



NOUGAT APPLICATION RESEARCH

COMPARING THE FUNCTIONALITY OF EGGS TO EGG REPLACERS IN NOUGAT FORMULATIONS

NOUGAT RESEARCH EXECUTIVE SUMMARY

For this study, egg whites were reduced and/or removed from nougat confection formulas and replaced with commercial egg replacer products at the manufacturers' suggested rates. All the nougat samples were evaluated quantitatively and qualitatively following industry-standard protocols. Overall, not a single product performed as well as or better than real eggs in all attributes assessed.

The egg replacers varied slightly in functionality, but all resulted in nougat confections with different appearance and flavor attributes than Control. Analytical and sensory tests confirm that nougat formulas need egg whites or egg replacers in formulation to perform functionally, and that some egg replacers may result in acceptable nougat products, while others may be substantially different from Control formulas and unappealing to consumers. Manufacturers must test egg replacing ingredients and spend time optimizing formulas for acceptable results.



OBJECTIVE

The purpose of the study was to provide food manufacturers research-based formulation and application information on the use of egg replacers in nougat confections. Due to the known performance characteristics of real egg whites in nougat confections, it was hypothesized that no single ingredient would be able to replace the multiple functions provided by egg whites in nougat without affecting product quality.

EGG REPLACING INGREDIENTS

After researching egg replacers, six egg replacer ingredient companies were selected, based on dollars spent on marketing and advertising in industry publications. A variety of egg replacing ingredients was selected based on recommended use to reduce or replace eggs whites in nougat. Ingredient specifications, nutritionals, starting formulations and recommended usage rates were collected from the manufacturers and used to create test formulas. Egg replacers not recommended for this application were excluded from testing.

The recommended egg white replacement level varied from 50 to 100 percent. Only one of the companies recommended removing 100 percent of the egg whites from nougat formulations. Almost all companies recommended keeping the ratio of moisture to dry ingredients the same. Since the Control gold standard formula was formulated with dried egg white, many of the egg replacers were replaced with a one-to-one ratio. If liquid egg whites had been used, a calculation would need to be done to determine the appropriate amount of egg replacing ingredients.

FORMULAS

Control/Gold Standard Formulas

The Control nougat formula consisted of granulated sugar, tapioca syrup, water, powdered sugar, palm shortening, cocoa powder, dried high whip egg whites and salt.

Negative Control

A test was conducted with the absence of egg whites or egg replacers to demonstrate the need for the functionality of these ingredients.

Test Formulas

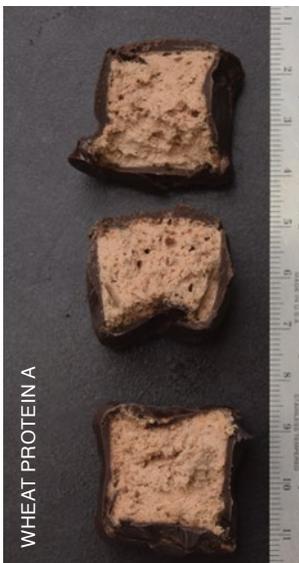
Six egg replacer ingredients were tested in nougat formulas. Those tested included:

- Blends of various ingredients, including starches, proteins, fibers and flours
- Dairy proteins
- Wheat proteins

Nougat test formulas were based on the ingredient manufacturer's recommended percent in application and percentage of egg white replacement, which varied widely among products. Formulas were created using the Control gold standard formula, with the addition of egg replacer ingredients.



NOUGAT VISUAL COMPARISON



TESTS

The nougat samples were analyzed using industry standard, category-specific tests. Precision and control of environment at each step of the process is vital to confectionery production. Samples were all prepared in the same conditions, in the same standing mixer and on the same day. Consistent batching, portioning and processing procedures were used to limit variables. Each test was batched in the same mixer using standardized mixing procedures. Identical pans were used and each was prepared for portioning in the same manner. Mixing times were not adjusted or optimized for each test formula, instead a standardized time was used to ensure each Test saw the same conditions.

