# dry peas, lentils, chickpeas...



#### NUTRITIONALLY POWERFUL.

Dry peas are among the most powerful of pulses. Their nutritional importance dates back almost 10,000 years BC when the protein and energy in these legume seeds were essential to developing civilizations. Even in these modern times, the high quality protein, natural dietary fiber and beneficial starch in dry peas is difficult to match. Today, pea derivatives such as roasted pea flour (peasemeal), pea flour protein concentrates, pea fiber and starch isolates, have emerged as functional food ingredients that deliver fresh marketing appeal. In fact, pulses are actually listed twice (in both the protein and vegetable categories) in USDA's Food Guide Pyramid.

Comprised of 25%-27% dietary fiber—both soluble and insoluble—as well as resistant starch and high quality protein, pea flour is well suited for a wide range of healthy food and baking applications. With rates of obesity, diabetes and heart disease now routinely described as "epidemic" in the U.S., food products that incorporate pulses are increasingly appropriate and more marketable than ever

These unhealthy weight-related trends have prompted a surge in consumer demand as well as regulatory pressure for food staples that combine new nutritional relevance with familiar taste and texture. Pulses and their derivatives

can help specialty and commercial bakers and pasta processors grab a piece of a functional food market expected to grow from \$25 billion to almost \$40 billion by 2011.

# PRACTICAL AND NATURALLY WHOLESOME.

Within the last two years, 65% of consumers report a greater interest in healthy eating, according to market research from Tate & Lyle. The nutritional components in pulses such as pea flour can contribute to food product formulations that address these growing concerns about digestive and cardiovascular health as well as weight control and diabetes.

#### FIBER WITH FRINGE BENEFITS.

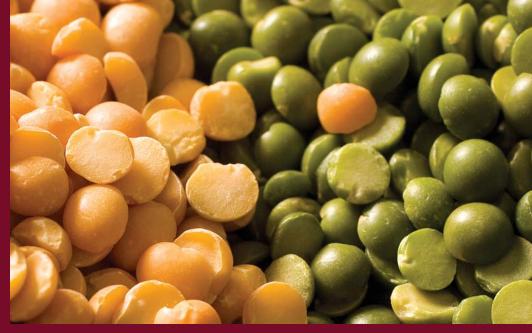
Fiber leads the consumer wish list. That's understandable; USDA reports that only 1 in 5 Americans get the recommended daily amount of fiber, with most of us consuming less than the recommended levels. good news is that nearly 50% of today's consumers believe that fiber can actually taste good, and boasts benefits beyond regularity. Indeed, survey results from the 2008 International Food Information Council found that 77% of consumers are proactively trying to consume additional fiber. With more than 10 grams of natural dietary fiber per ¼ cup, pea flour in your formulation makes that task easy. The scientific jury is still debating the

"pulses: edible, dry seeds from legume plants."

"peasemeal: roasted yellow pea flour."

1





"Isn't it time for a healthier hamburger bun? Pea flour is a great way to enhance fiber and protein in quick breads, rolls and buns."

risk/benefit ratio of manufactured fiber sources. But fortifying with natural fiber from whole foods is no fad. Both the American Heart Association and the American Dietetic Association continue to emphasize the vital role that natural sources of dietary fiber play in maintaining good health.

#### GOOD 'CARBS' ARE SLOW 'CARBS'.

Closely behind the clamor for fiber, listen for the buzz about the benefits of low "GI" foods. Pulses such as dry peas have a low glycemic index (GI), meaning a complex, slowlydigesting starch or carbohydrate portion that prevents sharp spikes in blood sugar levels. These blood sugar spikes not only are problematic for diabetics, but can lead to obesity and may present an increased risk for atherosclerosis in the non-diabetic population.

A staggering 23.6 million people—and more than 1 in 10 Americans over the age of 20—now have diabetes. This has prompted the American Diabetes Association (ADA) to state that "the intake of low glycemic index foods that are rich in fiber and other vital nutrients [such as pulses] should be encouraged both for the general population as well as those with diabetes." Beyond diabetes prevention, high glycemic index diets may also be associated with elevated triglycerides, another heart disease risk factor. Recent scientific evidence found that following a low GI diet over many years significantly lowered coronary heart disease risk.

