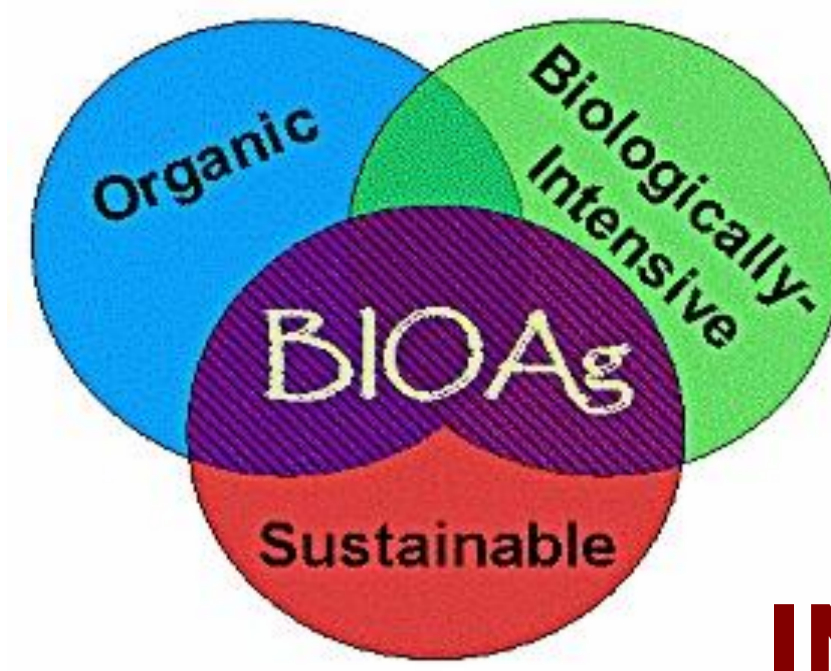


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INTRODUCTION

There is growing consumer demand for organic and no-till wheat, due to their perception as being safe, healthy and sustainable. Considering the known effects of environmental conditions on grain yield and quality, we hypothesized that wheat grain characteristics would vary among different cropping systems. We have analyzed soft white (SW) and hard red (HR) wheat grain produced in organic, no-till, and conventional cropping systems for numerous properties, some of which are presented here, and others presented in the neighboring poster by Park et al., "Functional and Nutritional Characteristics of Wheat Grown in Organic, No-till, and Conventional Cropping Systems". In this report, we emphasize end-use quality and mineral analysis data.

CROPPING SYSTEMS EVALUATED

Organic vs. conventional hard red wheat from Montana (Figures 1 and 4) (Dr. Perry Miller, Bozeman).

Organic vs. conventional soft white wheat from Pullman (Figures 2 and 5) (Dr. Ian Burke).

No-Till vs. conventional tillage soft white wheat from Oregon (Figures 3 and 6) Dr. S. Machado, OSU-CBARC).

ANALYSES CONDUCTED: Wheat quality analyses conducted in duplicate at the USDA-ARS Western Wheat Quality Laboratory at WSU. Mineral analyses were conducted in triplicate on whole grain by Dr. Lin Yan at USDA Human Nutrition Laboratory, Grand Forks, ND.

RESULTS

End-Use Quality, Figures 1-3:

The effects of organic and no-till cropping systems on grain, flour, and end-use products were significant in many cases. **Protein and bread volume, hard red wheat (Figure 1):** Protein was somewhat lower in organic hard red wheat and bread loaf volume decreased slightly compared to the conventional high fertility system. **Protein and cake volume, soft white wheat (Figures 2 and 3):** The effects on protein in the low-N Pullman organic system III (Figure 2) and in the no-till study in Moro (Figure 3) were dramatic. In soft wheat, low protein and weak gluten is desirable; as a result, cake volume increased significantly for the low protein samples.

