



Will consumers purchase gene-edited foods?

A nationwide survey on US consumer beliefs, knowledge, understanding, and willingness to pay for gene-edited foods under different information treatments

Presenter: Dr. Vincenzina Caputo

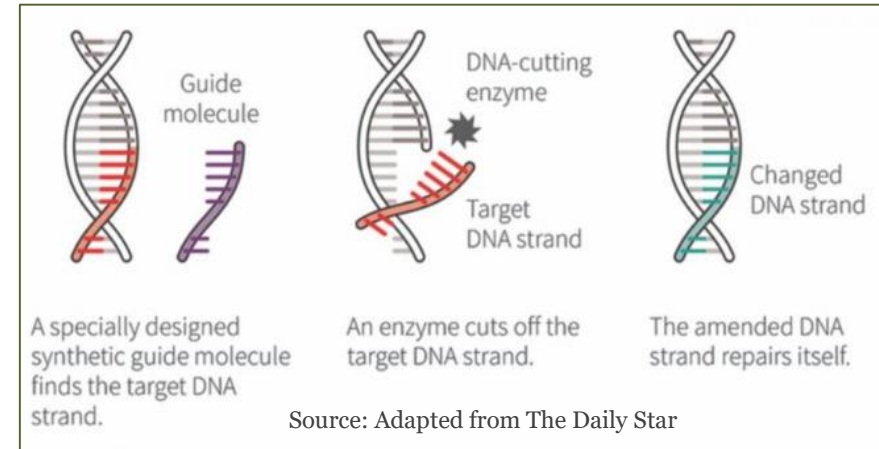
Research Team: Vincenzina Caputo, Jayson Lusk, and Valerie Kilders

Outline

1. What is Gene-Editing?
2. Consumer Perspective: what are the issues?
3. Objectives
4. Approach
5. Key Findings
6. Implications

What is Gene-Editing?

- ◆ Gene-Editing is a type of genetic modification (or genetic engineering) through which scientists make precise changes in an organism's DNA.



- ◆ Unlike the first-generation of genetic modification, also known as GMOs (Genetically Modified Organisms), changes of the DNA are targeted and controlled and it does not necessarily imply the insertion of foreign DNA.
- ◆ Applications are manifold and for food include:




- ◆ Would consumers perceive gene-edited food products differently than GMO food products?

⇒ **Importance:** The **negative reputation of GMOs** is likely to affect gene-edited foods if consumers make the association between them

- ◆ How will gene-edited food products fare in comparison to organic, non-GMO and conventional food products as well as GMO foods with the new “Bioengineered” label?

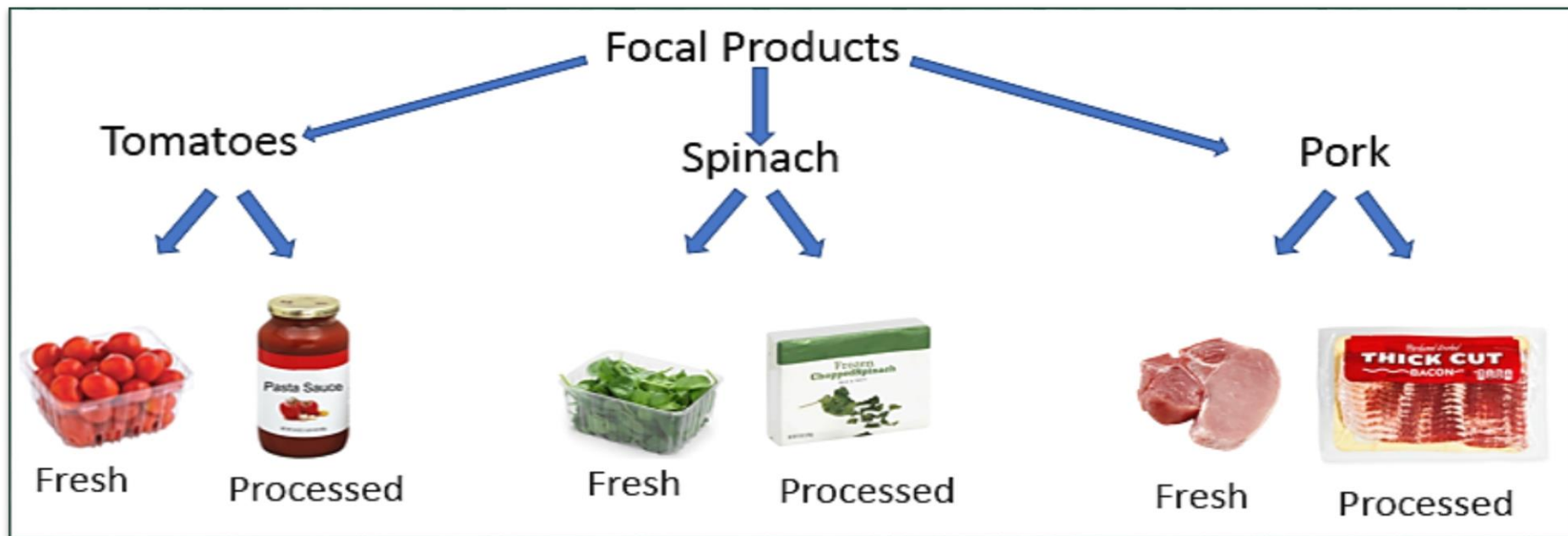
⇒ **Importance:** Define market potentials and marketing strategies



We designed a consumer survey to answer those questions

1. Determine the level of consumers' beliefs, knowledge, and understanding regarding gene-editing technologies;
2. Determine consumer acceptance of gene-edited food by examining how consumers value gene-edited foods over **conventional, GMO, non-GMO**, and **organic** labeled food products;
3. Determine whether and how different information about the **benefits implied by the use of the technology** influences consumer preferences and Willingness-to-pay (WTP) for gene-edited foods.

