

The “Second Meal” Effect Of Dry Beans and Lentils Offers Health Benefits

By Joanne Slavin, PhD, RD and Angela Bonnema, MS

Obesity in the United States is a public health concern with rates exceeding 30% of adults in the obese category and 70% of adults combined in the overweight and obese categories.¹ With obesity, the risk of other metabolic conditions increases, including type 2 diabetes, cardiovascular disease, hypertension, and stroke.² The prevalence of type 2 diabetes is rising with current estimates reaching 26 million (8.3% of the population) in this country.³

The increase in obesity has been linked to dietary changes favoring refined, processed foods and, consequently, decreased consumption of whole food products.⁴ Food companies have focused solutions on foods that are commonplace in the diet that may have a positive impact. Industry strategies toward reducing obesity rates have included functional foods and pharmaceuticals. In contrast, a shift back to the consumption of whole foods may be an important part of the solution.

RD/RDN Takeaway #1:

Legumes are a low glycemic food that have the ability to decrease glycemic response both at the first and second meal.

Glycemic Response

The glycemic index (GI) of a food is the ranking of a carbohydrate on a scale of 0 to 100 according to the extent to which it raises blood sugar levels over a 2-hour period after eating (i.e., immediate effect on blood sugar levels) compared to glucose.⁵ The rating provides a ranking for various foods but this value is arbitrary in that it does not take into account the amount of the specific food consumed. The glycemic load accounts for serving size of the food by taking the GI of a food multiplied by the grams of available carbohydrate in the serving. The glycemic response (GR) is then the effect that the carbohydrate-containing food has on blood glucose concentration during the digestion process.

Low-GI foods, by virtue of their slow digestion and absorption, produce gradual rises in blood glucose and insulin levels, and may thus have potential benefits for health, including improved glucose tolerance for individuals with diabetes or high-risk of diabetes, weight management, improved lipid parameters, and decreased fat mass. Low GI diets have not only been shown to improve both glucose and lipid levels in people with diabetes (type 1 and type 2),^{6,7} but they also have shown the potential to decrease the risk of developing type 2 diabetes.⁸

Macronutrients at Play

Legumes, such as dry beans, are rich in a number of nutrients including protein, complex carbohydrates, and dietary fiber, with a significant level of vitamins and

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Registered Dietitians/Nutritionists can now earn continuing professional education units by reading *Dry Bean Quarterly* and successfully completing a short test on each issue.

“We are glad to provide research-based information to help RDs/RDNs serve their clients and patients better,” said Ed Stroesser, *DBQ* managing editor. “We will continue to feature nationally-recognized authors as we relay the latest health research about dry beans.”

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Introducing . . .



The Bean Institute has developed a new tool to help RDs/RDNs educate clients about beans. Six “Bean Bulletins” will be distributed to RDs/RDNs in the coming year. Bean Bulletin will be available on-line and will address news items, timely issues, and information of interest to dietitians and their clients. RDs/RDNs are welcome to share Bean Bulletin with their on-line communities.

To receive Bean Bulletin at no cost to you, subscribe at www.BeanInstitute.com.

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minerals, as well.⁹ The content of protein, slowly digestible carbohydrates, and high fiber, along with moderate energy density, provide a number of positive attributes for glycemic control, a higher satiating diet, and an aid in weight management.¹⁰⁻¹²

The fiber content in legumes is predominantly insoluble (wide range of 1/3–3/4, with the remaining being soluble) and typically ranges from 15%–32%.¹³ The blend of soluble and insoluble fiber provides a range of positive effects such as fecal bulking, fermentable substrate, and viscous fiber which can slow gastric distention and emptying. In addition to the dietary fiber content including resistant starch, legumes also contain oligosaccharides that are highly fermentable. Specifically, the oligosaccharides are α -galactosides (α -1, 6 linked galactosyl groups attached to a sucrose molecule) but are generally referred to as raffinose (1 group), stachyose (2 groups), and verbascose (3 groups).¹³ This has, historically, provided legumes with a negative association, but fermentation of indigestible carbohydrates is beneficial and leads to the generation of short chain fatty acids (SCFA) and may therefore not only be considered prebiotic¹⁴ but can also impact gut hormones related to blunted glycemic response and reduced appetite at the second meal.¹⁵


RD/RDN Takeaway #2:
The combination of protein, slowly digestible carbohydrates, resistant starches, and oligosaccharides provide a combination of active components.

Beans and the Second Meal Effect
The ability to elicit a lower blood glucose response following a first, low GI meal and also a standardized second meal has been termed the “first-meal” and “second-meal effect,” respectively.¹⁶ Glycemic index of a food is one mechanism at play for this effect but colonic fermentation and delayed gastric emptying, linked to low GI foods that are slowly digestible or “lenta” containing fermentable fiber and resistant starches, have also exhibited this effect.¹⁷⁻¹⁹ The various mechanisms, however, do not impact all aspects of glycemic control and food intake equally. Various legumes have been found to have differing effects on GR at initial and second meal insulin, appetite, and food intake.²⁰⁻²² One study found lentil and yellow pea to decrease food intake with specific time points having lower appetite ratings but no impact on GR at first or second meal²⁰ while another found lentil to decrease GR at both first and second meal and flatten insulin levels.²¹ Chickpea did lower GR over a 5 hour period with no difference in food intake compared

to a high carbohydrate control.²⁰ These observed variances may be due to differences in the ratio of slowly digestible carbohydrates and resistant starch among various legumes.¹⁹ Isolated protein and fiber from yellow pea were fed to assess which component is responsible for the second meal effect and found that protein had the greatest impact but effects were lessened.²² This suggests that intact legumes have a greater impact than the isolated components.