Mineral Content, Figures 4-6:

Effects of cropping systems on mineral content were relatively small, but were significant in some cases. **Organic hard red wheat (Figure 4)** had significantly lower Fe, Mg, and Mn, which corresponded with lower ash content. (Ash content is an indicator of total mineral content). **Organic soft white wheat (Figure 5)** had higher Mg, P and Zn content, which corresponded with higher ash content. **No-Till soft white wheat (Figure 6)** had lower Ca and higher Mn, but otherwise there were few significant differences in this combined analysis of the three Oregon no-till studies.

ACKNOWLEDGEMENTS

This study was conducted with the financial support of USDA-OREI, WSU-CSANR-BIOAg Program, and Shepherd's Grain.

End-Use Quality: Flour Protein, Bread Loaf Volume, and Cake Volume

Figure 1. Montana Organic Hard Red Wheat 'Hank', 2006 Crop Year. Organic wheat followed spring pea ('Low Fert') or winter pea ('High Fert'); Conventional wheat same rotation but with low and high N fertility.

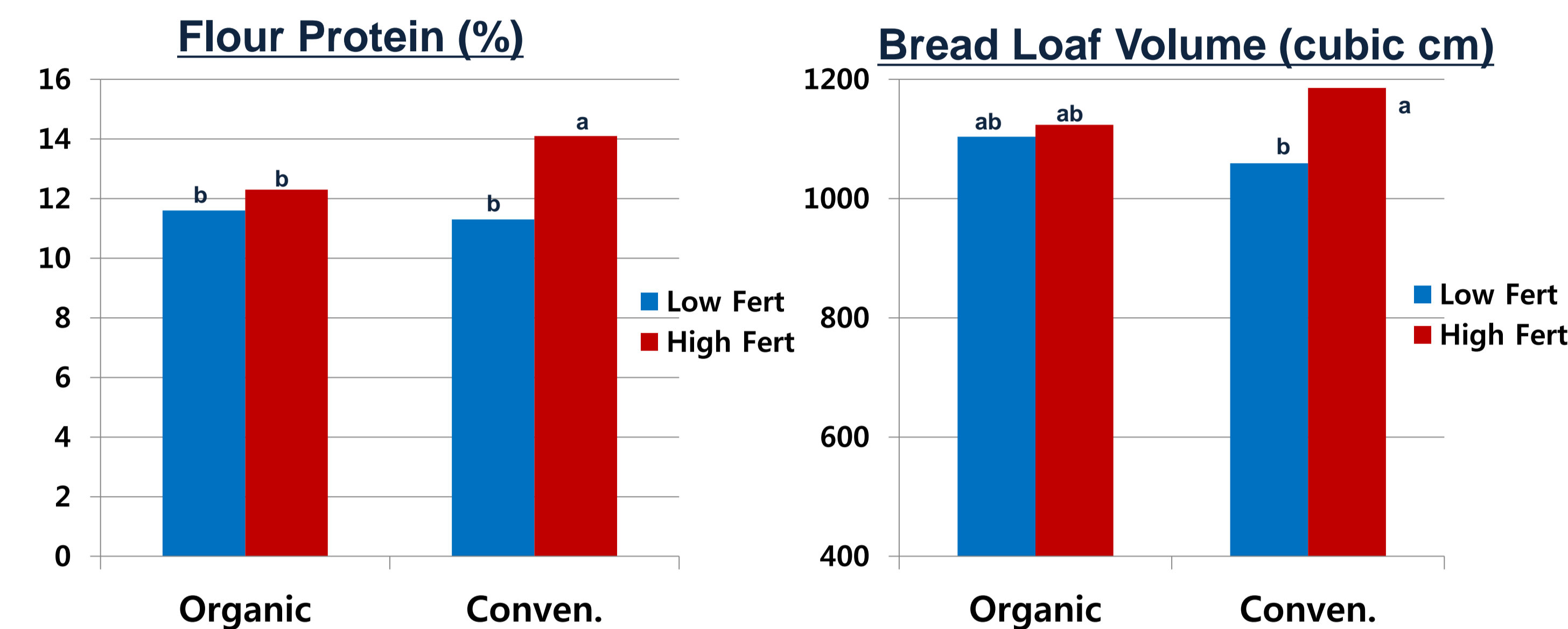


Figure 2. Pullman Organic Soft White Wheat 'Brundage 96', 2010 Crop Year. **System III:** very low N: winter wheat after winter pea (winter pea failed, no N input for five years). **System IV:** winter wheat after winter pea, N applied as manure. **System V:** identical to system IV but with chemical fertilizer, herbicides. **System VI:** winter wheat after spring pea, standard N rates. Organic System III had lowest protein and highest cake volume.

