

Honey in Ethnic Flat Breads

Summary of a research project funded by the National Honey Board and conducted by Colorado State University.

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Background

Flat breads include a variety of ethnic products such as Mediterranean breads (focaccia), Middle Eastern breads (pita, barbari, zata), Indian breads (naan), and other Asian or European breads. Each may be extremely different from one to the next. From the savory

taste of Jamaican cornbread to the rich taste of an English scone, all offer a world of new opportunities for bakers. However, even though each product is different, all have one thing in common: ethnic flat breads have become increasingly popular in the United States in recent

years.

The purpose of this project was to optimize quality attributes of several traditional ethnic flat breads and incorporate honey into the formulas for production in retail and/or industrial bakeries.

Table 1: Mean Values For Overall Quality For 10 Ethnic Flat Breads

	Control	Dry Honey	Liquid Honey
Bannock	3.6 ^a	2.9 ^b	2.4 ^c
Barbari	3.8 ^a	2.2 ^b	2.3 ^b
Pita	2.9	2.7	2.9
Rotis	4.0 ^a	2.7 ^b	2.9 ^b
Ksra	3.7 ^a	2.7 ^b	2.8 ^b
Naan	3.4 ^a	3.1 ^b	2.8 ^b
Jamaican Cornbread	3.0 ^a	2.5 ^b	2.5 ^b
Focaccia	3.8 ^a	2.2 ^b	2.5 ^b
Scones	3.3	3.1	3.1
Zata	3.5 ^a	2.5 ^b	2.4 ^b

^{a-c} Means in a row followed by different letters differ at $p < 0.05$

Values based on Hedonic scale: 1 = like extremely - 7 = dislike extremely

Table 2: Mean Values for Overall Flavor for Ten Ethnic Flat Breads

	Control	Dry Honey	Liquid Honey
Bannock	3.3 ^a	2.9 ^b	2.3 ^c
Barbari	3.8 ^a	2.3 ^b	2.3 ^b
Pita	2.9	2.6 ^b	2.7 ^{ab}
Rotis	3.9 ^a	2.7 ^b	2.7 ^b
Ksra	3.7 ^a	2.7 ^b	2.8 ^b
Naan	3.4 ^a	2.9 ^b	2.7 ^b
Jamaican Cornbread	2.9 ^a	2.5 ^b	2.4 ^b
Focaccia	3.9 ^a	2.2 ^b	2.4 ^b
Scones	3.9 ^a	2.9 ^b	3.0 ^b
Zata	3.7 ^a	2.4 ^b	2.5 ^b

^{a-c} Means in a row followed by different letters differ at $p < 0.05$

Values based on Hedonic scale 1 = like extremely - 7 = dislike extremely

Methods and Materials

Thirty formulas were developed for ten ethnic flat bread products made using liquid honey, dry honey, or controls with no honey added. Preliminary testing determined optimal levels of both liquid and dry honey and final flat bread formulations.

Actual percentages of honey incorporated in formulas ranged from 9.2 to 28.6 for the liquid honey, and from 9.0 to 19.5 for the dry honey. Objective and sensory tests were conducted to determine product acceptability of samples in four replications. Each bread was subjected to a series of objective tests (standing height, L a b, pH, moisture content, and texture). Sensory assessments were conducted by consumer panelists (n=30) who evaluated each bread for appearance, overall flavor, sweetness, and overall eating quality using a

seven-point hedonic scale (1=like extremely - 7=dislike extremely). The panel members then ranked the three treatments of each bread, control, liquid honey and dry honey, from liked best (1) to liked least (3).

Results

Instrumental values and sensory characteristics were evaluated based on ethnic flat bread formulations and type and amount of honey added. Addition of honey did not consistently affect product quality based on instrumental assessments. However, sensory quality attributes were influenced by honey addition when evaluated by consumer panelists. Based on 120 observations on each type of bread, when consumers were asked to rank the three random samples for preference (control, liquid honey added or dry honey added) the breads containing honey were

liked better than the control sample.

Conclusions

Incorporation of liquid or dry honey into ethnic flat breads can produce products with similar physical properties to breads made without honey and flat breads with liquid or dry honey were generally preferred over control formulations by consumer panelists. The addition of honey in ethnic flat breads can be beneficial to bakers because of honey's positive consumer appeal and functional attributes. The physical and sensory data were conclusive:

- Nine of the 10 formulations were rated by consumer panelists with the liquid or dry honey formulations as "liked best" when compared to a control bread without honey.
- Honey's reducing sugars contributed to browning

reactions in several of the baked goods.

formulation adjustments and not honey addition.

