A Baking Method to Evaluate Flour Quality for Rotary-Molded Cookies[1]

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ABSTRACT

A baking method to evaluate the quality of flour used in the production of rotary-molded (RM) cookies was developed. The ingredient formula and baking conditions were chosen to be similar to those used in commercial production of RM cookies. The RM method and the American Association of Cereal Chemists' (AACC) official method were compared, using flours of varying quality. The RM and AACC methods evaluated flour quality differently. The AACC method evaluated flour quality on the basis of cookie width, and the RM method evaluated it using cookie thickness and density, which are important in the commercial packaging of RM cookies.

Official method 10-50D of the American Association of Cereal Chemists (AACC) is designed to evaluate flour quality for wire-cut cookies by emphasizing cookie width (W) or spread. For lack of a more suitable method, this method is sometimes used to evaluate flour quality for rotary-molded (RM) cookies, in which little or no spread is desired. When misused for this purpose, the method often gives unsatisfactory data. A specific method for evaluating flour quality for RM cookies is therefore needed.

The difficulty with using the AACC method to evaluate flour quality for RM cookies is that it requires a relatively high sugar level (58% based on flour weight), a long baking time (10 min), a low baking temperature (400° F), and a constant and high dough water content. Commercial RM cookie production may vary sugar content around 30% and may use baking conditions close to 500° F for 5 min or less. Also, the dough water content is varied in relation to the water-carrying capacity of the flour to achieve consistent dough machining properties.

Control of cookie thickness and density are major problems associated with the commercial packaging of RM cookies. A standardized method to evaluate flour quality for RM cookies should therefore emphasize cookie thickness (T) and density. The objective of this study was to develop such a method, the RM method, and to determine its suitability, relative to that of the AACC method, for evaluating flour quality for RM cookies.

MATERIALS AND METHODS

Flour Types and Evaluation Agenda

Three studies were conducted, in which 28 flours were used.

Baking Surface and Dough Docking. Four series of cookies were baked from six flours (three cookie, one cracker, one cake, and one bread) to evaluate the desirability of baking RM method cookies on a solid or wire mesh steel surface and of baking docked or undocked dough pieces. Data obtained under these conditions were correlated with data produced with a pilot plant oven that used wire mesh to produce docked cookies. (The commercial product is usually baked from docked dough on a wire mesh surface.) The treatment series was: undocked dough baked on a solid surface, docked dough baked on a solid surface, undocked dough baked on a wire mesh surface, and docked dough baked on a wire mesh surface.

Flour Quality Indication. Seven good quality commercial cookie flours and seven poor quality flours (two bread and five cookie flours) were evaluated by the RM and AACC methods. Flour quality was judged by the commercial suppliers of the flours. The two cookie methods were compared to see how well they indicated poor cookie and cracker flours.

Correlations. Sixteen cookie and cracker flours of good to poor quality were evaluated by the RM and AACC methods. Cookie variables, flour variables—protein content and alkaline water retention capacity (Yamazaki 1953)—and method variables were analyzed for statistical variance.

Cookie Color

An Agtron (Magnuson Engineers, Inc., San Jose, CA) M-300A and M-500A reflectance spectrophotometer was used to measure the top color of the RM cookies and the bottom color of the AACC cookies. Variations in AACC cookie top cracking made measurement of top color difficult. Cookies were presented to the M-300A through a piece of flat-black plastic containing three holes, each of 53-cm diameter. The red (640-nm) spectral mode was used and standardized with the 00 and 90 discs. Higher color readings indicated lighter color.

Cookie Texture

Cookie texture was measured with a Biscuit Texture Meter (Baker Perkins, Inc., Saginaw, MI) on RM cookies only.

Cookie Baking

AACC cookies were baked according to the AACC Method 10-50D (1962). RM cookies were baked according to the following method.

Apparatus. The apparatus for the RM method was chosen to be similar to that required by AACC method.

The electric mixer (Hobart model N-50) had a 5-qt bowl (with water jacket) and flat beater. Water was circulated at 26.7°C (80° F).