#### PEA IS FOR PROTEIN.

With twice the protein of cereal grains, dry peas deliver an astounding 8 grams of high quality, low-fat, all-vegetable protein per ¼ cup. Rich in lysine, dry peas and pea flour have an amino acid balance that compliments cereal grain proteins. It's precisely because of the quantity and quality of protein that this pulse is a venerable staple in hunger relief programs world wide. This also makes pea flour and pea protein isolates and concentrates especially well-suited for protein-enriched baking and snack food applications demanded today.

Peas are a natural source of both folate and zinc. Providing about 125 mcg of Folate, just a cup of this pulse provides 37% of the RDA for folate. Because of its important role in preventing birth defects, folate enrichment is now a requirement for many U.S. baked products, including bread. And now, new research shows that folate intake may reduce asthma and allergy suffering. To tap into the growing functional food market, today's food designers are also taking a closer look at zinc-enriched products. The scientific evidence continues to underscore zinc's important role in disease resistance and immunity. Pulses such as dry pea flour provide a "natural' option for both folate and zinc enrichment.



## DRY PEA FLOUR ANALYSIS (Value Per 100 Grams)

		% Daily
	Dry Pea	
Calories (kcal)	365.0	
Calories from Fat (kcal)	20.0	
Fat (g)	2.2	3
Saturated Fat (g)	0.0	
Trans Fatty Acid (g)	0.0	
Cholesterol (mg)	0.0	
Sodium (mg)	15.0	1
Carbohydrates (g)	65.0	22
Dietary Fiber (g)	25.5	102
Total Sugars (g)	8.0	
Protein (g)	23.5	47
Calcium (mg)	55.0	6
Iron (mg)	4.4	25
Potassium (mg)	981.0	28
Zinc (mg)	3.0	20
Vitamin A - IU (IU)	149.0	3
Vitamin C (mg)	1.8	3
Thiamin (mg)	0.7	48
Riboflavin (mg)	0.2	13
Niacin (mg)	2.9	14
Vitamin B-6 (mg)	0.2	9
"Folate, total (mcg)"	274.0	69

Compiled from the data provided by USDA database and ESHA Genesis SQL software

1 cup pea flour	235	139	5	507
1 Tbls pea flour	14	8	0	30

<sup>&</sup>quot;Results may vary by moisture, temperature and particle size of pea flour."

#### FAULT-FREE AND "GREEN."

Pea flour and its derivatives let food processors tap into growing consumer awareness about what constitutes a "healthy" product. This ingredient is tailor-made for low-fat or fat-free formulas that are also GMO-free, non-allergen, gluten-free and cholesterol-free. And, few other ingredients can claim to be as environmentally Pulse plants such as healthy. peas use less water and require no chemical fertilizer. In fact, they actually replenish natural soil nitrogen as they grow, improving the soil in the process. This low energy use is why pulses such as peas are called a "magical crop," as healthy to grow as they are to eat, and perfect for products with a "green" story to tell.

# THE FUNCTIONAL, PRACTICAL "PULSE."

These are challenging times for bakers and snack-makers. The daily barrage of headlines about obesity, heart disease and diabetes has Americans hungry to feel good about what they eat. Yet they still demand great taste and convenience. Now you can satisfy this new appetite for the delicious and nutritious by harnessing the power of pulses. Indeed, food scientists are discovering that these natural legumes seeds are also highly functional ingredients.

Roasted pea flour is a prime example. Made from milled yellow peas, pea flour and its components let you create healthier products with traditional appeal. Loaded with fiber and high quality protein, roasted dry pea flour is suitable for a wide range of food product applications. Its mild, toasty flavor benefits a wide range of bakery goods. Non-allergen and glutenfree, with a low-glycemic index, it's also tailor-made for specialty bakery products.

## "Pulses are as healthy to grow as they are to eat."

# "'PEA'RFECT" FIBER AND PROTEIN SOLUTION.

Adding roasted pea flour to your ingredient mix is an instant way to enrich the fiber and protein content of snack bars, pasta, breads and other baked goods without altering appearance, taste or texture. And it's economical, especially when compared to fiber-fortifying gums or soy protein products. Light golden in color, yellow pea flour comes roasted and/or steam-treated depending



"Create tasty, high-fiber crackers with double the protein and half the fat."

upon the functional attributes desired. This pre-cooking process gives pea flour superb stability with longer shelf life and flavor

Yellow pea flour contains 25-27% all-natural dietary fiber—both soluble and insoluble. Although some products will accept 30% or more without formula changes, adding just 7% to your recipe can boost fiber by 1.4 grams. In fact, every 10 grams or ¼ cup of pea flour hikes both protein and dietary fiber by a hefty 2.5 grams. That same ¼ cup also delivers 8 grams of natural, high quality all-vegetable protein. Rich in lysine, with twice the protein (22.8%), pea flour has an amino acid profile that complements cereal grains.