- Differences in moisture content were due to

FORMULAS

BANNOCK

Fat-free version of an old Canadian favorite, flavored with dried cranberries and pecans.

Ingredient	LIQUID		DRY	
	% Baker's Wt.	% Formula Wt.	% Baker's Wt.	% Formula Wt.
Baker's Flour	100	33.5	100	30.3
Baking Powder	4.3	1.4	4.3	1.3
Salt	2.7	0.9	2.7	0.8
Chopped Pecans	16.0	5.3	39.9	4.8
Dried Cranberries	39.9	13.3	67.0	12.1
Water	69.1	23.1	127.7	38.6
Honey	67.0	22.4	39.9	12.1

** For Dry Honey Recipe: Mix dry honey with other dry ingredients.
 ** For Liquid Honey Recipe: Combine liquid honey with water before adding to dry ingredients.*

PROCEDURE:

1. Mix together dry ingredients.*
2. Combine liquid ingredients.**
3. Add liquid ingredients to dry ingredients and stir until just mixed.
4. Spray a 8" x 8" square pan with non-stick spray.
5. Spoon 460 grams of batter into pan. Smooth top with floured fingers.
6. Bake at 425°F, on second rack from bottom of oven, for 15-20 minutes or until golden.
7. Cool on wire rack for 10 minutes.

BARBARI

These basic breads of Persia are scored to prevent pockets from forming, and are used to scoop up foods or to soak up sauces.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's Wt.	% Formula Wt.	% Baker's Wt.	% Formula Wt.	% Baker's Wt.	% Formula Wt.
Baker's Flour	100	62.5	100	56.4	100	52.4
SAF Yeast	2.4	1.5	2.4	1.4	2.4	1.3
Salt	2	1.3	2	1.1	2	1
Water	50	31.3	44	24.8	52	27.3
Honey	0	0	23	13.1	28.8	15.1
Olive Oil	5.6	3.5	5.6	3.2	5.6	2.9

PROCEDURE:

1. Mix dry ingredients in Kitchen Aid mixer with flat beater for 1 minute. *
2. Combine liquid ingredients thoroughly** and add to dry ingredients. Mix all ingredients in Kitchen Aid mixer for 1 minute or until thoroughly combined.
3. Change flat beater to dough hook and knead for 10 minutes on speed 2. Dough should form a smooth, elastic non-sticky ball.*
4. Spray bowl and plastic wrap with non-stick spray. Place dough in bowl and cover with plastic wrap.
5. Place dough in warm oven (no higher than 110°F) and let rise for 30 minutes or until doubled in size.
6. Remove dough from bowl. Divide dough into two 180-gram portions. Roll each portion into a 1/4" thick round that is about 7" in diameter.
7. Spray baking sheet and plastic wrap with non-stick spray. Place rounds on baking sheet, cover with plastic, and let rise 20 minutes.
8. Remove plastic wrap and cut 4-5 parallel lines running the length of the bread with a sharp knife.
9. Bake at 425°F, on second rack from bottom of oven for 15 minutes or until golden.

* For Dry Honey Recipe: Combine dry honey with dry ingredients. When kneading dough will be sticky.

** For Liquid Honey Recipe: Combine liquid honey with the other liquid ingredients.

FOCACCIA

Crusty, chewy, dimpled bread associated with pizza. Brush with olive oil, sprinkle with salt, and serve.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Whole Wheat Flour	47.9	27.9	47.9	26.9	47.9	23.2

Bread Flour	52.1	30.4	52.1	29.3	52.1	25.3
SAF Yeast	2.4	1.4	2.4	1.3	2.4	1.2
Salt	1.3	0.8	1.3	0.7	1.3	0.6
Sugar	1.1	0.6	0	0	0	0
Water	63.0	36.7	47.9	26.9	69.7	33.8
Honey	0	0	22.3	12.6	29.3	14.2
Olive Oil	3.7	2.2	3.7	2.1	3.7	1.8

PROCEDURE:

1. Mix dry ingredients in Kitchen Aid mixer with flat beater for 1 minute.*
2. Combine liquid ingredients thoroughly** and add to dry ingredients. Mix all ingredients in Kitchen Aid mixer for 1 minute or until thoroughly combined.
3. Change flat beater to dough hook and knead for 10 minutes on speed 2. Dough should form a smooth, elastic non-sticky ball.*
4. Spray bowl and plastic wrap with non-stick spray. Place dough in bowl and cover with plastic wrap.
5. Place dough in warm oven (no higher than 110°F) and let rise for 30 minutes or until doubled in size.
6. Remove dough from bowl. Divide dough into 200-gram portions. Roll each portion into a 1/4" thick round that is about 7" in diameter.
7. Spray baking sheet and plastic wrap with non-stick spray. Place rounds on baking sheet, cover with plastic, and let rise for 20 minutes.
8. Remove plastic wrap and make dimples in dough with fingertips.
9. Bake at 350°F, on second rack from bottom oven, for 20-25 minutes or until golden.

** For Dry Honey Recipe: Combine dry honey with the dry ingredients. When kneading dough will be sticky*
*** For Liquid Honey Recipe: Combine liquid honey with the other liquid ingredients.*

JAMAICAN CORNBREAD

Non-traditional cornbread made with pineapple, coconut and various spices.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Yellow Cornmeal	59.0	18.3	59.0	17.3	67.0	16.8
Baker's Flour	40.9	12.7	40.9	12.0	32.8	8.2

Sugar	8.5	2.6	0	0	0	0
Baking Powder	2.0	0.6	2.0	0.6	2.2	0.6
Salt	1.0	0.3	1.0	0.3	1.1	0.3
Cinnamon	0.7	0.2	0.7	0.2	0.7	0.2
Cloves	0.2	0.1	0.1	0.05	0.2	0.05
Nutmeg	0.2	0.1	0.1	0.05	0.2	0.05
2% Milk	80.7	10.2	75.4	22.1	91.8	22.9
Egg	32.8	5.7	32.8	9.6	37.3	9.3
Vegetable Oil	18.4	8.1	18.4	5.4	20.9	5.2
Coconut	26.2	16.2	26.2	7.7	29.9	7.5
Crushed Pineapple	52.5	0	52.5	15.4	59.7	14.9
Honey	0	0	31.5	9.2	35.8	9.0
Water	0	0	0	0	20.1	5.0

PROCEDURE:

1. Mix together dry ingredients.*
2. Combine liquid ingredients. **
3. Add liquid ingredients to dry ingredients and stir until just mixed.
4. Spray a 8" x 8" square pan with non-stick spray.
5. Spoon 950 grams of batter into pan. Smooth top with floured fingers.
6. Bake at 425°F, on second rack from bottom of oven, for 25 minutes or until golden.

** For Dry Honey Recipe: Mix dry honey with other dry ingredients.*

*** For Liquid Honey Recipe: Combine liquid honey with water before adding to dry ingredients.*

KSRA

Flat, round, leavened bread made with whole wheat flour, and flavored with anise seed.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Bread Flour	52.8	28.5	52.8	27.4	52.8	24.0
Whole Wheat Flour	47.2	25.4	47.2	24.4	47.2	21.4
Cornmeal	4.4	2.4	4.4	2.3	4.4	2.0
SAF Yeast	1.9	1.0	1.9	1.0	1.9	0.9
Salt	1.9	1.0	1.9	1.0	1.9	0.9
Anise Seed	1.9	1.0	1.9	1.0	1.9	0.9
Water	75.5	40.7	56.6	29.3	75.5	34.3
Honey	0	0	26.4	13.7	34.6	15.7

PROCEDURE:

1. Mix dry ingredients in Kitchen Aid mixer with flat beater for 1 minute.*
2. Combine liquid ingredients thoroughly** and add to dry ingredients. Mix all ingredients in Kitchen Aid mixer for 1 minute or until thoroughly combined.
3. Change flat beater to dough hook and knead for 10 minutes on speed 2. Dough should form a smooth, elastic non-sticky ball.*
4. Spray bowl and plastic wrap with non-stick spray. Place dough in bowl and cover with plastic wrap.
5. Place dough in warm oven (no higher than 110°F) and let rise for 30 minutes or until size doubles.
6. Remove dough from bowl. Divide dough into 150 gram portions. Roll each portion into a 1/4" round that is about 5.5" in diameter.
7. Spray baking sheet and plastic wrap with non-stick spray. Place rounds on baking sheet, cover with plastic, and let rise for 20 minutes.
8. Remove plastic wrap and prick tops of dough with fork.
9. Bake at 400° F, on second rack from the bottom, for 15-20 minutes or until golden.