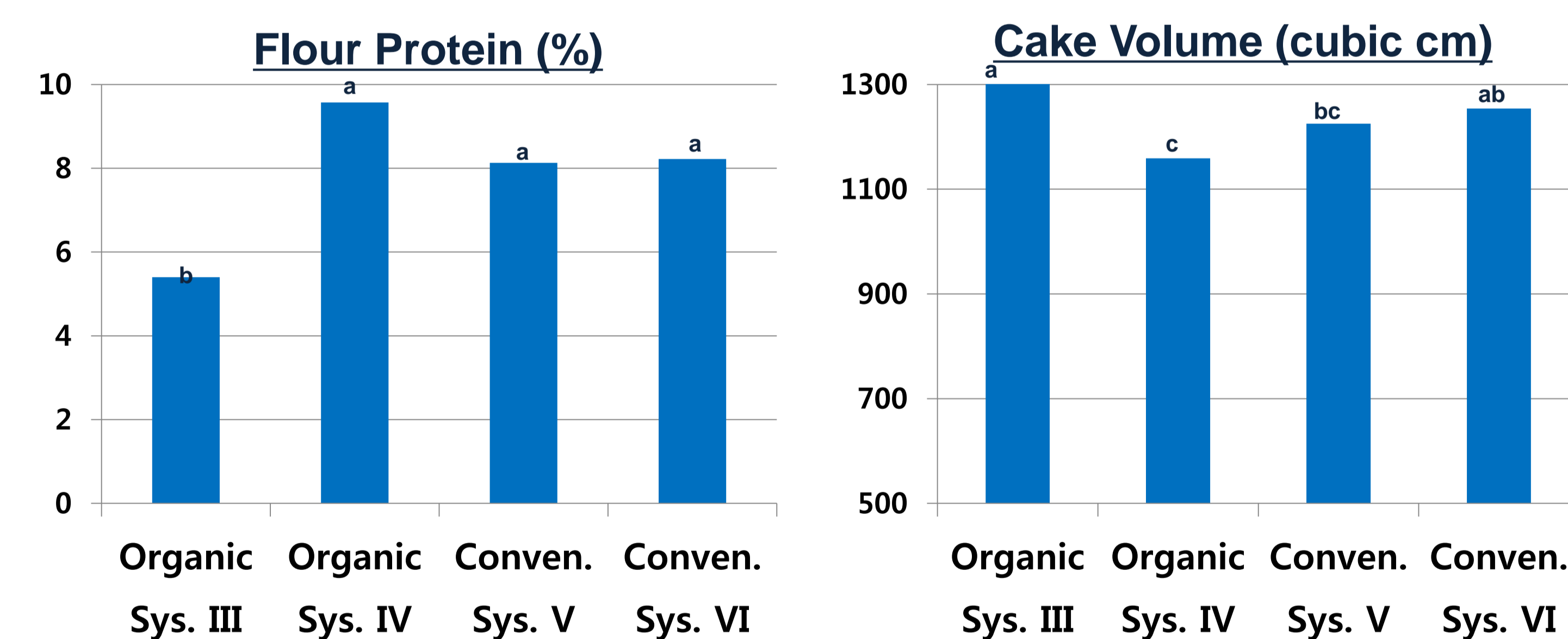
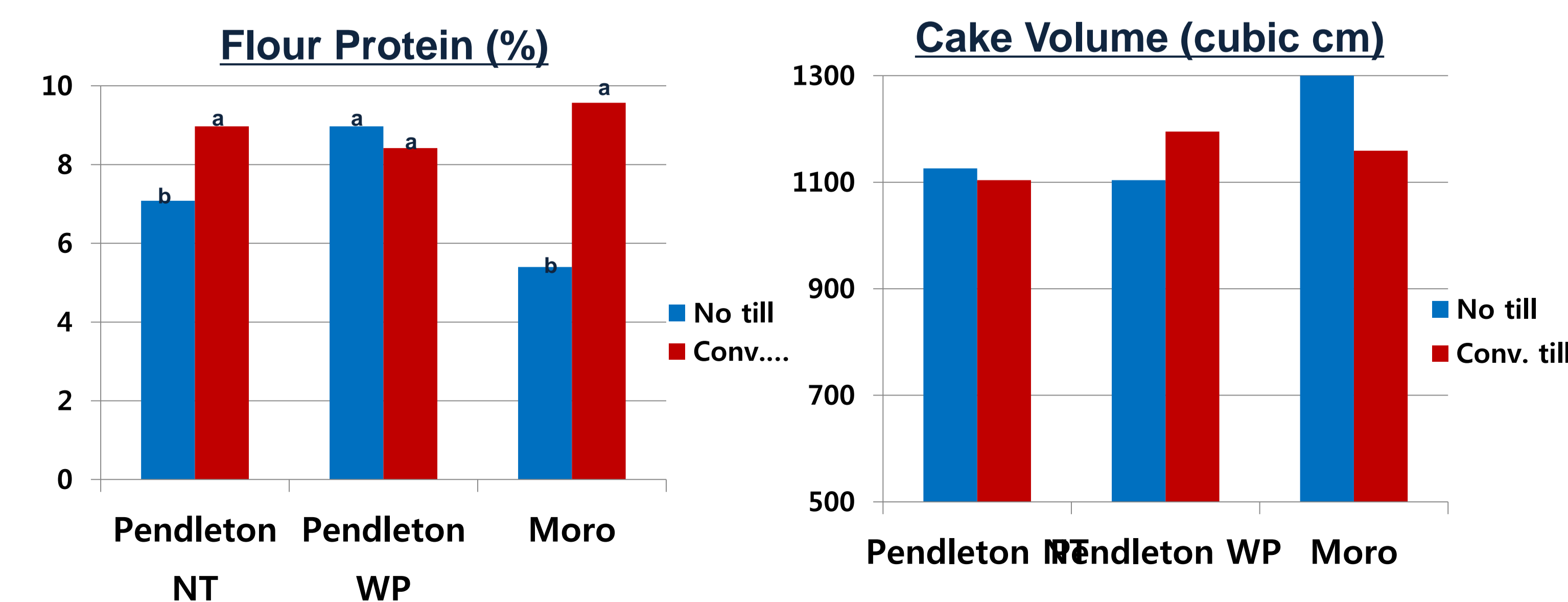


Figure 3. Oregon No-Till Soft White Wheat, 'ORCF 102', 2010 Crop Year, Three Studies: Pendleton NT (wheat/fallow rotation), Pendleton WP (wheat/pea rotation), and Moro (wheat/fallow rotation). The Moro No-Till had lowest protein and highest cake volume. To be repeated in 2011.



Mineral Content (µg/g) (Plotted on Log Scale)

Figure 4. Hard Wheat, Montana, 2-yr average organically grown hard red wheat had lower Fe, Mg, and Mn showing lower ash content.

