



USING

RAISIN INGREDIENTS

AS A BINDER AND PROTEIN BAR BASE



CALIFORNIA RAISINS

Sweet by Nature

calraisins.org



APPLICATION RESEARCH STUDY

RESEARCH REVIEW & SUMMARY

In this paper, we'll explore the functional benefits and opportunities for California-grown raisins and raisin ingredients as a binder in a bar application, using a Vanilla and Salted Almond Protein Bar as a model system.

For the application selected, we'll showcase the benefits of using raisins in food manufacturing and foodservice applications, determining the optimum raisin ingredient and percent utilization. When applicable, the California Raisin formulas were compared to commercial benchmarks and control formulas.

KEY BENEFITS

KEY BENEFITS OF USING CALIFORNIA RAISINS IN A VANILLA AND SALTED ALMOND PROTEIN BAR

- An excellent ingredient that can be used as a plant-based binder in protein bars due to natural sugars and fiber (7%DV)
- No declared added sugars on nutrition facts panel
- Could be paired with plant-based proteins for a fully vegan bar

FUNCTIONALITY AND SUMMARY OF FINDINGS

To illustrate the binding abilities that California Raisins have, a fruit-based protein bar was formulated. The formula on page 3 (*Figure 1*) was inspired by a popular commercial fruit-based protein bar known for having clean and simple ingredients. The ideal percentage of powdered protein and raisin paste was determined, and nuts were added for texture, flavor, and additional nutritional benefits. In development, increased salt with the raisins created a complex flavor that was salty, sweet, slightly sour, and unique, reminiscent of *umeboshi*, or Japanese salted plums. The salted raisins added new complexity to the protein bar that paired well with the almonds, cashews, and vanilla. Powdered Greek yogurt provided acidity to balance the sweetness of the fruit and the fattiness of the nuts.

Whole California Raisins are plump and have a soft chewy texture that, when ground or chopped, helps bind dry and wet ingredients together. The natural sugars in the raisins also create a firm texture when mixed with dry ingredients.¹ In this formula, whole raisins were ground and mixed with nuts and a protein powder to create a shelf-stable and firm-textured protein bar that can be slab formed or extruded into desired shapes. Raisins were the only binding ingredient used in this formula to fully show the raisins' capabilities.

California Raisins have carbohydrates like sugar and fiber, vitamins, and minerals that aid in sports nutrition. A 2012 study showed that raisins are as effective as sports chews for fueling workouts.²

The protein bar formula on page 3 can be marketed with claims like no added sugars, natural sugars and fiber from a fruit source, made with real California Raisins, and general fiber claims.

The pictures below show two possible forms that the bar formula can be formed in. The bars pictured are a 52g bar, like protein bars on the market today, and the bites are 14g spheres with larger inclusions to show possible variations.



FORMULAS

Figure 1

Ingredients	% Total by Weight
Whole California Raisins	41.6
Cashews	21.7
Whole Almonds	15.4
Dried Egg White Protein	10.8
Sliced Almonds	6.1
Vanilla Bean Paste	2.2
Powdered Greek Yogurt	2.0
Salt	0.2
TOTAL	100.00

BENCHTOP PROCESSING METHOD:

In a food processor or buffalo chopper, blend whole raisins, half the nuts, all the egg white, salt, vanilla, and yogurt powder. Process until mixture is the desired texture. Add in the remaining nuts and mix until fully dispersed. Using a mold, pack the mixture into the desired serving size or extrude the bars into desired shapes and weight.

For shelf-stable bars, the target water activity is 0.65 +/- 0.03.



NUTRITION FACTS PANEL

When compared to other protein bars, this formula is similar in grams of fat, carbohydrates, and protein per serving. However, it has no added sugars. If desired, grams of protein per serving can be increased by using plant-based or other protein sources at higher concentrations.