- ◆ To fulfill these objectives, we conducted a **nationwide survey** with a representative sample of **4400 US consumers**
- ◆ The survey centered around simulated **food shopping questions** with 3 different food products, each in a fresh and processed stage



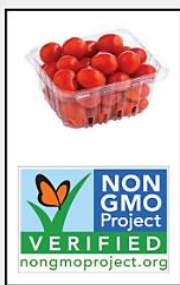
Approach: Food Shopping Questions

◆ Fresh and Processed Tomatoes

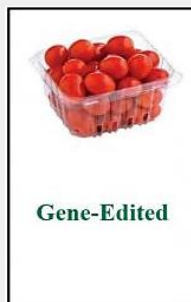
Please choose which **Grape Tomatoes** you would purchase or if neither pick the no purchase option



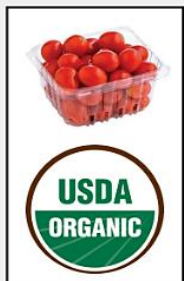
\$4.59



\$4.59



\$1.59



\$3.59



\$2.59

None of these

Fresh Tomatoes

Please choose which **Pasta Sauce** you would purchase or if neither pick the no purchase option



\$3.99



\$4.99



\$3.99



\$4.99



\$3.99

None of these

Pasta Sauce

Approach: Food Shopping Questions (cont)

◆ Fresh and Processed Spinach

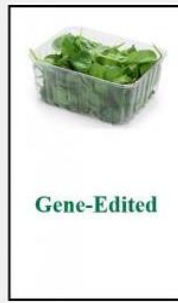
Please choose which **Fresh Spinach** you would purchase or if neither pick the no purchase option



\$4.59



\$3.59



\$3.59



\$2.59



\$1.59

None of these

Fresh Spinach

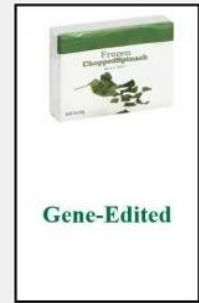
Please choose which **Frozen Spinach** you would purchase or if neither pick the no purchase option



\$3.99



\$4.99



\$3.99



\$4.99



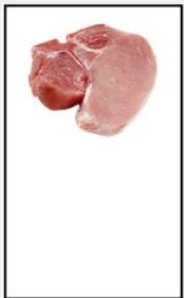
\$3.99

None of these

Frozen Spinach

◆ Fresh and Processed Pork

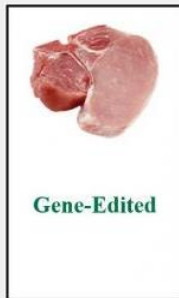
Please choose which **Pork Chops** you would purchase or if neither pick the no purchase option



\$2.59



\$5.59



\$4.59



\$7.59



\$3.59

None of these

Pork Chops

Please choose which **Bacon** you would purchase or if neither pick the no purchase option



\$4.99



\$8.99



\$4.99



\$6.99

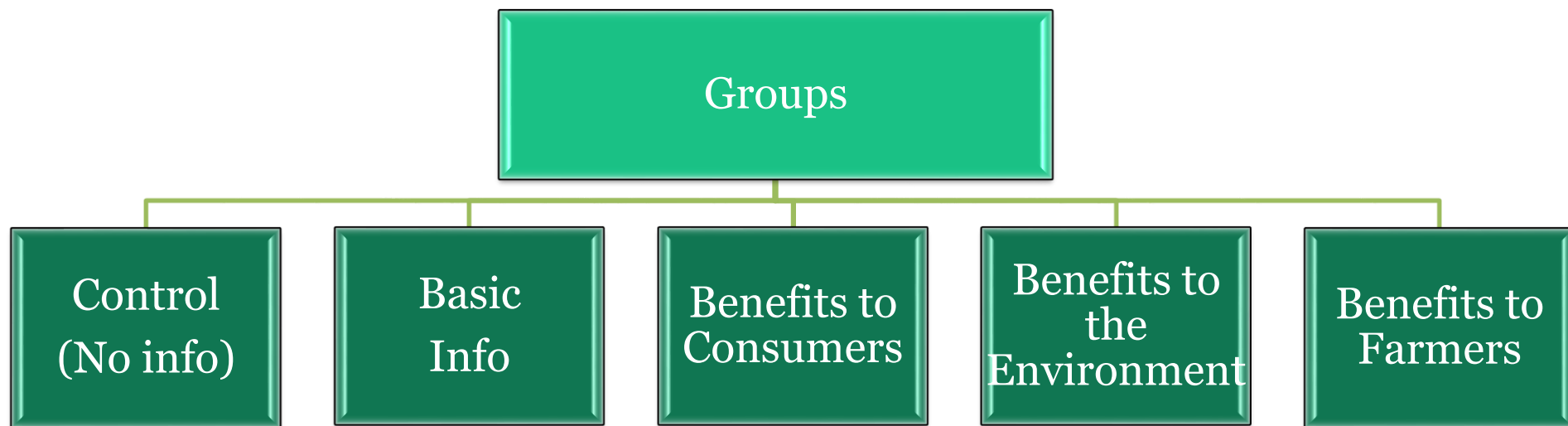


\$3.99

None of these

Bacon




- ◆ We designed five information treatment



- ◆ About 200 respondents per group
- ◆ Participants were randomly assigned to one treatment group and one of the six products (fresh/processed tomatoes, spinach and pork)

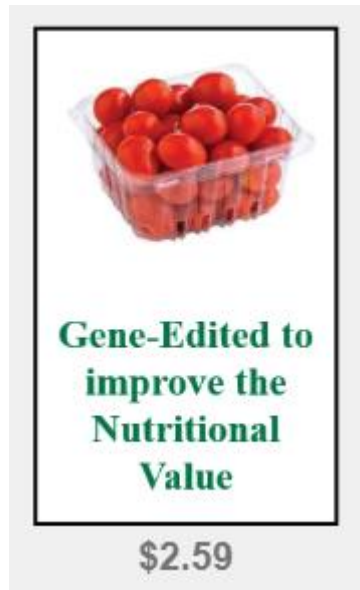
◆ Basic Information

In a moment, we are going to ask you which types of grape tomatoes you prefer to buy. Before proceeding, consider the following information about the labels that will be displayed in the products. When you complete reading the information, please click to continue.

