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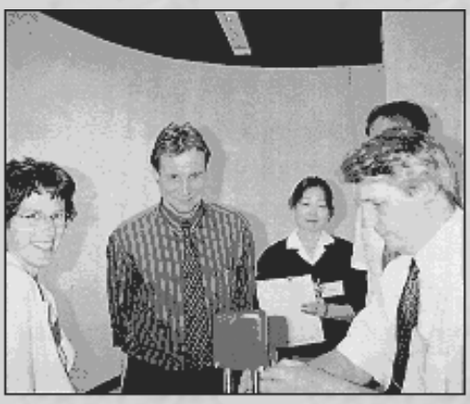
RVA™ Training Seminar in Italy

From 17 to 19 September, Senior Research Scientist, Mark Bason and Product Manager, Bronwyn Elliott visited the historic premises of Foss Italy in Padua for our second Distributor and Customer Training Seminar held in Europe.

The focus of this year's meeting was the starch industry and starch manufacture, with technical presentations and round-table discussion led by Dr Sidd Purkayastha, Physical Research Coordinator with A. E. Staley Manufacturing Co., Decatur, Illinois. Lively discussion about the issues that are important in starch manufacture and ways in which the RVA can address these issues was followed by a practical session demonstrating starch applications on the RVA.



From left to right, Corinne Charrié, Foss France; Niek van Waarde, Foss Benelux; Ran Choi, MHK; and Mark Bason, Newport Scientific.

AACC News

Newport Scientific Pty Ltd again attended the annual AACC Conference, along with American Agents, Foss North America, Inc.

At this year's conference in San Diego, the "General Pasting Method Using the Rapid Visco Analyser" was granted first approval by the American Association of Cereal Chemists. This method has wide applicability for assessing wheat and rye meals and flours for amylase activity and pasting quality as it applies to baking.

There are now seven internationally approved methods for use with the RVA.

Exclusive Distributor for Scandinavia

Newport Scientific is delighted to announce the appointment of Calibre Control International Ltd of Warrington, England, as exclusive distributor for Newport Scientific products throughout Scandinavia. Over the last five years Calibre Control has established a high standard of customer support for the RVA in the UK market and they will now extend their services into Scandinavia with regular site visits, telephone help desk and mail outs.

Customer Service in Australia

All customer support in the Australian market will now be provided direct from Newport Scientific. Customers can telephone, fax or email our head office in Warriewood for all enquiries, including instrument, spare parts and consumables sales, as well as applications, service and software assistance. We look forward to hearing from you!

Welcome to Our Homepage

Come and join us at www.newport.com.au for product information, applications, research and published references on the RVA. You can contact us direct or search our listing to find your local Newport Scientific distributor. Keep up to date with our news page and RVA World, and link to related sites including Foss North America, Inc. RVA Newsletter and AACC.

In this issue

If you're serious about starch . . . there is only the Rapid Visco Analyser

Assessing the Functional Properties of Wheat Flour Proteins

Natalie Turner and Mark Bason
Research Scientists, Newport Scientific

The ability of the Rapid Visco Analyser (RVA) to assess wheat gluten quality has recently been investigated. Following publication of a cold acid method to assess flour, we have also investigated the use of hot aqueous ethanol for assessing commercial gluten and bread wheat flours. Preliminary results from this work are reported in this paper.

An established method for measuring gluten protein quality in soft wheat flour using the MacMichael viscometer, AACC Method 56-80 (1) has been adapted for use in the RVA (2). An additional heating step to 50ºC was added in the RVA method, producing a breakdown parameter, which may indicate starch damage.

Low molecular weight gluten proteins are soluble in cold aqueous ethanol and the solubility of higher molecular weight proteins increases in hot aqueous ethanol. The RVA is able to combine these two conditions, affording the opportunity to rapidly assess heat damage in commercial samples of gluten and wheat gluten quality in flour for baking (3).

The goals of this work were to adapt the MacMichael cold viscosity method to the RVA, and develop methods for assessing heat damage in wheat gluten and gluten quality in bread flour.

Materials and Methods

In order to adapt the MacMichael cold acid method for use in the RVA, a range of 40 advanced breeders lines with known varieties were used. Hardness and protein was measured by NIR, Extensograph and Farinograph by RACI Methods 06-01 (4) and 06-02 (5) respectively, and baking and moisture by AACC Methods 10-09 (6) and 44-15 (7) respectively. For RVA analysis, the profile listed in Table 1 along with 15.00 g flour and 25.0 mi 0.1 M lactic acid was used. ANOVA, correlations and coefficient of variation were carried out using MSUSTAT vers. 4.11.

Table 1.
Acidulated Wheat
RVA Testing Profile

Time (HH:MM:SS)	Value
00:00:00	25.0°C
00:00:00	1000 rpm
00:01:00	160 rpm
00:05:00	25.0°C
00:07:00	50.0°C
00:10:00	50.0°C (end of test)

Sub-samples of one commercial gluten powder were heated in sealed containers at 1OOºC for varying lengths of time to produce varying degrees of heat damage for the heat damaged gluten method. Subjective assessment of these samples showed that they ranged from strongly vital through to non-vital after heat treatment. The profile listed in Table 2 was used with 6.00 g gluten, 3.50 g 95% ethanol and 20.5 g water for RVA analysis.

Four flours of known hardness were used for the baking flour method. The profile listed in Table 2 was also used for this method with 3.00 g flour, 3.50 g 95% ethanol and 20.0 g water.