#### A FOLATE FORTRESS.

When added to your baked good formulas, pea flour can significantly

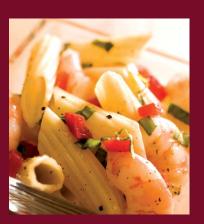
reduce the need for additional folate fortification. Typical of all legumes, pea flour is a natural and substantial source of this crucial B vitamin as well as zinc. And, if it's a specific attribute you're after, concentrated fractions of pea fiber, protein and starch are also commercially available.

# NOT YOUR TYPICAL LOW-FAT FLAVOR ENHANCER.

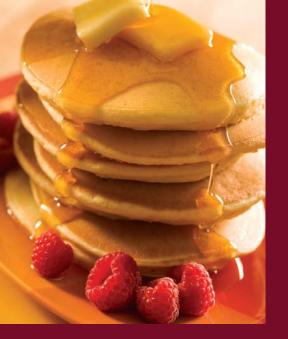
Besides enriching fiber and protein, precooked pea flour is an excellent way to improve flavor attributes in a variety of baked goods. Low in fat (2.5%), and highly unsaturated at that, pea flour has no cholesterol, yet gives low-fat products structure and vital nutritional value. High in slowly digestible starch and resistant starch, both contribute to pea flour's low glycemic index, making it an anti-obesity weapon and valuable food ingredient for diabetics and those at risk for diabetes and heart disease.

#### STABLE, SAFE AND PURE.

With stability comparable to wheat flour, precooked pea flour is microbially safe with low aerobic plate counts (300-600 CFU/g). U.S.-grown peas make excellent roasted pea flour as they have low levels of foreign matter, are dried naturally in the sun, and harvested only when completely mature. Pea flour can be stored at ambient temperature for at least three months with no color loss, oxidation or off flavors. When kept cool (under 80 degrees F) and dry, a one-year shelf life can be expected.



"Valuable food ingredient for diabetics."





#### YELLOW PEA FLOUR (ROASTED)

Roasted yellow pea flour is well-suited for making more nutritious flatbreads, tortillas, pita breads, crackers, cookies, energy bars and extruded snacks. Increase dough yield, firmness and texture in the process.

Isn't it time for a healthier burger bun? By adding 30% pea flour to a conventional commercial formula and then optimizing for moisture, U.S. food technologists created a delicious burger bun with 4 grams of fiber, 7 grams of protein and traditional taste, texture and appearance. (See **www.northernpluse.com** for recipe). Pea flour is a great way to enhance fiber and protein in all sorts of quick breads, rolls and buns.

Gluten-free breads, cookies and high protein pastas are just some of the innovative pea flour food products making their way on to grocery shelves. Indeed, pea flour is a great way to add structure and enhance nutrition of products made with other gluten-free ingredients such as rice, tapioca or potato starches.

#### NEUTRAL COLOR AND FLAVOR.

Roasted pea flour is an excellent flavor carrier and flavor improver. Breakfast bars containing up to 30% pea flour deliver great taste in a nutritional template of high fiber, vegetable protein, oligosaccharides, isoflavones, zinc, selenium and resistant starch.

Crisp, crunchy texture potential. Create tasty, high fiber crackers with double the protein and half the fat.

Yellow pea flour is stabilized by roasting and/or steam precooking. Either process partially gelatinizes starch, denatures protein and inactivates enzymes to increase shelf life. Because of its high absorption properties, additional moisture is warranted in some formulations. Expect minimal non-enzymatic browning and oil absorption when frying. (See recipes for a delectable, fiber-enriched doughnut and other great products at <a href="https://www.northernpluse.com">www.northernpluse.com</a>). Dry or wet milling processes produce different purities in pea flour fractions, each with applications suitable to specific food matrix functions.