Category	Meaning
	The USDA organic label indicates food products that are grown on soil that had no prohibited substances applied for three years prior to harvest. Prohibited substances include most synthetic fertilizers and pesticides. Genetic engineering of plants is not allowed under this label.
	The bioengineered label indicates that the product contains genetic material that has been genetically modified by adding/inserting foreign genes from other organisms at a random location into the DNA of the products and for which the modification could not otherwise be obtained through conventional breeding or found in nature. The product can be referred to as GMO food.
	The Non-GMO label indicates that the product has not been genetically modified. The label does not prohibit the use of pesticides, herbicides or other conventional production methods, such as antibiotics, unrelated to genetic modification.
Gene-Edited	Gene editing is a form of precision breeding that makes small targeted changes, commonly called edits, to a plant genome to bring about desired characteristics.
No label: Conventionally Produced	The product lacking a label has been conventionally grown. Conventional agricultural production often uses a collection of breeding methods that have been developed over time. This includes crossbreeding of related plants, as well as manipulated changes to produce new crop varieties with desirable characteristics.

Approach: Information Treatments cont.

- ◆ In the Benefit Treatments, respondents received a **benefit message** in the choice questions and a brief **benefit statement** prior to the choice questions



Claim in the choice
questions

The gene-edited grape tomatoes that you have the option to hypothetically purchase in the following section were created by turning on or off pre-existing genes **to increase the levels of vitamin C, potassium, and antioxidants, and thus strengthen the nutritional value of the product.**

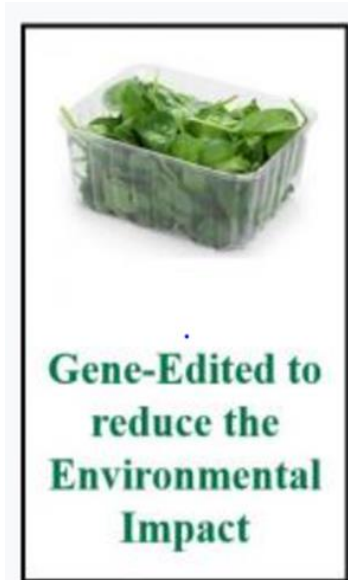
The gene-edited grape tomatoes that you have the option to hypothetically purchase in the following section were created by turning on or off pre-existing genes from the grape tomatoes **to reduce the need for pesticides and thus reducing the environmental impact.**

The gene-edited grape tomatoes that you have the option to hypothetically purchase in the following section were created by turning pre-existing genes from the grape tomatoes on or off to help farmers **reduce losses by increasing the resilience of the plants against a contagious and potentially deadly plant disease.**

Benefit messages: Benefits to the consumers, environment and farmers



◆ Layout for Pork Chops:



\$4.59

Claim in the choice
questions

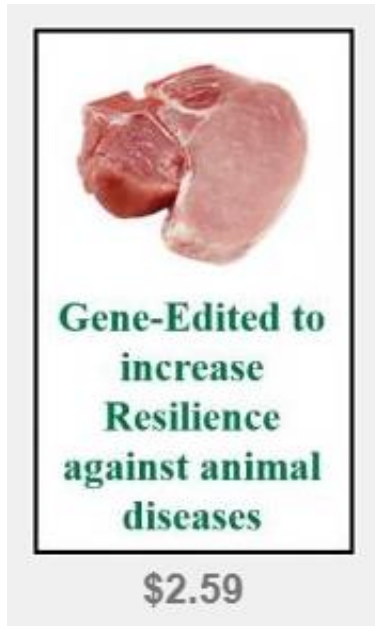
The gene-edited fresh spinach that you have the option to hypothetically purchase in the following section was created by turning pre-existing genes from the spinach on or off **to use 40% less water in production and thus reducing the environmental impact.**



Benefit messages: Benefits to the environment



◆ Layout for Pork Chops:



Claim in the choice
questions

The gene-edited pork chops that you have the option to hypothetically purchase in the following section were created by turning pre-existing genes of the pig on or off **to increase the resilience of animals against a contagious and potentially deadly virus and thus enhancing the health care of the animals.**

Benefit message: Benefits to the consumers
(**animal welfare**)



Approach: Other Survey Questions

◆ In addition to the choice questions participants were also asked about:



...their general consumption and purchasing behavior



...their beliefs (how healthy, expensive, tasty are the product alternatives)