Testing was performed at the CuliNex Seattle Test Kitchen and Medallion Labs in Minneapolis, Minnesota.

Analytical Tests

Height
Color
Texture
Water activity

Subjective/Sensory Tests

Appearance
Color
Cell size
Aroma
Texture
Flavor
Overall likability

RESULTS & DISCUSSION

APPEARANCE

Height

All except one egg replacer were not significantly different in height from Control. Given that five out of the six egg replacers tested performed as well as the Control formula, this suggests that some egg replacers do function to aerate nougat candies, but without eggs or egg replacers, nougat will not reach height targets.

Color

With the exception of one, the Tests were similar in colorimeter and sensory analysis to Control. Because the amount of cocoa in the test formulas was consistent with Control, it can be concluded that color of nougat samples is directly related to the level of aeration. These results suggest that without eggs or egg replacers, nougat may not reach color targets; additionally, some egg replacers do function to aerate nougat, and therefore attain the correct color.

Appearance

Uncoated squares of Control nougat were described as appealing in appearance, with a uniform appearance, slightly mottled top and a moist and fluffy-looking interior. Test formula nougats varied and were described as being either wetter than or drier than control. These comments imply that no egg replacer formulation produced nougat that matched the Control nougat in appearance attributes.

Air cell size

None of the test formulas were significantly different in cell size from Control. These results suggest that egg replacers do function to help aerate nougat.



EATING QUALITY

Aroma

The aroma of Control was described as pleasant and mild with sweet cocoa notes. All panelists agreed it was appealing. Negative Control and the test formulas were deemed similar in intensity and likability to Control. These results suggest nougat aroma is not greatly impacted by egg white reduction and/or replacement in nougat.

Water activity

Results suggest most egg replacers do not impact water activity in nougat formulations.

Texture

The texture of only one of the test formulas was rated significantly different from Control. These results suggest eggs or egg replacers are necessary to replicate the texture qualities found in nougat confections.

Flavor

The flavor of Control nougat was described as having a very sweet, balanced cocoa/chocolate flavor with no off flavors. Test samples varied widely in flavor evaluations from pleasant to harsh. Based on the varied ratings, it was concluded that nougat made with reduced egg content and/or egg replacers may increase cocoa flavor, saltiness and sweetness perception, while some egg replacers may contribute off flavors to nougat.

Overall Likability

With all attributes taken into account, panelists were generally in agreement that Control was the most appealing sample. Texture and flavor of test formulas were most often mentioned as not meeting desired targets for ideal nougat. Results suggest nougat formulations need eggs or egg replacers to function properly.

CONCLUSIONS

The use of ingredients to reduce or replace eggs in nougat can be a challenging exercise for confectionery manufacturers. The sensory evaluation results from panelists on the organoleptic attributes of the nougat Tests made with real eggs and egg replacers were generally consistent with the findings of the objective analytical test results. The areas of nougat quality most negatively affected when egg whites are removed and/or replaced, included appearance, color, height, texture, flavor and overall likability. Attributes less influenced by egg reduction, included color, cell size, aroma and water activity.

Tasters unanimously preferred the Control to the Test formulas. Its characteristic cocoa brown color, fluffy, light texture & balanced flavor won panelists' approval as the most appealing nougat. It was neither too hard nor soft, & its structure was tender in the mouth, yet firm & pleasant to chew.



Unfortunately, few generalizations about egg replacers can be made, because they vary vastly among manufacturers. Even though ingredient manufacturers may have usage rate recommendations and even starting formulations, many do not know how their product performs in a variety of applications. Their recommendations for incorporating egg replacers into formulas can be vague and hard to follow, making product optimization through the use of egg replacers a time-consuming exercise.

Formulators must determine the best ingredients for nougat confections through hands-on testing on the bench and in the plant to achieve the desired results, balancing cost with functionality

and flavor. Ultimately, that may mean using real egg whites in nougat formulations.

COMPLETE RESEARCH REPORT & FINDINGS

For a copy of the complete 61-page research report with further study background and detailed findings, please contact Elisa Maloberti at info@RealEggs.org or call **847.296.7043**.





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