Nutrition Facts	
TBD servings per container	
Serving size	1 bar (52g)
Amount per serving	
Calories	220
% Daily Value*	
Total Fat 11g	14%
Saturated Fat 1.5g	8%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 130mg	6%
Total Carbohydrate 25g	9%
Dietary Fiber 2g	7%
Total Sugars 15g	
Includes 0g Added Sugars	0%
Protein 10g	
Vitamin D 0mcg	0%
Calcium 58mg	4%
Iron 2mg	10%
Potassium 378mg	8%

*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Raisins, Cashews, Almonds, Dried Egg Whites, Vanilla Bean Paste, Dried Greek Yogurt (Cultured Whey Protein Concentrate, Skim Milk), Salt.

CONTAINS: Egg, Milk, Tree Nuts (Cashews, Almonds).

INGREDIENT INSIGHTS AND FUNCTIONAL BENEFITS SUMMARY

Protein bars made with California Raisins as the main ingredient can expand into many other types of protein and snack bar categories with unlimited flavor options. Raisins are a strong binder and can be used in numerous applications. The raisins' flavor and ability to be used as a flavor enhancer may help mask the bean flavor notes of plant-based proteins like pea and soy isolates. Overall, raisins are an excellent binder that perform well when used in protein bar applications and could be used as a binder in many other applications.

CALIFORNIA RAISINS OVERVIEW

PRODUCTS AND PROCESSING

California Raisins are simply grapes that have been cleaned, dried, de-stemmed, and washed. The majority of California grown raisins are the *Vitis vinifera* varietal and are typically either sun-dried on trays or dried on the vine.¹ Other California Raisin varietals and cultivars include Zante Currant, Muscat, Monukka, Sultana, Thompson Seedless, Fiesta, Selma, and DOVine.¹

The California Raisin industry offers a variety of raisins and raisin ingredients that are suitable for food manufacturing and foodservice applications. Raisins feature in a variety of applications ranging from bakery, breads, cereals, condiments, confectionery, dairy, and snacks, just to name a few.

California-grown raisins are available in a multitude of forms such as whole raisins (various sizes and varieties), raisin paste (made from whole, ground raisins), and raisin juice concentrate that make them ideal for many applications.

PROCESSING

California Raisins are grown in the sunny fields of California and can take three full years from initial planting before bearing fruit that is subsequently dried.¹ Raisins are harvested either by the traditional hand method or with a mechanical harvester, which became widely available in the 1990s.¹

After harvesting and drying, raisins are evaluated by government inspectors to ensure that they meet strict quality standards.¹ Next, any remaining stems are removed, and the raisins are packaged or further processed to create raisin paste or raisin juice concentrate.¹ Thanks to these high-quality standards, California Raisins have never been linked to any cases of foodborne illness according to the CDC.¹

Golden raisins are produced when fresh grapes are harvested and dried using drying tunnels to preserve the golden color.¹

For more in-depth information on raisin processing and harvesting, please refer to the [California Raisins Industry Brochure](#).

NEED PRODUCT DEVELOPMENT INSPIRATION?

Visit the [California Raisins website](#) or download our [INNOVATION BROCHURE](#).

COMPOSITION AND NUTRITION

Table 1, below, shows average values of the commonly tested physical and chemical properties of California Raisins. The chemical and physical properties of raisins contribute greatly to the functional properties in the next section.

Table 1: Physical & Chemical Properties of California Raisins³ (Average Values)

Product	PH	Water Activity	Moisture Content	Sugar Content (g/100g)
California Raisins, Whole (Mixed Varieties)	3.5-4.0	0.51-0.56 (13-15% Moisture at 25°C)	Varies, Based on Processing	Total: 68-70g Glucose, Fructose, Sucrose, and Fructose/ Glucose

NUTRITION FACTS PER SERVING

California Raisins are naturally low in fat and sodium, and as whole fruit, raisins have unrefined sugars and dietary fiber, making them a nutritious additive with numerous uses in product development and culinary applications.