#### **PEA FIBER**

Pea fiber fractions offer bakers a natural, more economical and nutritious alternative to gums. While enhancing dough yield, pea fiber fortification can also modify texture, create a full- bodied mouth feel, improve uniformity and consistency of and reduce breakage in bars and cookies. Traditionally derived from the hull portion the seed, pea fiber is 85% soluble and 15% insoluble. Its high (20:1) water binding capacity, fat absorption and dough

10

# THE PEA FLOUR TOP TEN

FIBER ENRICHMENT

PROTEIN ENRICHMENT

**FOLATE ENRICHMENT** 

**HIGH LYSINE** 

**LOW-FAT** 

**NON-GMO** 

**GLUTEN-FREE** 

CHOLESTEROL-FREE

**NON-ALLERGEN** 

LOW GLYCEMIC INDEX



conditioning properties make pea fiber great for granola bars, pasta and many baked products. Particularly well-suited for low-fat or color-sensitive applications, pea fiber increases wheat flour's water absorption and is easily substituted for up to 25% of wheat flour in cakes, cookies and muffins, to create products with up to 4 grams of fiber per serving.

Better than bran. Substitute 50% pea fiber to create a lemon blueberry muffin with half the calories, a third of the sugar, a fifth of the sodium and 2 grams more fiber than a comparable raisin bran muffin. Developed by Canadian food scientists, the lemon blueberry (pea fiber) muffin delivered 8 grams of fiber and still earned a taste panel thumbs up!

Proprietary processes for producing insoluble pea fiber from the seed's interior are also available. The resulting white 70% fiber powder has emulsifying and gelling properties that make it especially useful for enriching white bakery products without affecting color or flavor.

#### PEA PROTEIN

# FORTIFY PROTEIN IN BREAD, PASTAS AND NUTRITIONAL BARS.

Pea protein concentrates and isolates are functional, bio-available and loaded with lysine. Pea protein concentrates and isolates are an economical, non-allergen and non-GMO alternative to soy flour. Protein isolates (85% P) and concentrates

(55%-60%P) are highly soluble with excellent water-holding capacity, give structure to gluten-free products, and create satisfying but nutritious snacks because of their expansion and extrusion potential. Pea protein's promising potential as an egg replacer is currently being explored.

#### PEA STARCH

# IMPROVE CRISPNESS, LOAF VOLUME AND APPEARANCE.

With more than 98% purity, pea starch isolates have excellent gel strength and a bland taste. Especially well-suited for cookies and crackers as well as Asianstyle noodles, they also contribute to increased volume and expansion in extruded products and puffed snacks. Pea starch makes an excellent low-glycemic ingredient.

# HOP ON THE FIBER LABELING BANDWAGON.

FDA's Nutrient Content Claims on dietary fiber allow a "Rich," "High" or "Excellent Source" of fiber claim when your product delivers 5 grams or more fiber per serving. Use a "Good" source of fiber claim for products with 3 grams to less than 5 grams of fiber per serving. Consult FDA guidelines for more specific information prior to making label claims.

To find the following exciting pea flour recipes, visit www.northernpulse.com

	Dietary Fiber/Serving	Protein/ Serving
Bagel	3 g	7 g
Brownie	1 g	2 g
Buttermilk pancak	e 2 g	4 g
Carrot muffin	4 g	4 g
Doughnut	3 g	5 g
Ginger cookie	1 g	2 g
Burger bun	4 g	7 g
Pan bread	2 g	4 g
Tortilla	3 g	7 g
Whole wheat brea	d 4 g	5 g

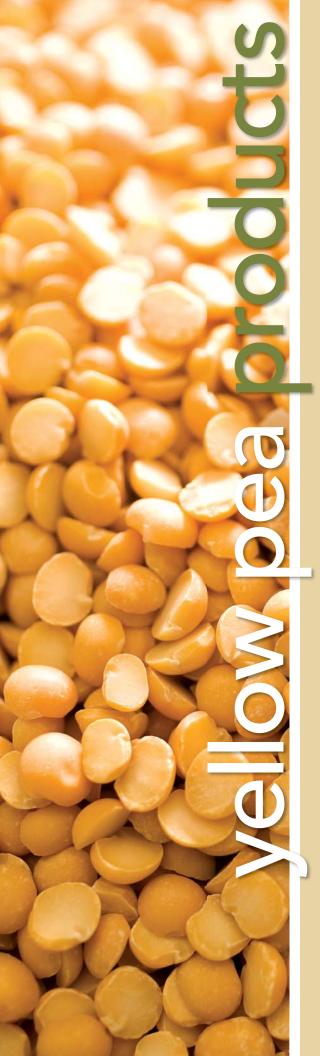


www.pea-lentil.com



www.northernpulse.com

Project funded by: Northern Pulse Growers Association



#### **Pea Flour**

Flours and powders available Organic, kosher, and halal available Roasted or steam-treated for stability