A solid steel cookie sheet of the type used in commercial solid-band cookie ovens was made from hardened and tempered steel (Sandvik Conveyor, Inc.). The sheet was 0.055 in. thick and 12 × 16 in. in size with a 1-in. handling lip bent upward on the long end of the sheet. The sheet was conditioned three times on both sides with a very thin film of ingredient shortening by being heated at 500° F for 15 min. Also, a wire mesh baking sheet was made by welding

TABLE I
Rotary-Molded (RM) Cookie Ingredient Formula

Ingredient	Weight (g)
Flour (as is basis)	400.0
Sugar[a]	132.0
Shortening[a]	112.0
Salt	4.0
Glucose	4.0
Sodium bicarbonate	1.08
Ammonium bicarbonate	0.80
Distilled water	(determined by the RWAM[b])

[a] Sugar and shortening are those specified in AACC method 10-50D (1962). Shortening should be tempered 24 hr at 80° F before being used.
[b] Research water absorption meter.

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commercial wire mesh in a 17.5 × 13.5 in. steel frame. The wire mesh sheet was also conditioned three times as above.

Two 1 × 15 in. metal gauge strips, 3 mm thick; a 60-mm cookie cutter; and a rolling pin (with cover) 12 in. long and 2.5 in. in diameter were used.

The rotary electric baking oven had a hearth consisting of an oven-type, chain-link wire screen (3-cm diagonal openings) placed on a 0.25-in. thick steel plate. Top and bottom heat was at medium setting and oven vents were closed.

A cylindrical (straight-sided) water pan was placed on the oven hearth. The ratio of the surface area of the water to the internal volume of the baking chamber was approximately 0.1.

The research water absorption meter (RWAM) (Henry Simon, Ltd., Kansas City, MO) had an extrusion cylinder equipped with a water-jacket and water circulated at 26.7°C (80°F). Total extrusion weight (including plunger) was 5,398 g; the extrusion orifice was 0.75 in. in diameter.

The dough docker (circular) contained ten evenly spaced flattened nails.

Formula. The RM ingredient formula is presented in Table I. The RM dough water content was determined with the RWAM on three doughs, each having a different water level.

Immediately after mixing, each dough was formed into a ball by hand and placed in a covered water-jacketed mixing bowl with water circulated at 26.7°C (80°F). The dough was extruded every 5 min from the time mixing was completed until 30 min of total rest or "lay" time had passed.

These data were plotted on graph paper, usually as straight lines, and the seconds of extrusion time at 15 min rest time was determined for each water level from each plot. The water levels were chosen so that at least one dough had a consistency between 5 and 20 sec at 15 min rest time and at least one dough had a consistency between 20 and 45 sec at 15 min rest time. A range of dough water of 1–2% based on flour weight was usually appropriate. Doughs with a consistency of less than 5 sec or more than 45 sec at 15 min rest time were not used.

A plot was made of the three water levels versus the log of the extrusion seconds at 15 min rest time. From this plot, the amount of dough water needed to achieve a RWAM consistency of 20 sec was determined for the flour. This was the appropriate dough water level for the RM method for that flour.

TABLE II
Analysis of Variance[a] for Characteristics of Rotary-Molded Cookies Baked on Solid and Wire Mesh Baking Surfaces

Quality Characteristics	Source	Degrees of Freedom	Sum of Squares	F Value	Probability > F
Width	Flour	5	6.4176	6.15	0.0339
	Surface	1	9.7155	46.58	0.0010
	Docking	1	1.8760	8.58	0.0301
	Error	5	1.0428		
Thickness	Flour	5	1.5045	34.43	0.0007
	Surface	1	1.6854	192.84	0.0002
	Error	5	0.0437		
Width/thickness ratio	Flour	5	9.0169	12.53	0.0074
	Surface	1	14.2142	98.79	0.0002
	Error	5	0.7194		
Density	Flour	5	0.0197	290.57	0.0001
	Docking	1	0.0003	22.71	0.0050
	Flour-surface	5	0.0008	11.41	0.0092
	Flour-docking	5	0.0008	11.58	0.0089
	Error	5	0.0001		
Texture	Flour	5	139.8750	36.10	0.0006
	Docking	1	9.3760	12.10	0.0177
	Error	5	3.8750		

[a] Statistical model: dependent variable = constant + flour + surface + docking + flour-surface + flour-docking + error.

Baking Procedure

A cookie sheet was lightly greased with ingredient shortening and the excess wiped away until only a thin film remained.

Shortening, sugar, and salt were creamed and mixed on speed 1 for 30 sec. After being scraped, they were mixed on speed 2 for 30 sec and scraped. (The shortening was cut into several pieces by hand with the beater before being mixed.)