...their awareness of GMO (bioengineered) and gene-edited food



...their subjective and objective knowledge about gene-edited food

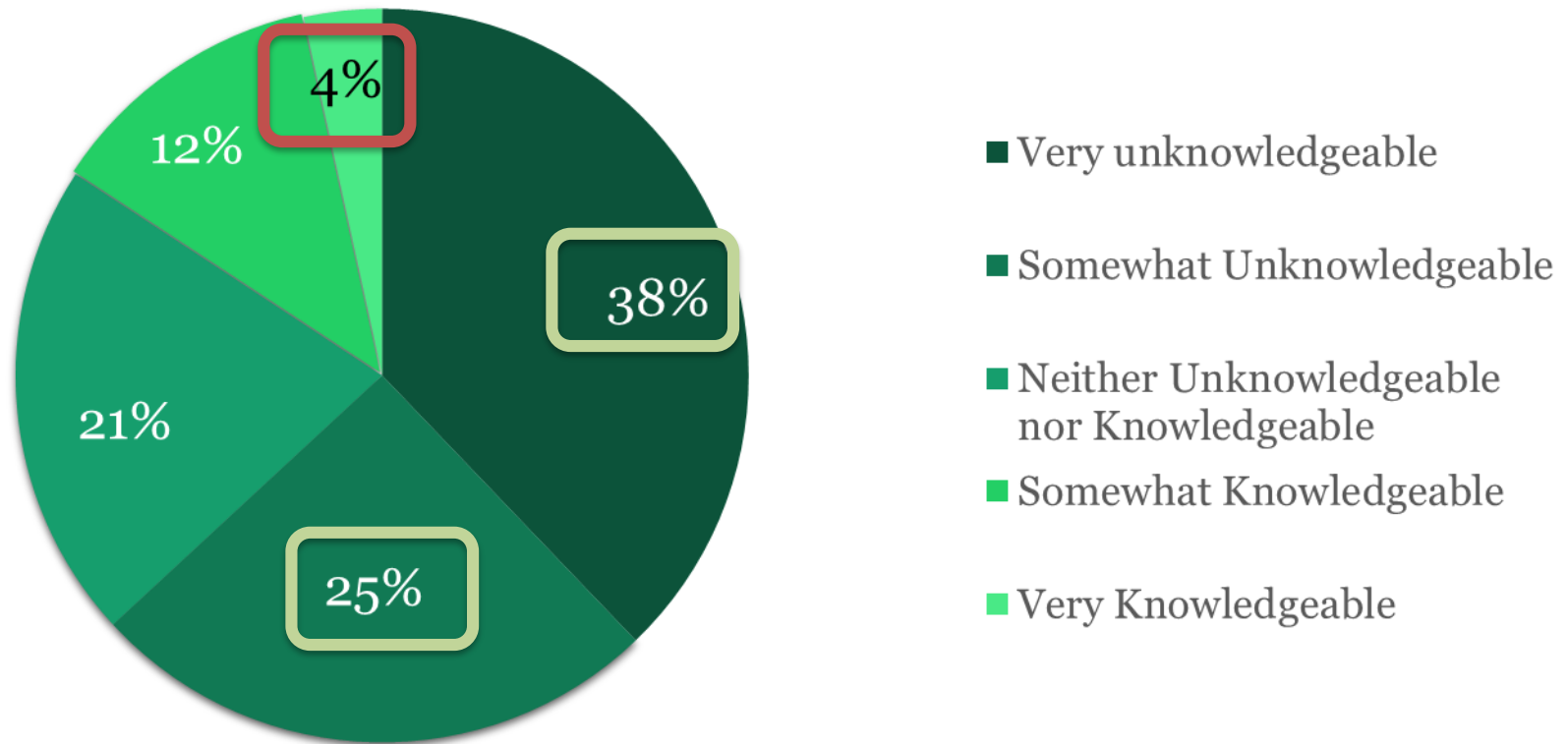


...their risk preferences



...their general demographics

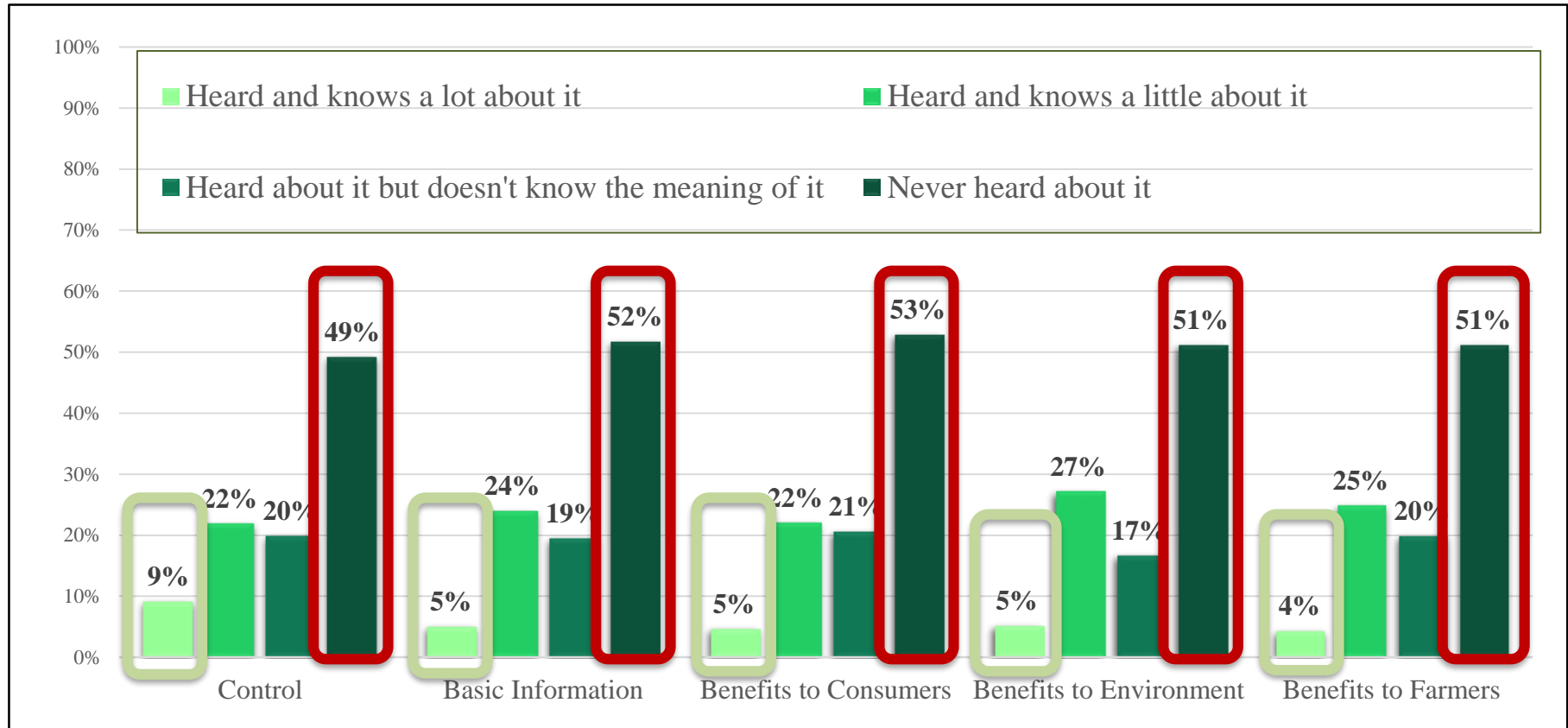
- ◆ Most consumers (>50%) evaluate their **knowledge** on Gene-Editing as overall very poor