#### **Attributes**

- Fiber and protein enrichment
- Neutral color
- Excellent flavor carrier
- Folate, Zinc enrichment

#### **Food Product Applications**

- Breads, pastas, breakfast bars
- Flat breads, pitas, rolls, doughnuts, buns, crackers
- Gluten-free bakery products
- Extruded products, meat products

#### Pea Fiber

Yellow pea fraction Outer hull and inner fiber products available Organic, kosher, and halal available

#### **Attributes**

- Fiber fortification
- Economical gum alternative
- Modify texture
- Improve uniformity
- Reduce breakage

#### **Food Product Applications**

- Nutrition bars
- White breads, bagels, muffins, cookies, cakes, tortillas
- Low-fat applications
- Pasta, meat products
- Soups, vegetarian foods
- Ready-to-eat meals

#### **Pea Protein**

Yellow pea fraction
Dry-milled concentrates
Wet-milled isolates

#### **Attributes**

- High-lysine
- Non-allergen, non-GMO
- Economical alternative to soy
- Soluble, excellent water-holding capacity
- Enhanced structure, nutrition

#### **Food Product Applications**

- Breads, dressings
- Nutrition bars, snacks
- Pasta, soups, seafood, meats
- Gluten-free, vegetarian
- Baby food, meal replacement beverages

#### Pea Starch

Yellow pea fraction Dry or wet-milled products available Resistant and slowly digestible starch

#### **Attributes**

- Improve crispness, volume, appearance
- Excellent gel strength
- Bland taste

#### **Food Product Applications**

- Cookies, crackers
- Breakfast bars, snacks
- Extruded products
- Noodles



#### **Pea Tortillas**

Ingredient List	Amount (Baker's %)
High-gluten bread flour	100.0
Precooked yellow pea flour	20.0
Shortening	12.2
Salt	1.8
Baking powder	1.5
Water	57.0

#### Processing

Mix ingredients for 6-7 minutes Rest dough for 10 minutes Cut, mold and bake for 1.2 seconds in tortilla maker Bake sheeted tortilla for 2 minutes at 550°F

Serving size: 1 tortilla (75 g)

#### **Nutrition Facts** Calories from Fat 50 Calories 230 Total Fat 6g 9% Saturated Fat 2.5g 13% Trans Fat 0g Cholesterol 5mg 2% 15% Total Carbohydrate 37g 12% Sugars 1g Protein 7g Vitamin A 0% Calcium 4% Iron 4% | Calories | Calories

#### Pea Buttermilk Pancakes

Ingredient List	Amount (Baker's %)
All purpose wheat flour	100.0
Precooked yellow pea flour	33.3
Vegetable oil	18.7
Buttermilk	122.6
Whole milk	93.3
Eggs	40.0
Sugar	19.2
Salt	1.6
Baking powder	3.5
Baking soda	3.1

#### Processing

Mix ingredients until smooth; approximately 2 minutes Bake on medium heat until browned on both sides

Serving size: 1 pancake (56 g)

Nutri Serving Size		Fa	cts
Amount Per Serv	. 0,		
Calories 180		ries from	Fat 90
		% Daily	Value*
Total Fat 10g			15%
Saturated			23%
Trans Fat 0	0		
Cholesterol 4			13%
Sodium 290n	0		12%
Total Carboh		g	6%
Dietary Fib	er 2g		8%
Sugars 4g			
Protein 4g			_
Vitamin A 4%		tamin C	0%
Calcium 6%		n 4%	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
Total Fat	Calories Less Than	2,000 65q	2,500 80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium Total Carbohydrat Dietary Fiber	Less Than le	2,400mg 300g 25g	2,400mg 375g 30g
Calories per gram	n: Carbohydrate		



#### **Pea Carrot Muffins**

Ingredient List	Amount (Baker's %)
All-purpose wheat flour	100.0
Precooked yellow pea flour	300.0
Cooking oil	285.0
Sugar	296.0
Eggs	228.0
Vanilla	5.2
Carrot	296.0
Baking soda	11.1
Salt	6.5
Cinnamon	2.9
Pecans	57.0
Raisins	57.0
Pineapple	57.0

#### **Processing**

Mix all ingredients until well incorporated Pour into muffin cup and top with chopped pecans Bake for 22-23 minutes at 350°F

Serving size: 1 muffin (62 g)