RD/RDN Takeaway #3:
Colonic fermentation may play a large role in the second meal effect of beans.

Bean Intake and Body Weight

Bean intake could potentially be useful in weight management over time. A study comparing the intake of rice and beans to lean meat for 8 weeks revealed a greater weight loss at 4 weeks in the bean group.²³ In contrast, an 8 week intervention found the legume meal to result in significant weight loss, equal to the meat, egg and lean dairy group, when compared to a fatty fish diet and control diet.²⁴ Both animal and plant proteins consumed at higher levels in the diet have been linked to increased satiety, decreased food intake, and increased weight loss.²⁵⁻²⁶ When consuming an energy deficient diet, pulses have been shown to have a significantly greater weight loss after 8 weeks compared to a control diet, -7.8 kg compared to -5.3 kg, respectively.²⁷ In the context of a low glycemic index diet, the intake of legumes in combination with whole grain bread resulted in 0.6 reduction in body mass index (BMI) and 1.5 kg weight loss compared to no change with a high glycemic control diet.²⁸ 

RD/RDN Takeaway #4:
The evidence suggests that the unique nutrients of legumes may also lead to reduced appetite, reduced food intake, and, possibly over time, weight loss.

About the Authors

Joanne Slavin, PhD, RD is a professor in the department of Food Science and Nutrition at the University of Minnesota. She was a member of the 2010 Dietary Guidelines Advisory Committee.

Angela Bonnema, MS is a PhD student working on the effect of protein and fiber in whole foods on satiety and food intake, focusing on animal protein compared to dry beans.

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Chef Ann Cooper

Bean Seminar Chef Named Top Health Crusader

Chef Ann Cooper was named one of the Top 15 Crusaders for Health in the Food Industry by Greatist.com. Cooper served as the chef of the Bean Institute's "Beans For A Better Life" seminar in Dallas last spring.

Thompson Awarded Grant To Study Health Benefits of Dry Beans

Dr. Henry J. Thompson, College of Agricultural Sciences, Colorado State University, has been awarded a grant from the National Cancer Institute to focus on the health benefits of cannellini beans because of their strong protective activity in preclinical models. Thompson is a former *DBQ* author (see *Vol. 1, No. 2*).



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Berry Bean Smoothie

Try this unique smoothie recipe for breakfast, lunch, or snack time.



Ingredients

- 15 oz. cooked and cooled Great Northern beans (substitute one can of beans, drained and rinsed, if desired)
- 1 cup orange juice
- 2 cups quartered strawberries, fresh or frozen
- 1 8 oz. can crushed pineapple with juice
- 3 Tablespoons honey
- 1 teaspoon ground cinnamon
- ¼ teaspoon vanilla extract
- 6 to 8 ice cubes (crushed works best)

PREPARATION

1. In a blender or food processor, process all ingredients, except ice cubes.
2. Add ice cubes and blend until smooth.
3. Serve in glasses.

YIELD: 8 servings

SERVING SIZE: 6 ounces

NUTRIENT INFORMATION PER SERVING:

Calories: 125; Fat: 0g; Protein: 4g; Total Fiber: 3.5g;
Cholesterol: 0g; Calcium: 39.5mg (4%);
Iron: 1mg (6%); Sodium: 6mg.



More recipes available at BeanInstitute.com



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Editor's Note: Beginning with this issue, we will feature strategies and ideas from RDs/RDNs who recommend beans to their clients and patients. We recently received this email from a reader.

Dear Editor,

I received the latest *Dry Bean Quarterly* and noticed that in your piece on cooking dry beans you didn't mention the no-soak method, which is the method I use to cook them and is very easy.

I rinse the dry beans in a colander and pick out the cracked beans and any stones; then I cook them on high in my crock pot, with water to cover, for 5½ to 6 hours. If one is home for the day or evening, this is a convenient way to go. I cover the crock pot with foil to keep the water from boiling away, but you may want to check every few hours and add more water, if needed.

That's it. Perfect beans and soooo easy. Then I cool them, pack 2-cup portions flat in freezer bags, and always have beans ready to go for recipes.

In health,

Mary Saucier Choate, MS, RD, LD
Hanover, NH

Managing Editor's Note

Hello, *DBQ* Readers,

We know you have developed innovative strategies to help improve the health of your clients and patients. If you would share your most successful strategy with us, we would like to print it in a future *DBQ*. Of course, we are most interested in strategies that involve beans but we would be interested in what works for you! Just email me at DBQ@mail.com.

Sincerely,

Ed Stroesser,
Managing Editor

Want more information about dry beans? Like us on **Facebook** and follow us on **Twitter** and **Pinterest**.