Graph 1: Consumer Subjective Knowledge of Gene-Editing

Key Findings: Consumer Awareness

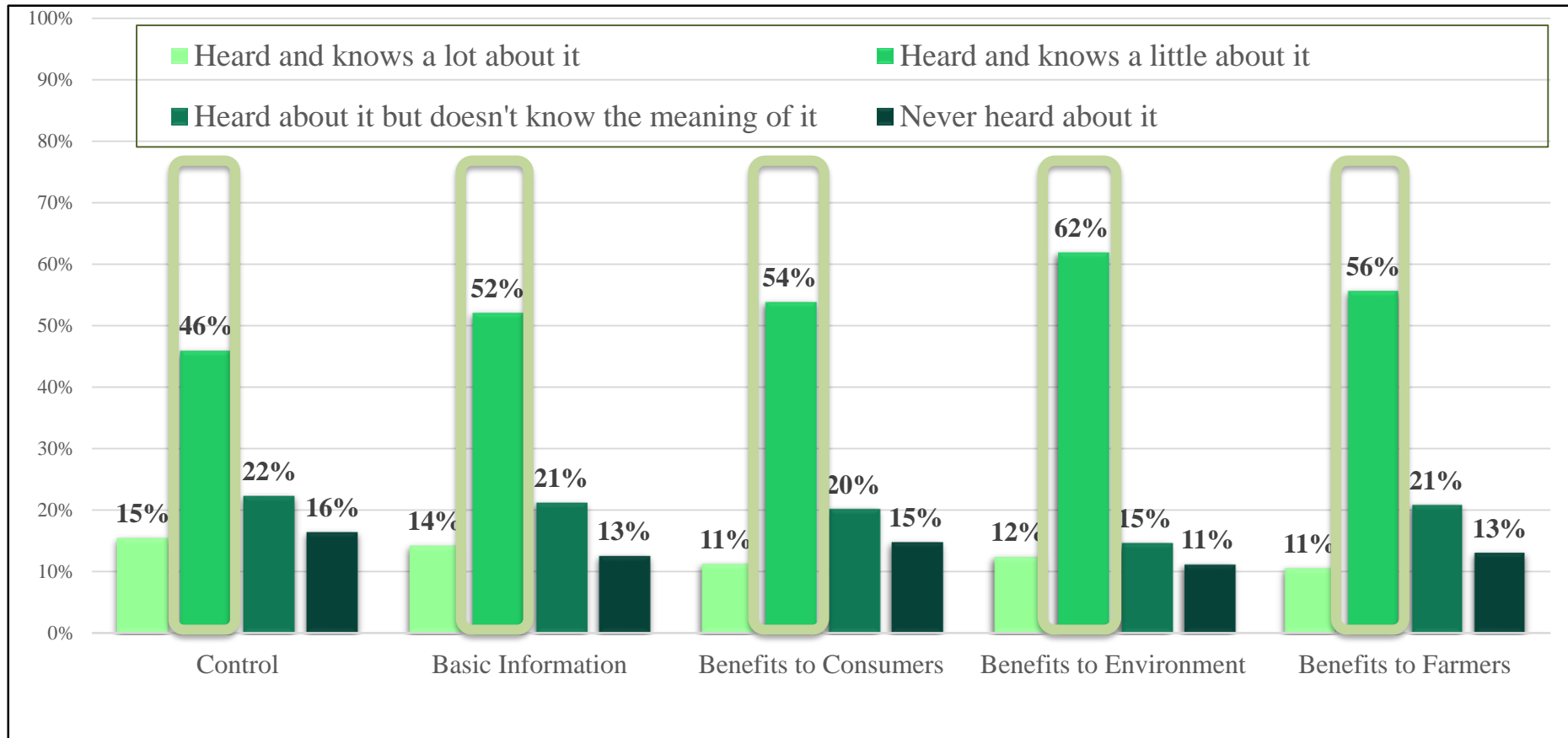
- ◆ Most consumers' **awareness** of gene-editing is severely limited: > 50% of them have never heard about it



Graph 2: Consumer Awareness of Gene-Editing

Key Findings: Consumer Awareness (cont.)

- ◆ In comparison respondents' **awareness** for **GMOs** is substantially larger



Graph 3: Consumer Awareness of GMO

- ◆ The **word associations** of respondent's with the term “*Gene-Editing*” reflect their lack of awareness and knowledge.