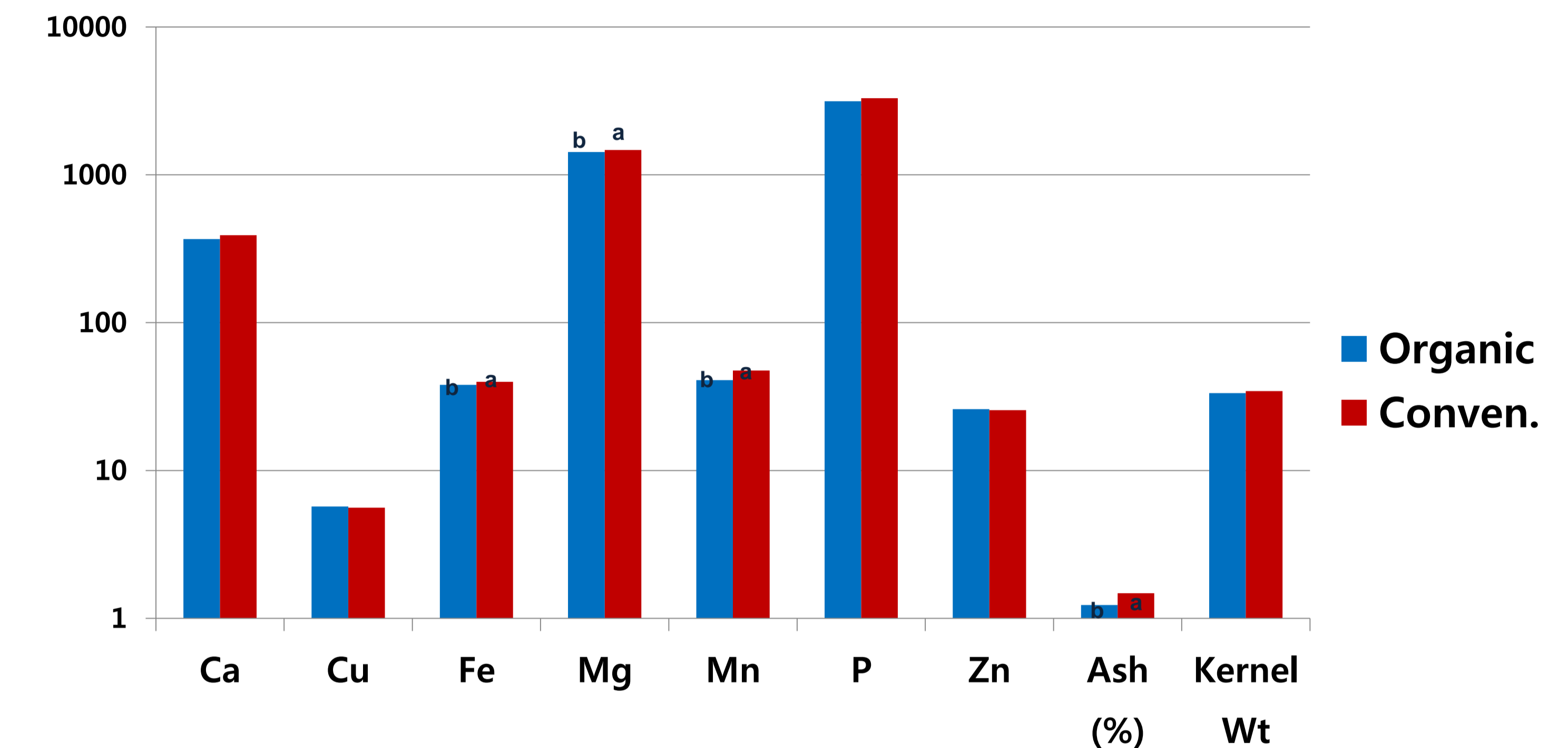


Figure 5. Soft Wheat, Pullman, 2-yr average. Soft white wheat under organic management showed higher Mg, P and Zn content with higher ash content.