Water in which the sodium bicarbonate, ammonium bicarbonate, and glucose were dissolved was added. The ingredients were mixed on speed 1 for 30 sec and scraped, then mixed on speed 2 for 30 sec and not scraped.

Flour was added. The dough was mixed on speed 1 for 15 sec and scraped. This procedure was repeated three more times, with scraping between each period, for a total of 1 min mixing time.

Immediately after being mixed, the dough was formed into a ball by hand and placed in a covered water-jacketed mixing bowl with water circulating at 26.7°C (80°F).

For baking on a solid sheet 15 min after mixing: dough temperature was recorded, and six equal portions of dough were placed on the cookie sheet and gently pushed down with the palm of the hand. Dough pieces were gently rolled to proper thickness with the covered rolling pin and gauge strips and were cut with the cutter. Excess dough was removed from around the cutter with a small spatula before the cutter was removed. Dough was docked if desired.

For baking on a wire mesh sheet 15 min after mixing: dough temperature was recorded, and six equal portions of dough were placed on grease-proof paper and rolled to thickness, using gauge strips. Dough was removed from around the cutter with a small spatula before the cutter was removed. Dough was docked if appropriate. Dough pieces were transferred to the wire mesh sheet with a spatula.

Dough was immediately baked at 500°F for 5.0 min on a solid baking sheet or for 5.5 min on a wire mesh sheet.

After being baked, cookies were removed from the solid sheet, cooled on absorbent paper for 10 min, and stored in a plastic bag. Cookies baked on the wire mesh sheet were cooled for 10 min, tapped from the bottom to loosen them from the mesh, and stored in a plastic bag.

The width of six cookies laid edge to edge was measured. Each cookie was rotated 90° and measured again. The mean of these two measurements was the six-cookie width (W_s). The six cookies were stacked and their thickness measured. Cookies were turned, restacked in a random order, and measured again. The mean of these two measurements was the six-cookie thickness (T_s). The six cookies were weighted (Wt_s), and the average density (D) was

TABLE III
Means[a] of Quality Data of Rotary-Molded (RM) Cookies Baked on Solid and Wire Mesh Baking Surfaces and of RM Cookies from Docked and Undocked Dough Pieces

Quality Characteristics	Baking Surface		Dough Pieces	
	Solid	Wire Mesh	Undocked	Docked
Width,[b] cm	38.83 a	37.56 b	37.91 a	38.47 b
Thickness,[b] cm	3.93 a	4.46 b	4.23 a	4.16 a
Width/thickness ratio[b]	9.97 a	8.43 b	9.02 a	9.37 a
Density[b,c] g/cc	0.459 a	0.457 a	0.461 a	0.454 b
Weight,[d] g	58.8	62.3	60.8	60.3
Agtron color[d]	56.9	50.3	53.8	53.4
Texture,[b] sec	18.8 a	18.4 a	19.3 a	18.0 b

[a] Mean of 12 observations from six flours (means of both baking surfaces contain both docked and undocked dough pieces; means of both dough pieces were from both baking surfaces).

[b] Reading horizontally, means followed by the same letter are not significantly different at the 0.05 level of probability as determined by Duncan's multiple range test.

[c] Flour-surface and flour-docking interaction terms are significant at the 0.05 level of probability for density.

[d] The statistical model was unable to explain variation among means at the 0.05 level of probability.

calculated:

$$D = \frac{\frac{Wt_s}{6}}{(\pi)\left(\frac{W_s}{6}\right)^2\left(\frac{T_s}{6}\right)}$$

The cookie sheet was washed in warm, slightly soapy water but not allowed to soak. It was rinsed and immediately dried to avoid rust formation.

The procedure was repeated two more times and the cookie size measurements for each flour were reported as the mean of three observations, plus or minus one standard deviation.

RESULTS AND DISCUSSION

RM Method

The RM method differs from the AACC method primarily in formula and baking conditions. The RM method has a 42% reduction in leavening agents, a 57% reduction in sugar, a 27% reduction in glucose, and approximately a 64% reduction in added dough water. The RM oven temperature is 25% higher and the baking time is 50% shorter. The cookie sheet is changed from aluminum to commercial band-oven steel or wire mesh. Depending on the flour used, RM cookies can be expected to have a moisture content of approximately 2.5% and a pH of approximately 7.2.

