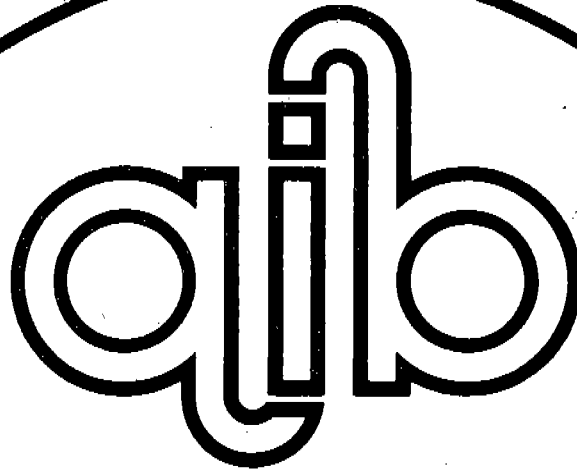


19 APR 1990

RESEARCH REPORT

1990-3



American Institute of Baking Report

REFINED MENHADEN OIL IN CINNAMON ROLLS

RELEASED

PARTLY RELEASED

CONFIDENTIAL ✓

DATE: *April 1992*

Dr. S. Barlow
Intern. Assn. of Fish Meal Mfrs
Hoyal House, Mutton Lane
Potters Bar
Herts EN6 3AR
Association
2 2

1213 Bakers Way • Manhattan, Kansas • 66502 • 913-537-4750



RESEARCH REPORT

Submitted to:

Stuart Barlow, B.Sc., Ph.D.
Director General
International Association of
Fish Meal Manufacturers
Hoval House, Mutton Lane, Potters Bar
Hertfordshire EN6 3AR. U.K.

REFINED MENHADEN OIL IN CINNAMON ROLLS

Submitted by:

Wulf T. Doerry
Director, Cereal Technology Research
American Institute of Baking
1213 Bakers Way
Manhattan, KS 66502

April 12, 1990

REFINED MENHADEN OIL IN CINNAMON ROLLS

BACKGROUND:

In October 1989, the American Institute of Baking (AIB) evaluated a refined menhaden oil in a variety of bakery products. At that time, it was found that the fish flavor and odor of the oil may not be identified by the average consumer in a more strongly flavored product, such as cinnamon rolls or blueberry cake muffins.

In a letter dated January 23, 1990, Dr. Stuart Barlow, Director General of the International Association of Fish Meal Manufacturers, authorized the AIB to prepare cinnamon rolls with two different levels of refined menhaden oil (RMO), and to have an untrained taste panel evaluate these rolls and compare them with equivalent product prepared with soybean oil.

SUMMARY:

Cinnamon rolls were prepared with freshly refined menhaden oil or soybean oil added to the dough and brushed onto the surface of the sheeted dough before application of the cinnamon-sugar mixture. There was no visible difference in the appearance of the baked rolls prepared with either oil.

The taste panel evaluated the cinnamon rolls one and four days after baking. Both times, the panel preferred the cinnamon rolls prepared with soybean oil. This preference increased significantly after the rolls had been stored for four days at 77°F.

MATERIALS AND METHODS:

A fresh sample of deodorized and stabilized SPMOTM menhaden oil (lot #022690-2790) was received from the Zapata Haynie Corporation in early March 1990. The soyoil (Imperial Oil) had been supplied by Bunge Foods.

The sweet dough for the cinnamon rolls was prepared according to the formulation and processing procedures given in Table I. The RMO was added to the test dough in place of the soyoil at the level of 5% of the total flour weight in the formula.

After the doughs were mixed, they were divided into three portions of 1900 g. each, which were placed in a retarder at 40⁰F for 25 to 60 minutes to relax the gluten structure. Each dough piece was then rolled out to a uniform thickness and to cover an area of 15 inches by 38 inches. Nineteen grams (1% of the dough weight) of the same oil as had been added to the dough, were brushed onto the dough surface, followed by 95 g. (5% of the dough weight) of a cinnamon-sugar mixture, that was evenly spread over the same area.

The dough sheet was then rolled-up to form a long "snake" filled with cinnamon sugar. This dough-snake was sliced into pieces approximately one inch wide and weighing two ounces (56 g.) per unit. Thirty of these units were placed on a half-sheet (12.5 inch by 17.5 inch) aluminum pan lined with a silicone treated paper liner. The rolls were allowed to proof (rise) for about 55 minutes at a temperature of 109±1⁰F before they were baked for 13 minutes at 410⁰F (210⁰C). After cooling to room temperature, the rolls were covered with a polyethylene film to prevent them from drying out. The rolls were iced lightly with a powdered sugar-water icing before they were served to the panel members one and

four days after baking. No panel test was conducted seven days after baking, as originally proposed.