Nutritional Facts of Raisins per 40g serving⁴

Nutrition Facts	
1 serving per container	
Serving size	1/4 cup (40g)
Amount per serving	
Calories	120
% Daily Value*	
Total Fat 0g	0 %
Saturated Fat 0g	0 %
Trans Fat 0g	
Cholesterol 0mg	0 %
Sodium 10mg	0 %
Total Carbohydrate 32g	12 %
Dietary Fiber 2g	7 %
Total Sugars 26g	
Includes 0 Added Sugars	0 %
Protein 1g	
Vitamin D 0mcg	0 %
Calcium 25mg	2 %
Iron 0.7mg	4 %
Potassium 298mg	6 %
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	
Ingredients: California Raisins	

FUNCTIONAL PROPERTIES

The table below is a brief overview of a few functional properties that raisins can provide in a formula, either to substitute an ingredient or to provide a specific attribute to a product. Raisins retain their flavor for an extended period, can enhance a food's flavor without overwhelming the overall taste, and can function as a substitution for sugar or fat in baking scenarios.

Table 2: Functional Properties of Raisins and Raisin Ingredients

Functional Property	Description	Uses and Purpose
Added Sugar Reduction	Raisins are a dried fruit full of natural sugars. As a whole fruit, the sugars in raisins do not need to be declared as “added sugar” on nutritional fact panels.	<ul style="list-style-type: none"> Substitute refined and other added sugar sources with raisins to claim “no added sugar” The Dietary Guidelines recommends consumers should limit their calories from added sugars to less than 10% of total calories daily
Plant-Based Fat Substitute	Fibers and sugars in raisins, along with the soft, chewy texture, mimic fat and richness ³	<ul style="list-style-type: none"> Natural fat substitute for baked goods Substitute high-fat animal products with plant-based product Overall calorie reduction
Binding/Texture and Enhancer/Bulking Agent	Texture and low moisture content of raisins aid in creating chewy textures and binding dry in ingredients ³	<ul style="list-style-type: none"> Optimal for use in baked goods, bars, and other products that use a liquid or paste binder Manipulate textures of products to become chewier without adding liquid Prevents case hardening
Shelf-Life Extension Inhibit Mold Growth/Natural Preservative	Flavor stability, low water activity, antioxidants, and acids like propionic, glutamic, and tartaric acids inhibit mold growth. ³ High percentages of natural sugars and fiber bind free water.	<ul style="list-style-type: none"> Alternative to chemical-sounding and artificial preservatives
Limit Water Activity	Raisins have a lower water activity due to their intact skin, glucose, and fructose content ³	<ul style="list-style-type: none"> Prevent microbial growth Reduce overall water activity in final products
Flavor Stability	Sweetness and fruity flavor of raisins can be stable for up to 15 months when stored in optimal conditions ³	<ul style="list-style-type: none"> Stable sweetness and flavor in products Flavors not affected by manufacturing Natural alternative to refined sugars and sweeteners
Flavor Enhancement	Raisins contain about 2% tartaric acid, a known flavor enhancer, as well as precursors to the Maillard reaction from the drying process ³	<ul style="list-style-type: none"> Able to improve or intensify added flavors (including natural flavors)
Flavor Compatibility	Raisins have a naturally sweet and mild flavor that pairs well with other sweet flavors and spices ³	<ul style="list-style-type: none"> Able to carry flavors well with underlying sweetness Add complexity and balance

REFERENCES

- Raisins, C. (n.d.). Industry Brochure. Retrieved from California Raisins: https://calraisins.org/wp-content/uploads/2021/09/FinalRAC_Industry_Brochureweb-9_9_21.pdf
- Too BW, Cicai S, Hockett KR, Applegate E, Davis BA, Casazza GA. Natural versus commercial carbohydrate supplementation and endurance running performance. *J Int Soc Sports Nutr* 2012; 9(1): 27: <https://jissn.biomedcentral.com/articles/10.1186/1550-2783-9-27>
- Raisins, C. (n.d.), Tech Brochure. Retrieved from California Raisins: <https://calraisins.org/professionals/foodprocessing/raisin-technical-brochure/>
- Raisins, C. (n.d.). Nutrition Facts Label & Information. Retrieved from California Raisins: <https://calraisins.org/raisin-nutrition/nutrition-information- and-facts-label/>