The RWAM consistency of 20 sec was chosen by evaluating the doughs of six different commercial RM cookie products. Flours may vary in required water from 12 to 16% based on flour weight and will average approximately 14% (56 ml). When the doughs were tested with the RWAM, they contained all ingredients, including the leavening agents. The use of 20 ml of fresh stock solution of leavening agents (13.5 g of sodium bicarbonate plus 10.0 g of ammonium bicarbonate per 250 ml) and 20 ml of fresh stock solution of glucose (50 g/250 ml) was found to be expedient. The remainder of the dough water was then adjusted with distilled water.

All sugar was passed through a 56 GG sieve (295-μ openings). The pan of water placed in the oven was an attempt to simulate the humidity build up in commercial ovens. It also eliminated the need to bake a "dummy" batch of dough before starting work.

Evaluation of Baking Surface and Dough Docking

Four series of cookies were baked from six flours to evaluate the desirability of baking RM method cookies on a solid or wire mesh steel surface and from docked or undocked dough pieces. The analysis of variance table for the characteristics of RM cookies obtained from the four treatment combinations is presented in Table II. Cookie width, thickness, W/T ratio, density, and texture were significant with the statistical model. Only those source items having an F value probability greater than $P = 0.05$ were included in the table. The model was not significant at the $P = 0.05$ level for cookie weight and color.

Most variation in cookie width was explained by the baking surface used. Flour quality and dough docking were also significant. Cookie thickness variation was also explained by baking surface and flour quality. Dough docking did not significantly explain variations in thickness. Cookie density was the only characteristic that had significant interaction terms. Variations in density were therefore explained by combinations of flour quality and baking surface and of flour quality and dough docking. Cookie texture variation was best explained by flour quality variations as well as by docking. Baking surface did not significantly explain variations in cookie texture.

The means of the values from both baking surfaces and both docking techniques are presented in Table III. When compared to cookies baked on the solid surface, those cookies (both docked and undocked) baked on the wire mesh surface had significantly less width and W/T ratio and significantly greater thickness and weight. Comparison of docked and undocked cookies (baked on both surfaces) showed that the docked cookies had significantly greater width and significantly less hardness. The effect of docking on cookie density depended on the flour(s) evaluated.

The data from the four treatment series were correlated for each flour with cookie quality characteristics obtained from cookies baked in the pilot-scale oven. Correlations determined to be statistically significant at the $P = 0.05$ level of probability or less are

TABLE IV
Significant Correlations of Quality Characteristics of Rotary-Molded Cookies and Pilot Oven Cookies Under Various Treatment Conditions

Treatment Combinations: Baking Surface	Treatment Combinations: Dough Docking	Correlated[a] Quality Characteristics
Solid sheet	Undocked	Width ($r = 0.87$, $P = 0.02$)
		Weight ($r = 0.91$, $P = 0.01$)
Solid sheet	Docked	Density ($r = 0.82$, $P = 0.04$)
Wire mesh sheet	Undocked	Width ($r = 0.95$, $P = 0.01$)
Wire mesh sheet	Docked	Width ($r = 0.94$, $P = 0.01$)
		Thickness ($r = 0.84$, $P = 0.03$)
		Width/thickness ratio ($r = 0.83$, $P = 0.04$)
		Density ($r = 0.88$, $P = 0.02$)
		Color ($r = 0.85$, $P = 0.03$)

[a] r = linear correlation coefficient, P = probability level.

TABLE V
Comparison of Evaluations of Flours[a] by Two Methods

Qualities Compared	Number of Poor Quality Flours with Means: Statistically Different[b] from Means of Good Quality Flours, Shown by Method — AACC	RM	Outside Good Flour Cut-Off Limits, Shown by Method — AACC	RM
Width	7[c]	0	7[c]	3
Thickness	3	5[c]	3	7[c]
Width/thickness ratio	3	5[c]	3	6[c]
Weight	3[c]	0	5[c]	3[c]
Density	3[d]	4[c]	6[d]	7[c]
Combined thickness and density	0	2[c]	3	7[c]

[a] Total flours = 7.
[b] At $P = 0.05$ by Duncan's multiple range test.
[c] Contains both bread flours.
[d] Contains one bread flour.

