NOTE ON A SIMPLIFIED PROCEDURE FOR THE PURIFICATION OF WHEAT-FLOUR PENTOSANS[1]

Cereal Chemistry 53(6): 871-873

S. K. KIM[2] and B. L. D'APPOLONIA[2], Department of Cereal Chemistry and Technology, North Dakota State University, Fargo, ND 58102

To study the effect of pentosans in baking, it is essential to have a pure pentosan preparation. Pentosans isolated by the procedure of Medcalf *et al.* (1) have high protein contents prior to DEAE-cellulose fractionation. Since the isolation and purification procedure is time-consuming, a rapid procedure was developed using crude papain (N F VIII, Difco Laboratories, Detroit, Mich.).

The procedure used is shown schematically in Fig. 1. Flour (200 g) was mixed with water (400 ml) in a Waring Blendor for 4 min followed by centrifugation (16,000 × *g*, 20 min). The water-soluble supernatant was heated to 52°C, and papain (1.5 g) was added and allowed to react for 1 hr. After treatment with trichloroacetic acid (6%, w/v) and centrifugation (16,000 × *g*, 20 min), the supernatant was dialyzed at room temperature against distilled water for 2 days and freeze-dried.

The sludge fraction was suspended in distilled water and passed through a 400-mesh sieve. The residue remaining on top of the sieve was washed thoroughly with distilled water, removed, and suspended in distilled water.

The suspension was brought to 0.5*N* by adding 10*N* NaOH; then it was stirred for 1 hr, and centrifuged (16,000 × *g*, 20 min). The supernatant was neutralized with glacial acetic acid and the pentosan material precipitated with 4 vol of 95% ethanol. The resultant crude pentosans extracted from the sludge were dissolved in distilled water (300 ml) and treated with papain (0.7 g) as described for the water-soluble pentosans.

[1]Published with the approval of the Director of the Agricultural Experiment Station, North Dakota State University, Fargo, as Journal Series No. 657A.

[2]Respectively: Graduate Research Assistant and Associate Professor.

For comparison purposes, crude water-soluble and water-insoluble pentosans were isolated according to Medcalf *et al.* (1), using the procedure involving fractionation by DEAE-cellulose with deletion of the α-amylase step. Both preparations were then purified with papain as described previously. Since a dried material was obtained by the procedure of Medcalf *et al.* (1), a 1:1 ratio of papain:pentosan was used.

Protein content was determined by the standard AACC procedure (2) and the ratio of component sugars was measured by gas chromatography (3).

Table I shows the yield, protein content, and ratio of component sugars of the pentosan preparations obtained by the proposed procedure and by the procedure of Medcalf *et al.* (1). The yield of purified water-soluble pentosans was similar for both procedures. The lower recovery of water-insoluble pentosans in the proposed simplified procedure was due to a greater removal of starch during sieving. Papain treatment of the crude water-soluble and water-insoluble pentosans, which were obtained by the procedure of Medcalf *et al.* (1), resulted in approximate 40 and 60% losses, respectively.

The protein contents of the water-soluble and water-insoluble pentosans obtained by the proposed procedure were higher than those obtained by the procedure of Medcalf *et al.* (1) and purified with papain. The lower values obtained may be due to the additional purification steps employed in the

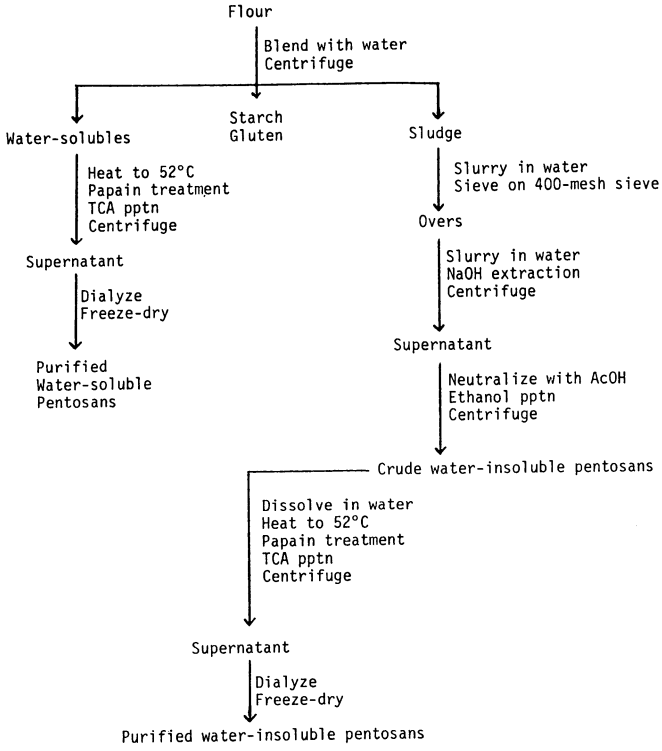

Fig. 1. Schematic diagram for the purification of pentosans from wheat flour.

TABLE I
Yield, Protein Content, and Ratio of Component Sugars of Purified Pentosans

	Yield[a] %	Protein Content[b] %	Ratio of ARA:XYL:GAL	Ratio of ARA:XYL:GLU
Water-soluble pentosans	0.5[c]	5.2	1:1.05:0.54	
	0.4[d]	3.2	1:1.07:0.30	
Water-insoluble pentosans	0.2[c]	6.2		1:1.56:0.41
	0.4[d]	2.1		1:1.48:1.57

[a]Recovery from flour (db).
[b]On a dry basis (N × 6.25).
[c]Present study.
[d]Isolated according to the procedure of Medcalf *et al.* (1), with elimination of α-amylase treatment, and purified with papain.

procedure of Medcalf *et al.* (1). However, the protein contents of both pentosan preparations obtained in the present study were significantly lower than the pentosan preparations obtained by the original procedure of Medcalf *et al.* (1).

Glucose was essentially absent in the water-soluble pentosans obtained by either procedure, whereas in the water-insoluble pentosans glucose was present. The lower glucose value of the water-insoluble pentosans obtained by the simplified procedure is due to a greater removal of glucose during sieving.

The ratio of the principal component sugars, arabinose:xylose, in the water-soluble and water-insoluble pentosans was similar with both procedures.

The main purpose of this study was to obtain pentosan preparations with relatively low protein and soluble starch contents to be used in baking studies. The procedure proposed indicated that crude papain can be used satisfactorily without affecting the integrity of the pentosan structure.

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[Received December 29, 1975. Accepted February 9, 1976]