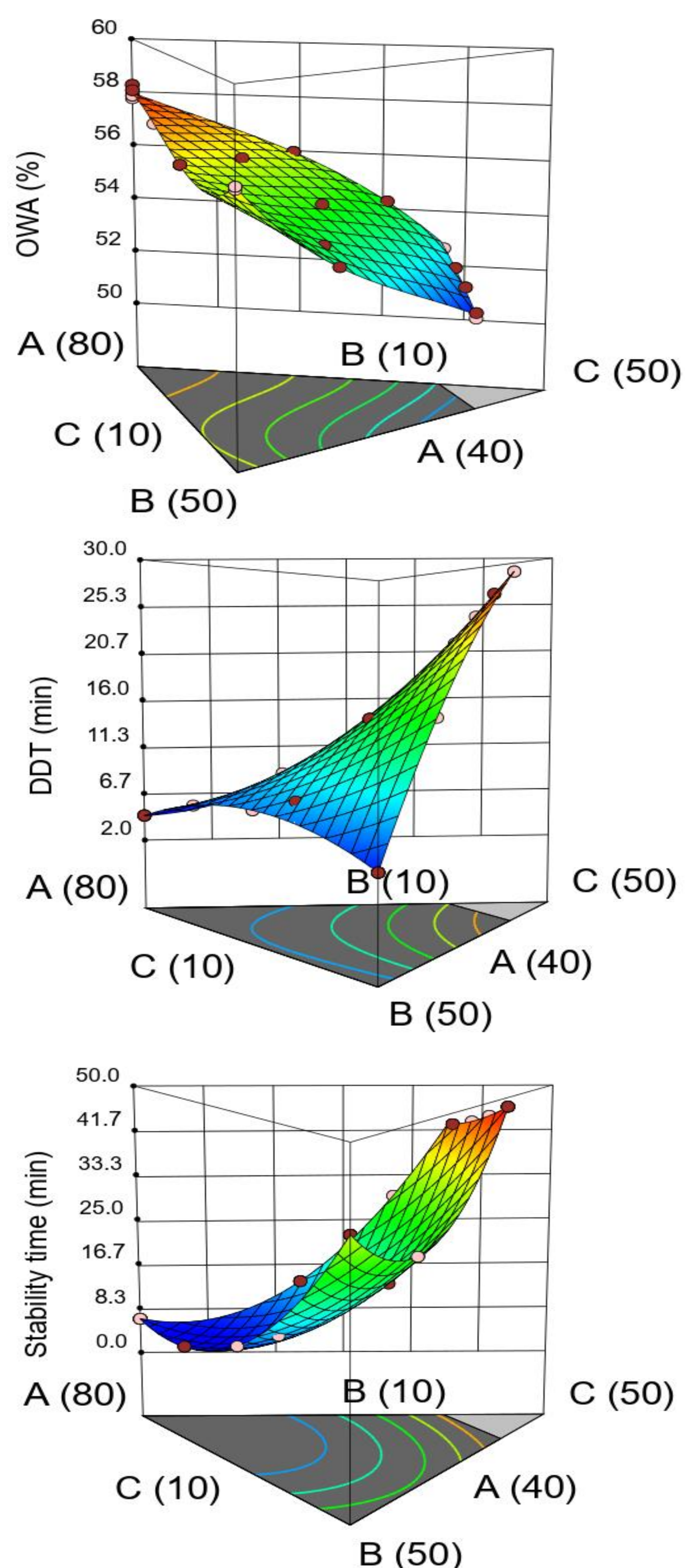


Fig.1. Response surface plots of the effect of wheat-OFSP-Pumpkin proportions on rheological properties of dough.

- OFSP and pumpkin flour decreased loaf volume and specific volume but increased crumb hardness (Fig. 3).
- High baking temperatures (190-200 °C) hardened the crust of bread and minimized moisture loss and hence reduced crumb hardness.
- Crumb redness (a^*) and yellowness (b^*) increased while lightness (L^*) decreased as OFSP and pumpkin flour increased.