TABLE VI
Mean, Between-Flour Variance, Range, and Within-Flour Variance of the Size, Density, and Weight of Cookies Made by the RM and AACC Methods from 16 Flours

Variable and Method	Mean[a] (cm)	Between[b] Flour Variance	Range	Within[b] Flour Variance
Width				
RM	38.25	0.168 a	1.59	0.0349 a
AACC	45.52	1.579 a	4.29	0.2070 b
Thickness				
RM	4.13	0.0632 a	1.15	0.0091 a
AACC	6.03	0.3194 b	1.94	0.0098 a
Width/thickness ratio				
RM	9.32	0.4820 a	3.50	0.0666 a
AACC	7.61	0.6319 a	2.91	0.0322 a
Density				
RM	0.443	2.65×10^{-4} a	0.063	3.75×10^{-5} a
AACC	0.428	4.78×10^{-4} b	0.091	5.17×10^{-5} a
Weight				
RM	58.3	2.40 a	8.3	1.50 a
AACC	116.0	13.10 b	16.9	2.48 a

[a] Mean of 48 observations.
[b] Within each variable, values followed by the same letter are not significantly different at the 0.05 level of probability as determined by an F distribution statistic.

TABLE VII
Correlation Coefficients[a] Between Values of Flour Analysis and Cookie Size Characteristics[b] Determined by the RM and AACC Methods

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
A	···	−0.78	0.82	0.66	ns	ns	ns	ns	ns	−0.69	0.64	0.73	ns	ns	ns	ns	A
B		···	−0.98	−0.94	0.59	ns	−0.71	ns	ns	0.73	−0.60	−0.87	ns	ns	0.69	ns	B
C			···	0.91	−0.56	ns	0.67	ns	ns	−0.66	0.53	0.87	ns	ns	−0.62	ns	C
D				···	ns	ns	0.80	ns	ns	−0.65	0.50	0.84	ns	ns	−0.58	ns	D
E					···	ns	ns	−0.64	ns	ns	ns	ns	ns	ns	0.58	−0.55	E
F						···	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.55	F
G							···	ns	ns	−0.55	ns	0.70	−0.60	ns	ns	ns	G
H								···	−0.65	ns	−0.50	ns	ns	0.61	ns	0.67	H
I									···	−0.68	0.82	ns	ns	−0.76	ns	−0.70	I
J										···	−0.97	0.75	0.63	0.57	0.66	ns	J
K											···	0.63	−0.55	−0.66	−0.54	ns	K
L												···	ns	ns	−0.63	ns	L
M													···	ns	0.56	ns	M
N														···	ns	0.56	N
O															···	0.71	O
P																···	P

[a] Correlation coefficients greater than 0.50 are significantly different from zero at the $P = 0.05$ level of probability and those 0.63 and greater are significantly different from zero at the $P = 0.01$ level of probability. ns = not significant at the $P = 0.05$ level of probability.
[b] A = RM width, B = RM thickness, C = RM W/T ratio, D = RM density, E = RM weight, F = RM color, G = RM texture, H = RM water level, I = AACC width (W), J = AACC thickness (T), K = W/T ratio, L = AACC density, M = AACC weight, N = AACC color, O = protein, P = AWRC.

presented in Table IV. The best correlations were obtained between pilot-scale oven data and data from RM method cookies that were docked and baked on a wire mesh baking surface. Both thickness and density, important RM method cookie characteristics, were correlated with the pilot-scale oven data when this treatment combination was used.

Comparison of RM and AACC Methods Using Good and Poor Quality Flours

Table V shows the number of poor quality flours the means of which were statistically different from those of any of the seven good quality flours. The AACC method was statistically more effective in differentiating the poor quality flours by cookie width, which is its designed function. The RM method was better at finding the poor quality flours using cookie thickness, W/T ratio, and density. When the critical qualities of thickness and density were combined, the AACC method could not distinguish any of the poor quality flours. However, an evaluator doing routine analysis of cookie flours would probably establish cut-off limits for the various cookie qualities, as was done in Table V, by using the upper and lower range limits of the seven good quality flours. The table shows the number of poor quality flours with means that did not fall within the good quality flour range limits. The RM method was again better at distinguishing poor flour quality by using cookie thickness, W/T ratio, density, and combined thickness and density. The AACC method best measured flour quality with cookie width and density.

