

High Fiber Okara Muffin

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What is Okara?

Soybean pulp

- By-product in tofu production

Physical Characteristics

- Beige
- Soft
- Crumbly, fine-grained texture
- Moist



How can okara be used in cooking?



Burgers



Unohana



Cookies

Assumptions

- Dried Okara is 90% fiber
- Water content in Okara is still 81.6%

	<u>Actual</u>		<u>New</u>	
	Wet	Dry	Wet	Dry
Fiber (%)	4.1	22	16.6	90
Water (%)	81.6	0	81.6	0

Challenges of our experiments

Moisture

- Okara contains 81.6% water when wet

Dry okara vs. Wet okara

- Could not decide which method was best



Challenges of our experiments

Batter

- Too dry even when all ingredients combined
- Affected internal texture

Time constraints

- Needed to Dry okara



Experiment #1-4

Wet
Okara

Dry okara with milk



Increased flour



Increased Baking Powder



Experiment #5-8

Hydrated okara, semi sweet choc. chip



Chocolate Chip



Cinnamon & sugar



Cinnamon Sugar
& choc. chip



Recipe comparison (6 muffins)

Ingredients	Original muffin	High-fiber muffin
All-purpose flour, sifted	1 cup	1 cup
Sugar	2 Tbsp	2 Tbsp
Baking powder	1-1/2 tsp	3 tsp
Salt	1/4 tsp	1/4 tsp
Egg	1/2	1/2
Canola oil	2 Tbsp	2 Tbsp
Low-fat milk	1/2 cup	1 cup
Dried okara	-	1 cup
<i>Flourishing</i>		
Sugar	-	1 Tbsp
Cinnamon	-	1/5 tsp
Milk Choc. Chips	-	12 chips

Ingredients List

Ingredients

- Milk
- All-purpose flour
- Dry Okara*
- Sugar
- Egg
- Canola oil
- Baking powder
- Salt
- Milk chocolate chips
- Ground cinnamon

Sensory Evaluation Form for High Fiber Okara Muffin

INSTRUCTIONS: Set before you is a High Fiber Okara Muffin sample. You are to evaluate the muffin on several sensory attributes. Observe, smell, and then taste the muffin. Rate each sensory attribute by circling one choice. Provide comments as needed.

INGREDIENTS: Milk, all-purpose flour, dried okara, sugar, egg, canola oil, baking powder, salt, milk chocolate chips, and ground cinnamon.

CAUTION: If you are allergic to any of the ingredients, please refrain from consuming this product.

	Extremely dislike	Dislike	Neutral	Like	Extremely like
Outer Appearance	1	2	3	4	5
Inner Appearance	1	2	3	5	5
Aroma	1	2	3	4	5
Taste	1	2	3	4	5
Sweetness	1	2	3	4	5
Overall Acceptability	1	2	3	4	5

Please comment on individual attributes

Additional comments: _____

Thank you for your participation

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Questions?



Reference

- Shurtleff W & Aoyagi A. 2001. *The book of tofu: protein source of the future...now!* Berkeley CA, Ten Speed Press.
- USDA Nutrient Database.
http://www.nal.usda.gov/fnic/foodcomp/cgi-bin/list_nut_edit.pl
- Wikipedia.
http://en.wikipedia.org/wiki/Okara_%28food%29.

Reference (continued)

- <http://blog.goo.ne.jp/fs318/m/200907> (okara picture)
- <http://www.kondatekun.com/recipe/recipe.asp?id=848> (Okara burger picture)
- <http://www.eseven.jp/cookie/okara.html> (Okara cookies picture)
- http://en.wikipedia.org/wiki/File:Stir-fried_okara.png (unohana picture)

Reference (continued)

- http://commons.wikimedia.org/wiki/File:Muffin_NIH.jpg (muffin picture on the first slide)
- <http://www.foodbeam.com/2006/07/30/mmm-cest-trop-bon-muffins-aux-pepites-de-chocolat/> (muffin picture)