** For Dry Honey Recipe: Combine dry honey with the dry ingredients. When kneading, dough will be sticky.*
*** For Liquid Honey Recipe: Combine liquid honey with the other liquid ingredients.*



ROTIS

Coconut breakfast bread served through-out the day as a tasty snack with tea, coffee, or fresh juice.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Baker's Flour	100	48.6	100	42.7	100	32.9
Unsweetened Coconut	25.5	12.4	25.5	10.9	25.5	8.4
Baking Powder	6.4	3.1	6.4	2.7	6.4	2.1
Salt	2.8	1.4	2.8	1.2	2.8	0.9
Water	70.9	34.5	49.6	21.2	99.3	21.7
Honey	0	0	49.6	21.2	69.5	22.9

Procedure:

1. Mix together dry ingredients.*
2. Combine liquid ingredients.**
3. Add liquid ingredients to dry ingredients and mix until the dough is soft and smooth.
4. Divide dough into 50-gram portions. Roll each portion into a round that is 1/8" thick and 4.75" in diameter.
5. Heat non-stick griddle to 375°F and spray with non-stick spray.
6. Cook breads about 2 minutes on each side, or until golden.
7. Cool on wire rack.

* For Dry Honey Recipe:
Combine dry honey with the dry ingredients. When kneading, dough will be sticky

** For Liquid Honey Recipe:
Combine liquid honey with the other liquid ingredients.

PITA

Pocket-type bread also known as Middle Eastern bread, Israeli flat bread, and Armenian bread.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Baker's Flour	53.1	31.2	53.1	30.0	53.1	26.2
Whole Wheat Flour	46.9	27.5	46.9	26.5	46.9	23.1
Sugar	5.5	3.2	0	0	0	0
Salt	2.1	1.2	2.1	1.2	2.1	1.0
SAF Yeast	1	0.6	1.0	0.6	1.0	0.5
Honey	0	0	27.3	15.5	35.7	17.6
Water	61.7	36.2	46.4	26.2	64.1	31.6

PROCEDURE:

1. Mix dry ingredients in Kitchen Aid mixer with flat beater for 1 minute.*
2. Combine liquid ingredients thoroughly** and add to dry ingredients. Mix all ingredients in Kitchen Aid mixer for 1 minute or until thoroughly combined.
3. Change flat beater to dough hook and knead for 10 minutes on speed 2. Dough should form a smooth, elastic non-sticky ball.*
4. Spray bowl and plastic wrap with non-stick spray. Place dough in bowl and cover with plastic wrap.
5. Place dough in warm oven (no higher than 110°F) and let rise for 30 minutes or until doubled in size.
6. Remove dough from bowl. Divide dough into 100-gram portions. Roll each portion into a smooth round ball.
7. Spray baking sheet and plastic wrap with non-stick spray. Place balls on baking sheet, cover with plastic, and let rest for 15 minutes.
8. Remove plastic wrap and roll each ball into rounds that are about 1/8 " thick and 7" in diameter. Place rounds back onto baking sheet.
9. Bake at 475 F, on second rack from the bottom, for 4-5 minutes or until golden.

** For Dry Honey Recipe: Combine dry honey with the dry ingredients. When kneading dough will be sticky.*

*** For Liquid Honey Recipe: Combine liquid honey with the other liquid ingredients.*

SCONES

A rich quick bread, flavored with cinnamon and ginger, based on the traditional English favorite.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Baker's Flour	100	41.5	100	42.6	100	29.0
Sugar	15.6	6.5	0	0	0	0
Baking Powder	5.2	2.2	5.2	2.2	5.2	1.5
Buttermilk Solids	6.0	2.5	6.0	2.6	6.0	1.7
Salt	1.2	0.5	1.2	0.5	1.2	0.3
Baking Soda	0.4	0.2	0.4	0.2	0.4	0.1
Cinnamon	0.4	0.2	0.4	0.2	0.4	0.1
Ginger	0.2	0.1	0.2	0.1	0.2	0.1
Butter	32.0	13.3	32.0	13.6	32.0	9.3
Water	80.0	33.2	22.0	9.4	13.2	38.3
Honey	0	0	67.2	28.6	67.2	19.5

PROCEDURE:

1. Sift together dry ingredients.
2. Cut in butter.
3. Add water ** to dry ingredients and stir until just mixed.
4. Spray muffin tin with non-stick spray (use triangular shapes if available).
5. Spoon 550 grams of batter into pan. Smooth top with floured fingers.
6. Bake at 400° F, on second rack from bottom of oven, for 10-15 minutes or until golden.