All samples were numerically coded and the untrained panel members were requested to taste the samples in a specific sequence, so that the first sample to be tasted alternated between the cinnamon rolls prepared with the soybean oil and those made with the RMO. Every untrained panel member was asked to express his/her opinion about how much he/she liked or disliked the samples. Samples of the evaluation sheet used are attached to this report as Table IV.

RESULTS AND DISCUSSION:

The cinnamon rolls prepared with both types of oil, soybean (control) and RMO, were comparable in appearance. Even though the aroma and taste of the cinnamon-sugar filling was quite strong, a number of taste panelists perceived a "foreign" odor and taste in the RMO rolls one day after baking. However, only one panel member correctly identified the odor as "fishy". At this time, only 60% of the panel members preferred the control rolls and 25% preferred the RMO product (Table III). This, however, changed drastically when the cinnamon rolls were retested four days after baking. At this time, 85% of the panel showed a significant preference (two points on the opinion scale of one to seven) for the control and only one member (5%) preferred the RMO rolls. At this time, the "fishy" aroma in the test product was much more distinct than it had been on the first day, and many panel members reacted to this "unexpected odor" in a negative way. This led to the cancellation of the panel-testing that had been scheduled for the seventh day after baking.

A member of the AIB research staff reevaluated the cinnamon rolls twelve days after baking and found that the fish odor emanating from the RMO rolls had further increased and the fish taste overpowered the strong taste from the cinnamon.

CONCLUSION

The refined and deodorized menhaden oil reverted relatively quickly in cinnamon rolls. This reversion continued during the shelf-life of the product. Although up to 40% of untrained taste panel members did not object to the slight aroma and taste coming from the RMO after one day, only one of twenty members remained insensitive to the off-aroma and taste four days after the rolls had been prepared.

TABLE I
SWEET DOUGH FOR CINNAMON ROLLS

Grams	Ingredients
3000	Bread Flour (11.5% Protein)
480	Granulated Sugar
240	Nonfat Dry Milk
60	Salt
30	Crumb Softener, GMS-90
150	Oil
150	Compressed Yeast
6	Liquid Egg Color
1620	Water (36°F)

5736 Total Dough Weight

Mixer: Hobart A-200 with 20 qt. bowl and dough hook.

Mixing Time: 9 minutes at medium speed.

Dough Temperature: $82^{\circ} \pm 1^{\circ} \text{F}$.

Fermentation (Rest) Time: 25 - 60 minutes in retarder.

Make-Up: Divide each dough into three 1900 g pieces and sheet each dough piece to a size of 15" x 38".

Filling: Brush 19 g oil onto entire dough surface and spread 95 g cinnamon-sugar mix uniformly over the oiled surface.

Roll up the filled dough sheet into a uniform "snake".

Scaling Weight: Slice the filled dough "snake" into uniform 2 oz sections and place the sections on a silicone paper-lined aluminum sheet pan with one cut side facing up.

Proof: Proof cinnamon rolls for 55 minutes at $109^{\circ} \pm 1^{\circ} \text{F}$.

Bake: Bake rolls for 13 minutes at 410°F .

TABLE II
CINNAMON-SUGAR MIXTURE

Grams	Ingredients
1200	Granulated Sugar
360	Cinnamon
40	Soybean Oil
1600	Total Weight

Blend all ingredients thoroughly.

Application Rate: 5% Cinnamon-Sugar mixture based on dough weight.

TABLE III
TASTE PANEL¹⁾ RESULTS

Days After Baking Type of Oil	Results			
	1 Day		4 Days	
	Soybean	RMO	Soybean	RMO ²⁾
Hedonic Acceptance Score	3.75 \pm 0.37	2.85 \pm 0.38	4.70 \pm 0.33	1.60 \pm 0.28
Preferred by Panelists: %	60	25	95	5
Very much preferred by panelists: %	35	5	85	-

1) Panels consisted of 20 untrained members.

2) Refined Menhaden Oil.

TABLE IV

CODE: _____

NAME: _____

DATE: _____

You will receive some coded samples. Please taste the samples in the order given, then check the term which expresses your opinion of each sample.

Opinion	Sample	Sample
Like Very Much		
Like Moderately		
Like Slightly		
Neither Like Nor Dislike		
Dislike Slightly		
Dislike Moderately		
Dislike Very Much		
Remarks		

CODE: _____

NAME: _____

DATE: _____

You will receive some coded samples. Please taste the samples in the order given, then check the term which expresses your opinion of each sample.

Opinion	Sample	Sample
Like Very Much		
Like Moderately		
Like Slightly		
Neither Like Nor Dislike		
Dislike Slightly		
Dislike Moderately		
Dislike Very Much		
Remarks		