Figure 1: Word Association, GMO

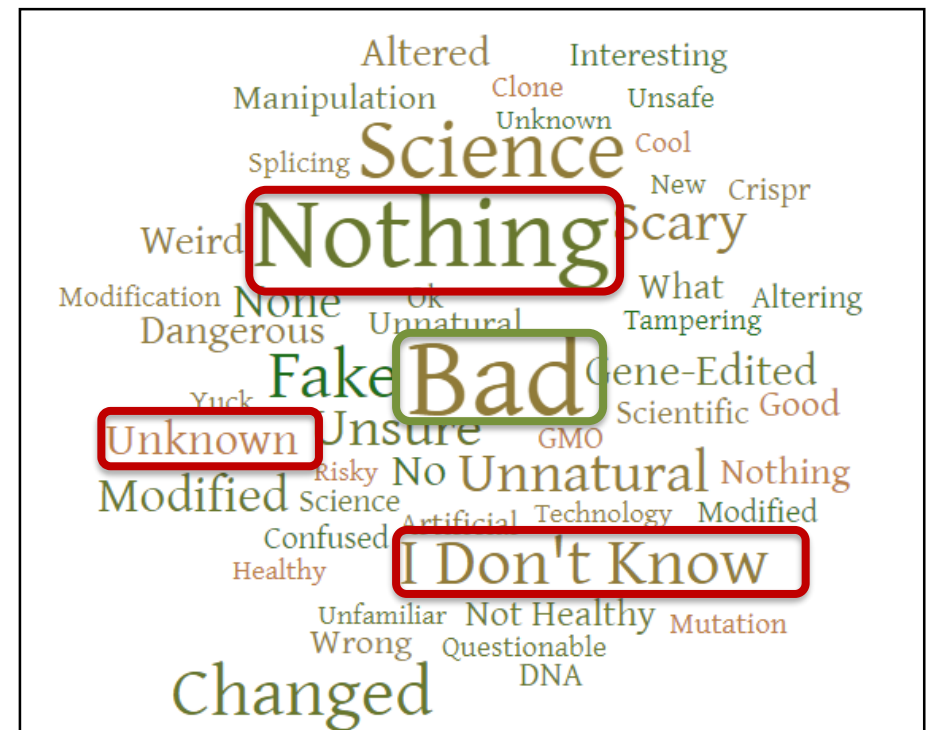


Figure 2: Word Association, Gene Editing



◆ The **word associations:** Organic, Non-GMO, Conventional



Figure 3: Organic



Figure 4: Non-GMO

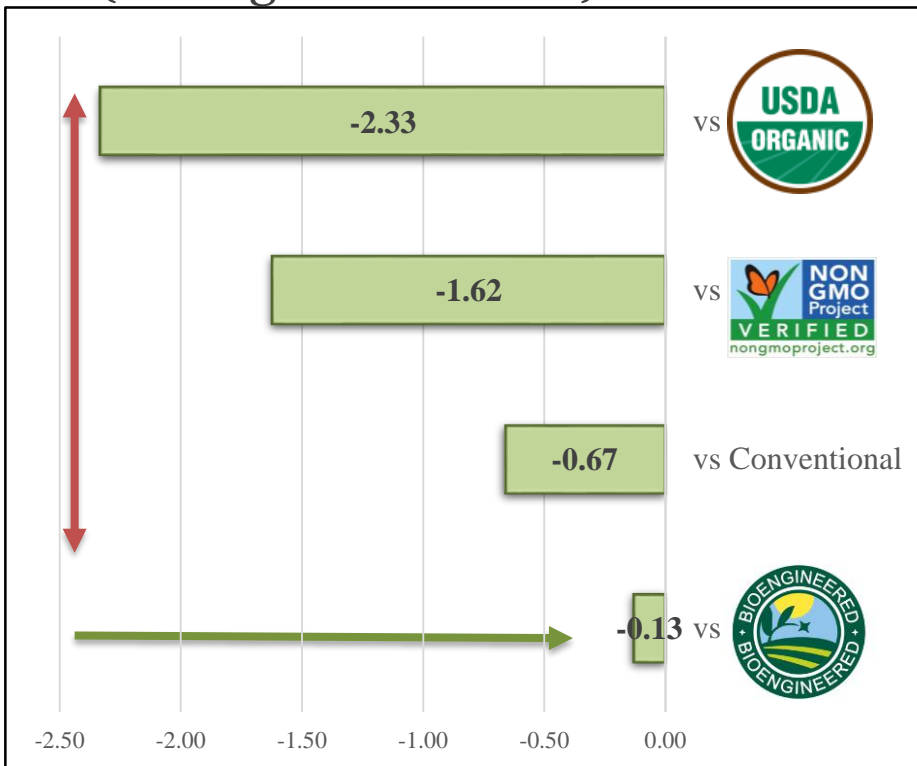


Figure 5: Conventional

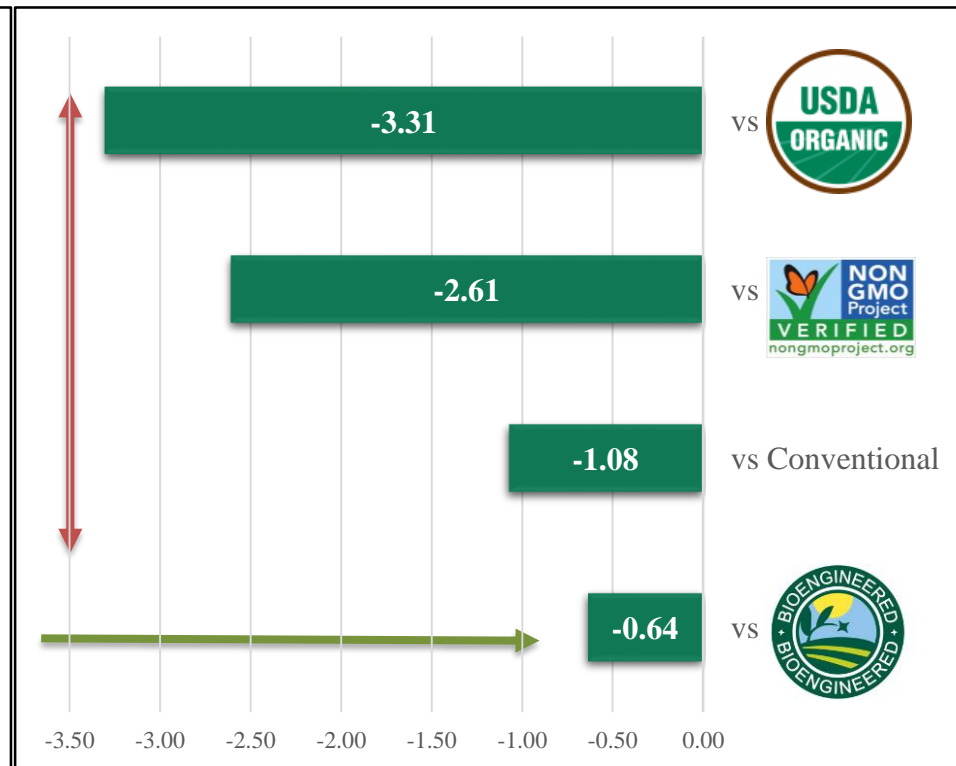


Key Findings: Consumer Marginal WTPs

- ◆ In simulated food choice questions, consumers **discount gene-edited** products relative to **organic** (USDA organic logo), **Non-GMO** (Non-GMO verified logo) and **conventionally grown** products, and they **DO NOT discriminate** much between **gene-edited** products and **GMOs** (bioengineered label).



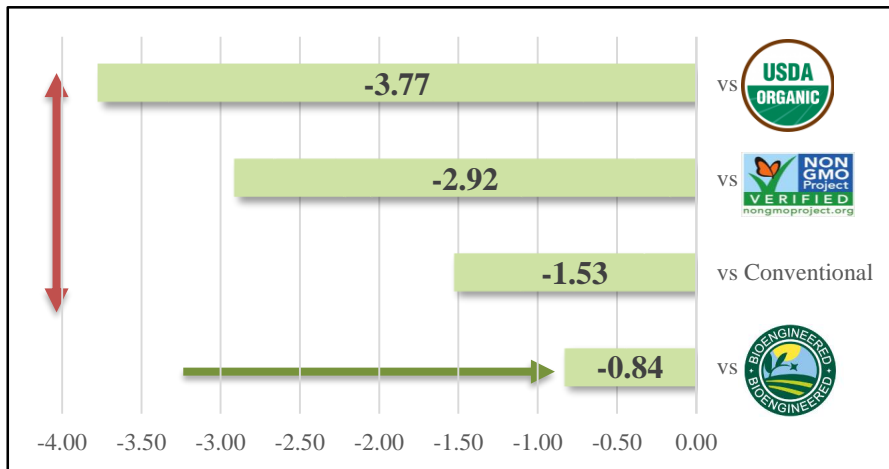
Graph 4: Marginal WTPs, Fresh Tomatoes



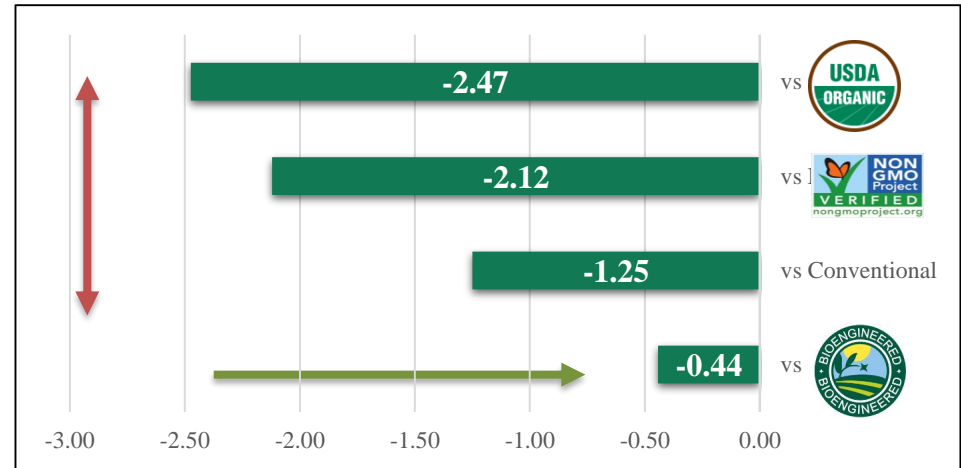
Graph 5: Marginal WTPs, Pasta Sauce

Key Findings: Consumer Marginal WTPs

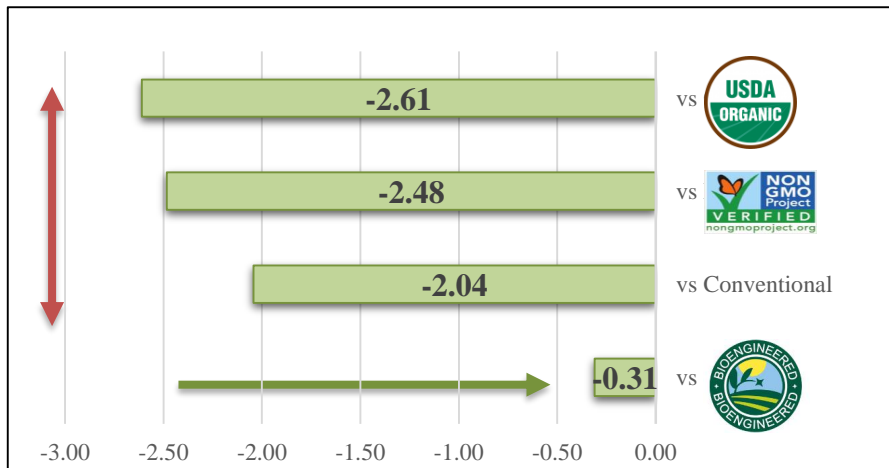
Cont.



