Note on the Effect of Bran Lipids on Cookie Quality[1]

W. T. YAMAZAKI, J. R. DONELSON, and R. L. CLEMENTS[2]

Cereal Chem. 56(6):584-585

ABSTRACT

Lipids extracted with hexane from the bran of soft red winter or eastern soft white winter wheats increased the cookie-spread potential of test cookies to the same degree as did lipids extracted from flour. In baking tests, addition of bran lipids to the flour as a hexane solution, followed by solvent evaporation, was more effective than adding them as solids to the shortening phase. Because it yields a greater amount of lipids and is less costly than flour, bran is an attractive source of lipids for improving cookie quality.

Lipids extracted from flour by hexane (Clements 1977) and added to flour improve the quality of test sugar-snap cookies by increasing their spread (Kissell et al 1971). They also counteract the spread-decreasing effect of certain materials added to flour to improve the nutritive properties of the product (Kissell and Yamazaki 1975).

Cookie-baking trials in our laboratory indicated that lipids extracted by hexane from wheat bran and from flour may function similarly. Bran contains a higher concentration of lipids than does flour, and because bran is normally less expensive than flour, a closer study of the functional properties of its lipids appeared useful. This article covers baking tests of cookies made with bran lipids.

MATERIALS AND METHODS

A composite bran from experimental Allis-Chalmers millings of soft red winter wheat and another bran of eastern soft white winter wheat were extracted with hexane (Clements 1977), and the lipids

[1]Cooperative investigation between the North Central Region, Science and Education Administration, U.S. Department of Agriculture, and the Department of Agronomy, Ohio Agricultural Research and Development Center, Wooster. Approved as Journal Article 30-79 of the Ohio Agricultural Research and Development Center.

Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the USDA and does not imply its approval to the exclusion of other products that may also be suitable.

[2]Research chemist, chemist, and research chemist, respectively, Soft Wheat Quality Laboratory, North Central Region, USDA-SEA, Ohio Agricultural Research and Development Center, Wooster, OH 44691.

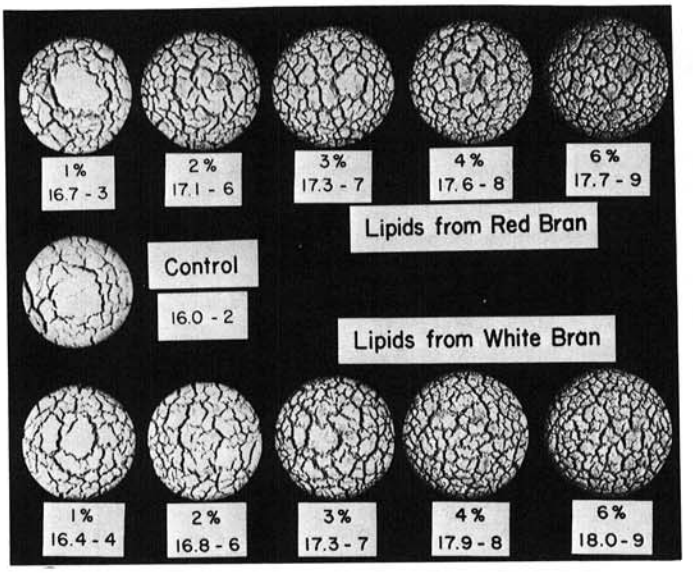

Fig. 1. Cookies made with red-bran lipids (top row) and white-bran lipids (bottom row) added to the flour. Control cookie (center) was made without added lipids. Boxes indicate percent of lipid addition based on flour weight, cookie diameter in centimeters, and top-grain score (9 = excellent, 0 = very poor).

TABLE I
Diameters and Top-Grain Scores of Cookies Made with Bran Lipids Added to the Flour or to the Creamed Mass

	Cookie	
	Diameter (cm)	Top-Grain Score[a]
Parent Flour	17.59	6
Flour lipids added		
4% in creamed mass	18.22	1
4% in flour	18.55	8
10% in creamed mass	18.53	0
10% in flour	19.52	8
Bran lipids added		
10% in creamed mass	18.37	0
10% in flour	19.75	9

[a]Scores ranged from 9 (excellent, good break-up of surface) to 0 (very poor, smooth surface).

were stored as hexane solutions. Lipids were incorporated into cookie doughs either as a solution added to the flour, after which the solvent was evaporated in an air stream, or as a solid addition to the creamed mass prepared for cookie baking (Method III, Finney et al 1950) after the solvent had been evaporated. Cookie diameter and top-grain score served as quality criteria. A large cookie diameter is associated with good flour quality. Top grain is scored from 9 (excellent, good break-up of surface) to 0 (very poor, smooth surface). In independent baking trials, least significant differences of diameter and top-grain score were established as 0.5 cm and 2.5, respectively.