Nutrition Facts Serving Size (62g)
33.v.i.ig 3.23 (32g)
Amount Per Serving
Calories 220 Calories from Fat 120
% Daily Value*
Total Fat 13g 20%
Saturated Fat 1.5g 8%
Trans Fat 0g
Cholesterol 30mg 10%
Sodium 230mg 10%
Total Carbohydrate 25g 12%
Dietary Fiber 4g 16%
Sugars 14g
Protein 4g
Vitamin A 40% • Vitamin C 2%
Calcium 2% • Iron 4%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less Than 65g 80g Saturated Fat Less Than 20g 25g
Cholesterol Less Than 300mg 300mg
Sodium Less Than 2,400mg 2,400mg
Total Carbohydrate 300g 375g Dietary Fiber 25g 30g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4

#### Pea Pan Bread

Ingredient List	Amount (Baker's %)
High-gluten bread flour	100.0
Precooked yellow pea flour	30.0
Shortening	7.8
Salt	1.9
Instant yeast	1.4
Sugar	7.8
Emplex <sup>a</sup>	0.7
Water	81.1
Processing	

Mix to optimum dough development for 5-6 minutes Scale dough, round, and let rest 10 minutes Mold the dough and proof for 80 minutes at 35°C and 85% RH Bake for 22-24 minutes at 400°F

Serving size: 1 slice (44 g)

Nutrition Facts

<sup>a</sup>American Ingredients. Contains sodium stearoyl lactylate.

Serving Size	(44g)	11 1 4	ClS
Amount Per Serv	/ing		
Calories 120	Ca	alories from	Fat 20
		% Daily	/ Value*
Total Fat 2g			3%
Saturated	Fat 1g		5%
Trans Fat	)g		
Cholesterol	Omg		0%
Sodium 160r	ng		7%
Total Carbon	ydrate	22g	7%
Dietary Fil	per 2g		8%
Sugars 2g			
Protein 4g			
Vitamin A 0%	•	Vitamin C	2%
Calcium 2%	•	Iron 2%	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
depending on yo	Calories	2.000	2,500
Total Fat	Less Tha	an 65g	80g
Saturated Fat Cholesterol	Less Tha		25g 300mg
Sodium	Less Tha		
Total Carbohydra		300g	375g
Dietary Fiber		25a	30a

es per gram: Fat 9 • Carbohydrate 4 • Protein 4



#### Pea Whole Wheat Hearth Bread

Ingredient List	Amount (Baker's %)
Whole wheat flour	100.0
Precooked yellow pea flour	5.0
Shortening	6.0
Salt	1.5
Vital wheat gluten	4.0
Emplex <sup>a</sup>	0.5
Milled Flaxseed	4.0
Water	72.0

#### **Processing**

Mix to optimum dough development for 4-6 minutes Scale dough, round pieces, and let rest for 10 minutes Bake for 22-24 minutes at 400°F

Serving size: 1 slice (44 g)

### 

#### Pea Hamburger Buns

Ingredient List	Amount (Baker's %)
High-gluten bread flour	100.0
Precooked yellow pea flour	30.0
Shortening	6.0
Salt	1.5
Instant yeast	1.2
Sugar	1.5
Dry milk	1.0
Emplex <sup>a</sup>	0.5
Water	67.0

#### Processing

Mix to optimum dough development for 6-7 minutes Scale dough, round pieces Proof for 60 minutes at 31°C and 75% RH Bake for 18-19 minutes at 400°F

Serving size: 1 bun (74 g)

<sup>a</sup>American Ingredients. Contains sodium stearoyl lactylate.

Nutrition Fact Serving Size (74g)	S
Amount Per Serving	_
Calories 210 Calories from Fat	30
% Daily Valu	e*
	5%
	%
Trans Fat 0g	_
Cholesterol 0mg 0	)%
Sodium 230mg 10	)%
Total Carbohydrate 37g 12	2%
Dietary Fiber 4g 16	%
Sugars 1g	
Protein 7g	
Vitamin A 0% • Vitamin C 2%	
Calcium 2% • Iron 4%	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs: Calories 2,000 2,500	
Calories 2,000 2,500  Total Fat Less Than 65g 80g	
Saturated Fat Less Than 20g 25g	
Cholesterol Less Than 300mg 300m Sodium Less Than 2,400mg 2,400	
Total Carbohydrate 300g 375g Dietary Fiber 25g 30g	
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4	

<sup>&</sup>lt;sup>a</sup>American Ingredients. Contains sodium stearoyl lactylate.