Project No.: UA 3/05

Project Title: Quality of SA Wheat for Asian Noodles: Environmental Variation and its Impact on Consistency and Marketability

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Executive Summary

Yellow alkaline noodles(YAN) represent a significant end-product for Australian Hard and Prime Hard wheat exported to SE Asia and Japan. Traditionally, much of the grain used to supply these markets has been sourced from northern NSW and Qld, although, in theory at least hard wheat produced on SA at the appropriate grain protein content should be suitable for all but the high quality end of the market. Development of cultivars suited to both bread and noodles and adapted to SA growing conditions would add flexibility to marketing SA wheat and be in line with AWB's future of attempting to increase exports to these areas. AS a first step in this process, current SA cultivars, the widely adapted variety Janz, and advanced breeding lines grown at a large number of sites across SA were evaluated for YAN-related quality traits. The initial focus was on noodle colour, colour stability, and traits that impact on colour since product appearance is critical.

Colour and colour stability, as well as components of colour, varied across sites. A significant part of this variation appeared to be due to differences in protein content or grain size. Within sites, genotypes generally maintained their ranking relative to benchmarks confirming that many key noodle colour traits are highly heritable.

Two breeding lines with exceptional colour stability(reduced darkening), due to polyphenol oxidase (PPO) activity that was significantly lower than the current Australian benchmark cultivars, were noted, but unfortunately many breeding lines and recent cultivars fell in the poorer end of the range and are therefore not consistent with improving quality for the Asian noodle market. For optimum end-product flexibility, the yellow pigment content should be sufficient to give creamy rather than yellow tinted flour. Many SA cultivars and breeding lines were above the ideal threshold for yellow pigment, the extreme being Krichauff, and particularly at sites with small grain the result was a wide variation in colour. SA cultivars and breeding lines were also high in lipoxygenase activity, and enzyme that leads to bleaching of yellow pigments in flour products and lack of consistency in end –product colour. Overall the research showed that there is no obvious reason why SA farmers could not produce high quality noodle wheat if well adapted cultivars with the optimum mix of noodle quality traits were available. Some additional attention to agronomic practices may be required in order to hit the target protein range. Neither low nor very high protein and small grain, which usually results from late stress, is ideal for YAN. Improving wheats for this application does not imply reduced quality for other end products such as bread but rather could extend the range of markets available to Australian growers. In this context, the next step involves recombination of well balanced noodle texture properties, typical of the better Aust prime hard wheats, with the best colour and colour stability in a local adapted background. Crossing and population development base on the very low PPO advanced lines identified in this project and APH cultivars from Qld and NNSW has already commenced.

Parallel work in a basic research program on noodle quality funded by GRDC is developing diagnostic tools for more efficient selection for noodle colour and germplasm based on primary synthetic wheat that contains near zero PPO and lipoxygenase. These tools and germplasm could be used to develop a prototype cultivar that could then be used by pant breeders