RESULTS AND DISCUSSION

The yields of lipids from the brans ranged from 4.2 to 5.4% on a dry weight basis. These recoveries contrast with those from flour, 1.1–1.2% (Clements 1977).

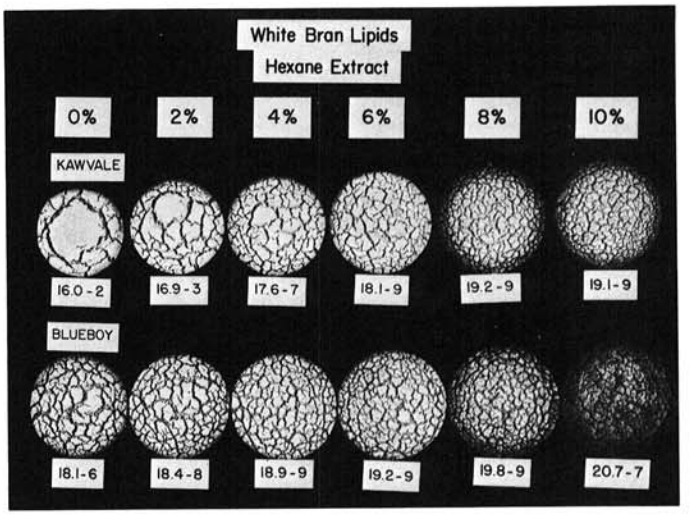

Fig. 2. Cookies made with Kawvale (top row) and Blueboy (bottom row) flours to which indicated percentages of lipids (on a flour basis) from white wheat bran had been added. Boxes beneath cookies indicate cookie diameter in centimeters and top-grain score (9 = excellent, 0 = very poor).

Figure 1 shows the diameter-increasing effect of 1–6% (flour weight basis) bran lipids added to a control flour. The flour was milled from a semihard wheat; therefore the control cookies had a small diameter and a low top-grain score. Lipids recovered from red-wheat bran did not appear to differ significantly from those of white-wheat bran in their spread-increasing effect.

Increasing the lipid addition to 10% of flour weight resulted in further increases in cookie diameter (Fig. 2), although cookies with the highest lipid content were somewhat distorted. Kawvale is a semihard red winter cultivar with poor cookie-spread potential, whereas Blueboy is a soft red winter cultivar known to have good cookie quality. Results comparable to those in Fig. 2 were obtained with red-wheat bran lipids.

Other baking tests we conducted showed that when the lipids were added to the flour, their beneficial effect on cookie diameter and top-grain score was more marked than when they were added to the creamed mass. The difference in product response to mode of lipid addition was quite significant at a high level of lipid addition (Table I) and was evident at a lower level.

The lipids from bran probably increased diameter by the same mechanism as that reported for flour lipids, soy lecithins, and similar emulsifiers in test cookies (Kissell and Yamazaki 1975). An attractive feature of using bran lipids as emulsifiers to improve cookie quality is the relatively low price of the source material; moreover, the yield of lipids from bran is higher than that from flour.

LITERATURE CITED

CLEMENTS, R. L. 1977. Large-scale laboratory Soxhlet extraction of wheat flour, and of intact and cracked grain. Cereal Chem. 54:865.

FINNEY, K. F., MORRIS, V. H., and YAMAZAKI, W. T. 1950. Micro versus macro cookie baking procedures for evaluating the cookie quality of wheat varieties. Cereal Chem. 27:42.

KISSELL, L. T., POMERANZ, Y., and YAMAZAKI, W. T. 1971. Effects of flour lipids on cookie quality. Cereal Chem. 48:655.

KISSELL, L. T., and YAMAZAKI, W. T. 1975. Protein enrichment of cookie flours with wheat gluten and soy flour derivatives. Cereal Chem. 52:638.

[Received May 14, 1979. Accepted August 16, 1979]