** For Dry Honey Recipe:
Combine dry honey with the dry ingredients. When kneading, dough will be sticky*

*** For Liquid Honey Recipe:
Combine liquid honey with the other liquid ingredients.*

ZATA

This is a Middle Eastern version of Italian focaccia that can be made thin and crispy, or thick and chewy.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	%	% Baker's	%	% Baker's	%
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	Formula		Formula		Formula	
Baker's Flour	100	60.0	100	57.1	100	51.5
SAF Yeast	2.3	1.4	2.4	1.4	2.4	1.2
Salt	1.2	0.7	1.2	0.7	1.2	0.6
Water	57.7	34.6	44	25.1	56	28.9
Honey	0	0	22	12.6	28.8	14.8
Olive Oil	5.4	3.2	5.6	3.2	5.6	2.9

Procedure:

- Mix dry ingredients in Kitchen Aid mixer with flat beater for 1 minute.*
- Combine liquid ingredients thoroughly** and add to dry ingredients. Mix all ingredients in Kitchen Aid mixer for 1 minute or until thoroughly combined.
- Change flat beater to dough hook and knead for 10 minutes on speed 2. Dough should form a smooth, elastic non-sticky ball. *
- Spray bowl and plastic wrap with non-stick spray. Place in bowl and cover with wrap.
- Place dough in oven (less than 110°F) and let rise for 30 minutes or until doubled in size.
- Remove dough from bowl. Divide dough into 200-gram portions. Roll each portion into a 1/4" thick round that is 7" in diameter.
- Spray baking sheet and plastic wrap with non-stick spray. Place balls on baking sheet, cover, and let rise for 20 minutes.
- Remove plastic wrap and prick the tops of the breads with fork. Bake at 425°F, on second rack from bottom of oven, for 10-15 minutes or until golden.

** For Dry Honey Recipe: Combine dry honey with the dry ingredients. When kneading dough will be sticky*

*** For Liquid Honey Recipe: Combine liquid honey with the other liquid ingredients.*

NAAN

Classic Central Asian bread. It is traditionally served on its own or as an accompaniment to a meal.

Ingredient	CONTROL		LIQUID		DRY	
	% Baker's	% Formula	% Baker's	% Formula	% Baker's	% Formula
Whole Wheat Flour	50	26.9	50	27.6	50	23.0

Baker's Flour	50	26.9	50	27.6	50	23.0
SAF Yeast	1.5	0.8	1.5	0.8	1.9	0.9
Salt	2.5	1.3	2.5	1.4	3.2	1.5
Water	50.0	26.9	22.5	12.4	32.5	14.9
Low-Fat Yogurt	28.5	15.3	28.5	15.7	37	17.0
Honey	0	0	22.5	12.4	38.3	17.6
Olive Oil	3.5	1.9	3.5	1.9	4.5	2.1

PROCEDURE:

1. Mix dry ingredients in Kitchen Aid mixer with flat beater for 1 minute.*
2. Combine liquid ingredients thoroughly** and add to dry ingredients. Mix all ingredients in Kitchen Aid mixer for 1 minute or until thoroughly combined.
3. Change flat beater to dough hook and knead for 10 minutes on speed 2. Dough should form a smooth, elastic non-sticky ball.*
4. Spray bowl and plastic wrap with non-stick spray. Place dough in bowl and cover with plastic wrap.
5. Place dough in warm oven (no higher than 110°F) and let rise for 30 minutes or until doubled in size.
6. Remove dough from bowl and divide into 180-g portions. Roll each into 1/4" thick rounds, about 7" in diameter.
7. Spray baking sheet and plastic wrap with non-stick spray. Place rounds on baking sheet, cover with plastic, and let rise for 20 minutes.
8. Remove plastic wrap and cut 1" slits, evenly spaced, radiating out from the center like sun rays.
9. Bake at 450° F, on second rack from bottom of oven, for 5-10 minutes or until golden.

** For Dry Honey
Recipe: Combine
dry honey with the
dry ingredients.
When kneading,
dough will be sticky*

*** For Liquid Honey
Recipe: Combine
liquid honey with
the other liquid
ingredients.*