Table 2.
Heat Damaged Gluten
and Baking Flour RVA Profile

Time (HH:MM:SS)	Value
00:00:00	50.0°C
00:00:00	960 rpm
00:00:30	160 rpm
00:02:00	50.0°C
00:06:30	85.0°C
00:08:30	85.0°C
00:16:00	20.0°C
00:20:00	20.0°C (end of test)

Where ethanol was used the sample was weighed into an RVA canister, ethanol added and mixed into the sample using a teflon stirrer, water was added, then the can was covered with an inverted stopper and shaken for 10 sec.

Results

Cold Acid Method: The method gave acceptable repeatability (C.V. = 3.0%) and was readily able to discriminate between different samples with a range of qualities (Figure 1). Significant correlations with rheological and baking qualities were found particularly for the RVA breakdown parameter. In particular, breakdown correlated to Farinograph dough development time (r = -0.66* stability (r = -0.78* *) and breakdown (r = 0.61 and to loaf volume (r = -0.54*) (significant at p<0.01 *, p<0.001 * *). These correlations were superior to those obtained using protein content. These results indicate potential utility of the method for assessing wheat quality (2).

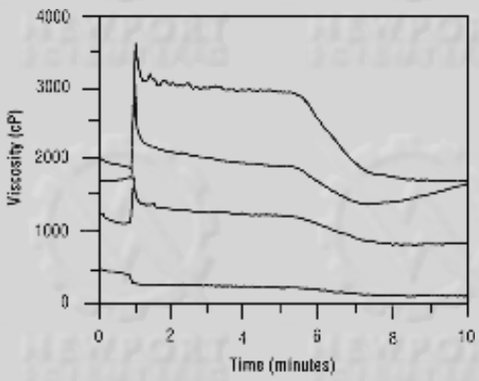


Figure 1.
Examples of RVA viscosity curves of acidulated wheat flour (2).

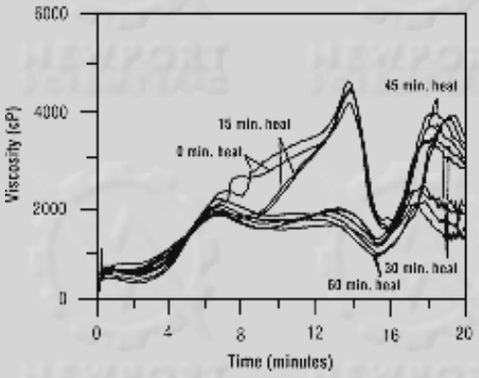


Figure 2.
Duplicate RVA viscosity curves of heat damaged gluten.

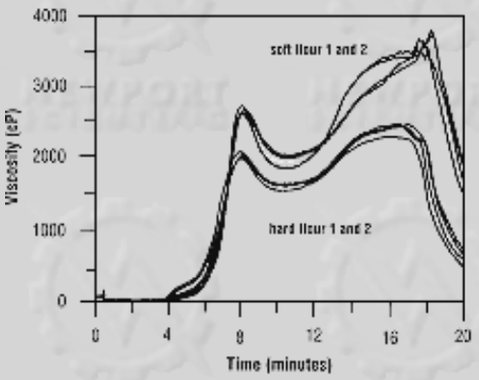


Figure 3.
Duplicate RVA viscosity curves for flour tested using aqueous ethanol.

Heat Damaged Gluten Method:
The method was well repeated for duplicates and able to distinguish between samples of varying amounts of heat damage (Figure 2). A marked reduction in peak viscosity occurred after minimal heat damage, indicating the potential of the method for assessing commercial heat damage. For vital samples, a dough ball formed in the RVA as the sample cooled, and proteins associated, indicating that gluten proteins retained vitality throughout the test.

Gluten Ouality in Flour:
This method was able to discriminate between the soft and hard wheat flours (Figure 3). The differences seen between the samples are an indication of flourhardness. The lower viscosity of the hard wheat samples could reflect lower solubility or unfolding of the suspended glutenin fraction, which is associated with bread making quality.

Further work is under way to verify these results for all three methods on a broader range of samples and compare RVA results to established methods.

Conclusions

The MacMichael method was able to be adapted for use in the RVA. The RVA was able to discriminate between gluten samples with varying degrees of heat damage and flour samples varying in hardness. These methods have the potential to augment existing flour and gluten quality assays such as using sedimentation, Farinograph and Mixograph tests.

Acknowledgments

We wish to thank Helen Allen, NSW Agriculture, for the supply of samples and reference data used in the cold acid method.

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Meet the People:

Natalie Turner

Natalie has been working at Newport Scientific for two years as a Research Scientist. With a Master of Applied Science in Food Science and Nutrition from the University of Western Sydney, her Masters research project was based on starch analysis.

Joining our Senior Research Scientist Mark Bason, Natalie carries out new research projects and customer support. Her major role as our second Research Scientist is developing new applications for the RVA and her appointment is an extension of our ongoing commitment to customer support, offering applications assistance, RVA help and calibration.

New RVA Paddles

Newport Scientific has introduced new paddles for the RVA. The new paddles feature clear polycarbonate plastic which eliminates the warping found in the older white paddles, and a new conical design to improve rigidity and symmetry. Affectionately dubbed the 'cone heads', these new paddles improve the paddle to paddle measurement repeatability, while not significantly altering the mean results obtained. For further information contact Newport Scientific.

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