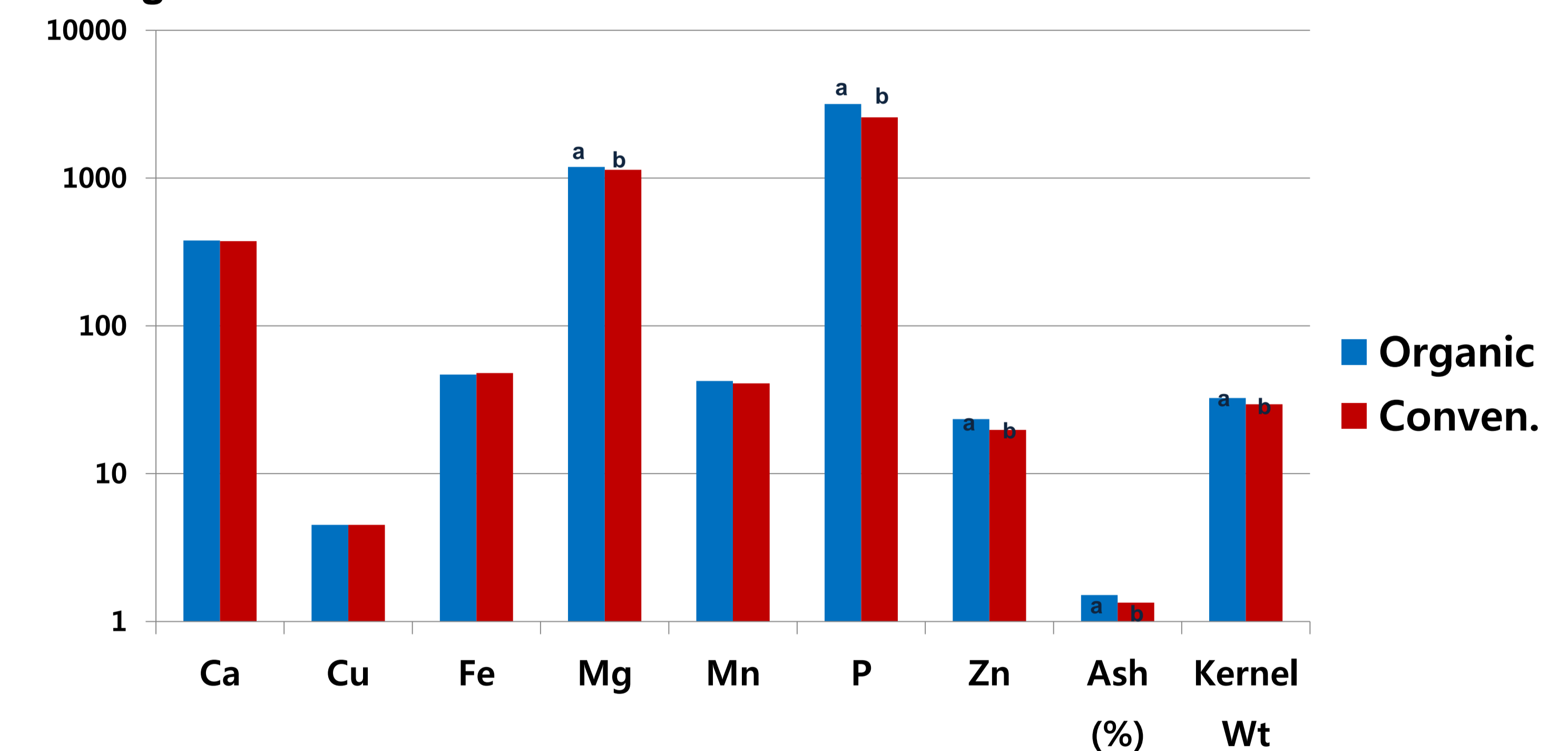


Figure 6. Soft Wheat, Oregon, 2010. Data averaged across three experiments. Soft white wheat under no till management practices showed lower Ca and higher Mn.