A cookie flour quality evaluation method should be capable of differentiating between cookie and bread flours. Using the qualities, critical to RM commercial cookies, of thickness and density, the AACC method was poor at distinguishing the two bread flours from the good quality cookie flours. The bread flours caused rounded and lumpy AACC cookie tops, which caused misleading thickness measurements. The AACC method placed both bread flours in the good flour range for cookie thickness and W/T ratio.

The AACC W/T ratio (which is multiplied by 10 to find the cookie "spread factor") was unsatisfactory in Table V for differentiating the poor quality and bread flours. Matz (1978) has stated that expressing the width and thickness as a ratio hides information about the two measurements. This is espeically true of thickness.

Variance and Correlation of RM and AACC Methods

The mean, between-flour variance, range, and within-flour variance of sixteen cookie and cracker flours of good to poor quality are presented in Table VI. Across all flours, the RM method had significantly less variability in width, thickness, density, and weight. The within-flour variance showed the RM width to have less variance; otherwise, no significant difference existed in the reproducibility of the two methods. However, if the within-flour variance of the AACC width is compared to the within-flour variance of the RM thickness or RM density, the reproducibility of the AACC width is seen to be significantly less.

Correlation coefficients are presented in Table VII for RM and AACC cookie width, thickness, W/T ratio, density, weight, and color; RM texture and dough water level; flour protein; and alkaline water retention capacity (AWRC) for sixteen cookie and cracker flours. Most correlations were not high but indicate statistically significant trends and show the degree of difference or similarity between the RM and AACC methods.

The RM thickness and AACC width were not significantly correlated. Because these are the main qualities shown by the two methods, the methods must evaluate flours differently. RM density, another important quality, was highly correlated with RM thickness (−0.94), but AACC density was not significantly correlated with AACC width. This does not recommend AACC density as a quality-measuring variable. The densities of both methods were best correlated with their respective cookie thicknesses.

AACC cookies that were thinner and wider tended to be darker. The color of RM cookies was not significantly correlated with cookie size, probably because they did not have a wide enough range of thickness.

Texture measurements on RM cookies were correlated with RM density (0.80) and RM thickness (−0.71). RM cookie weight was greater in thicker cookies (0.59) and in those made from higher protein flours (0.58), flours having less AWRC (−0.55), and flours requiring less dough water (−0.64). AACC cookie weight was also greater in thicker cookies (0.63) and when made with higher protein flours (0.56). Flour protein content was positively correlated with increased thickness in both RM (0.69) and AACC (0.66) methods and negatively correlated with the densities of both RM (−0.58) and AACC (−0.63) cookies.

AWRC was negatively correlated with AACC cookie width (−0.70). The best flour quality correlation with AACC width was that with AWRC; however, AWRC was not statistically correlated with the width, thickness, or density of RM cookies. The color of RM (0.55) and AACC (0.56) cookies was lighter as flour AWRC increased. AWRC was positively correlated with RM dough water level (0.67).

The individual RM and AACC cookie size characteristics were therefore correlated quite differently with flour protein and AWRC, especially RM thickness and density and AACC width. AACC width was significantly correlated with AWRC, whereas RM thickness and density were best correlated with protein. This also indicates that the two methods evaluate flour quality differently.

CONCLUSIONS

A baking procedure (the RM method) evaluated the quality of flours used in the production of RM cookies. The RM method differed from the AACC method in formula and baking conditions. Based on comparisons of both methods' data and correlations, we concluded that the RM and AACC methods evaluate flour quality differently.

The AACC method evaluates flour quality using the variable of cookie width, whereas the RM method uses the variables of cookie thickness and density, which are important in the commercial packaging of RM products. From correlating RM method cookie data with data obtained from a pilot plant oven, we concluded that dough pieces should be docked and baked on a wire mesh sheet when the commercial product is also produced in this manner.

Tolerances can be established for AACC cookie width or RM cookie thickness and density for flour acceptance or rejection. Additionally, the RM method may give an indication of whether a borderline quality flour will be expected to give packaging problems with RM cookie thickness (package height) or density (package weight) and thus will allow the formula or baking conditions to be corrected for the specific difficulty. The RM method may also give a relative indication of the water requirements for a flour to be used in RM commercial production. The RM method appears to be better suited for evaluating the quality of flours used in commercial RM cookie production.

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