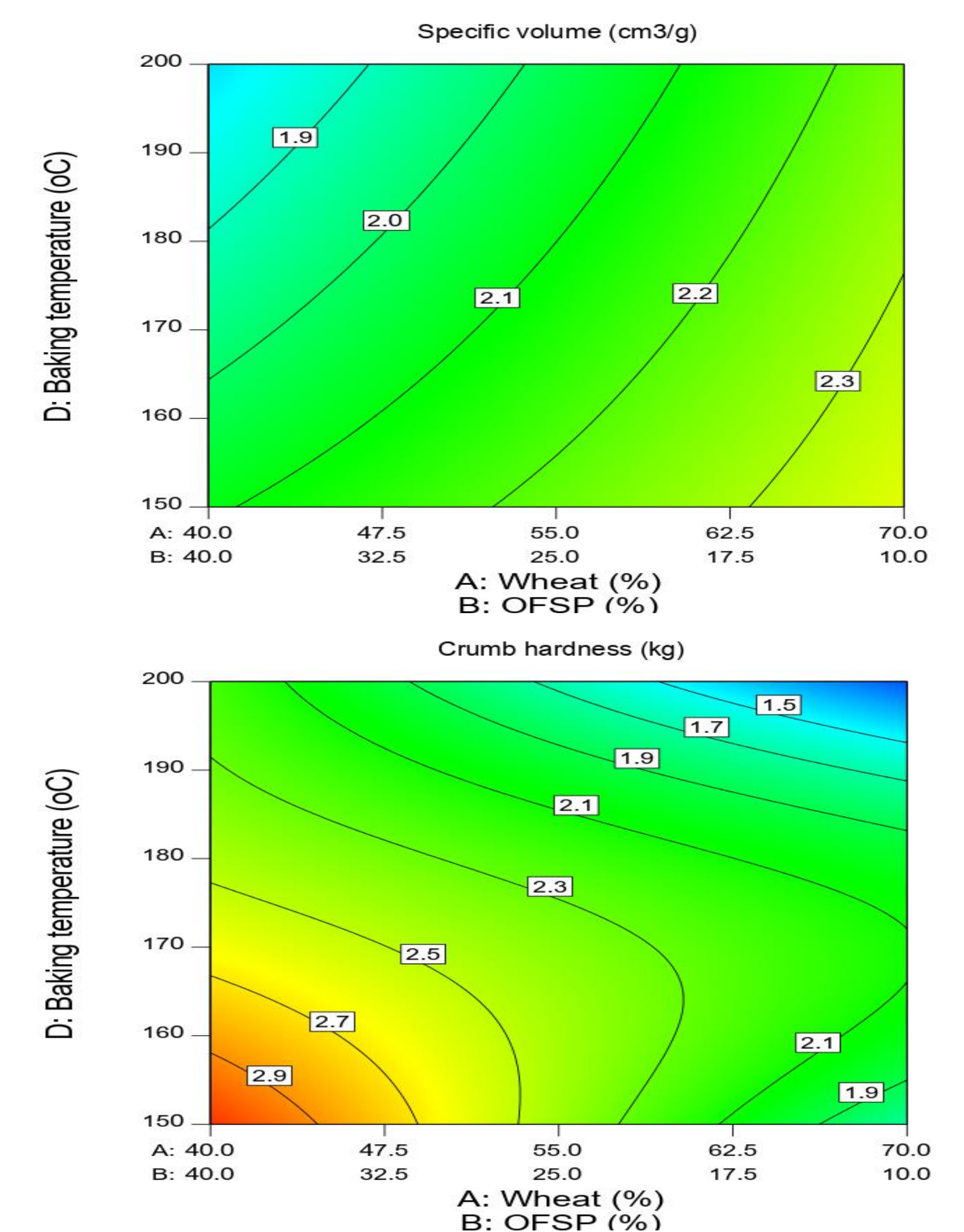


Fig. 3. Contour plot of the effect of wheat & OFSP flour proportions, pumpkin flour (20%), baking temperature and baking time (19min) on loaf specific volume and crumb hardness.

CONCLUSION

- The optimum rates of OFSP and pumpkin flour in wheat flour for bread making were 33 % and 12% respectively and baking at 160-180 °C for 15-17 min produced bread with good qualities.

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