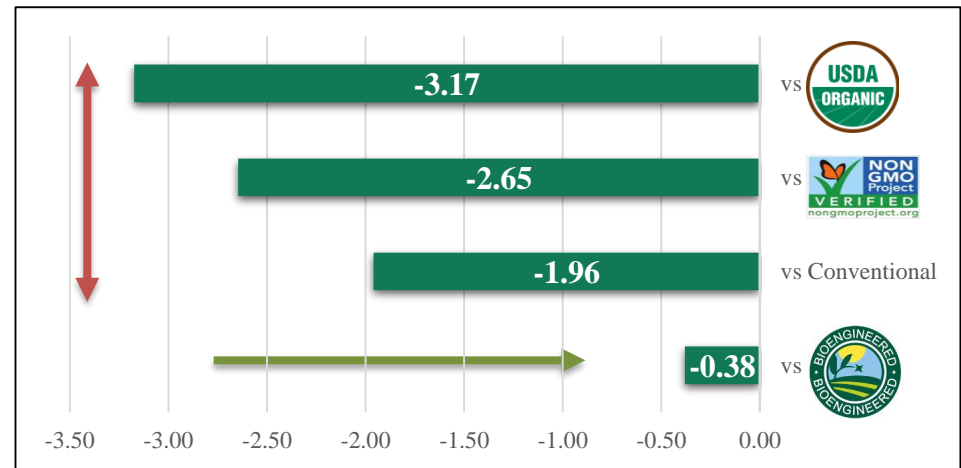
Graph 6: Marginal WTPs, Fresh Spinach



Graph 7: Marginal WTPs, Frozen Spinach



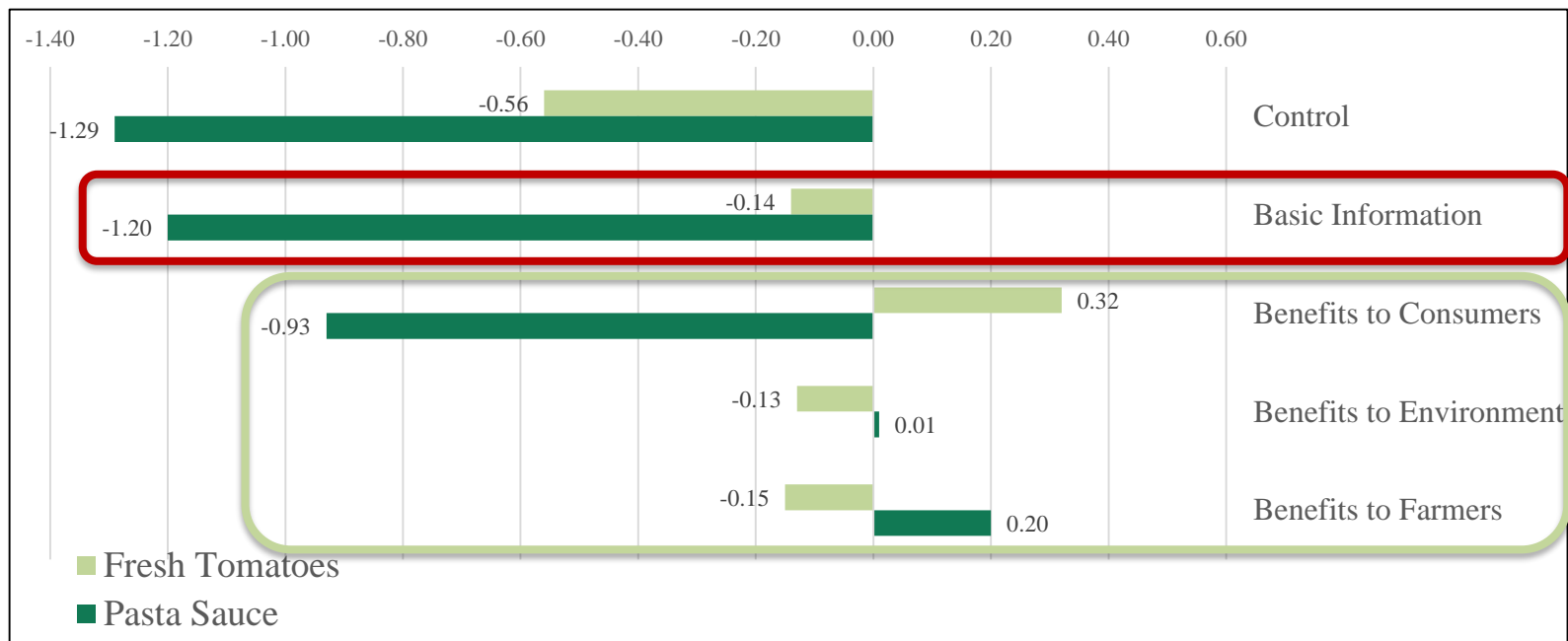
Graph 8: Marginal WTPs, Pork Chops



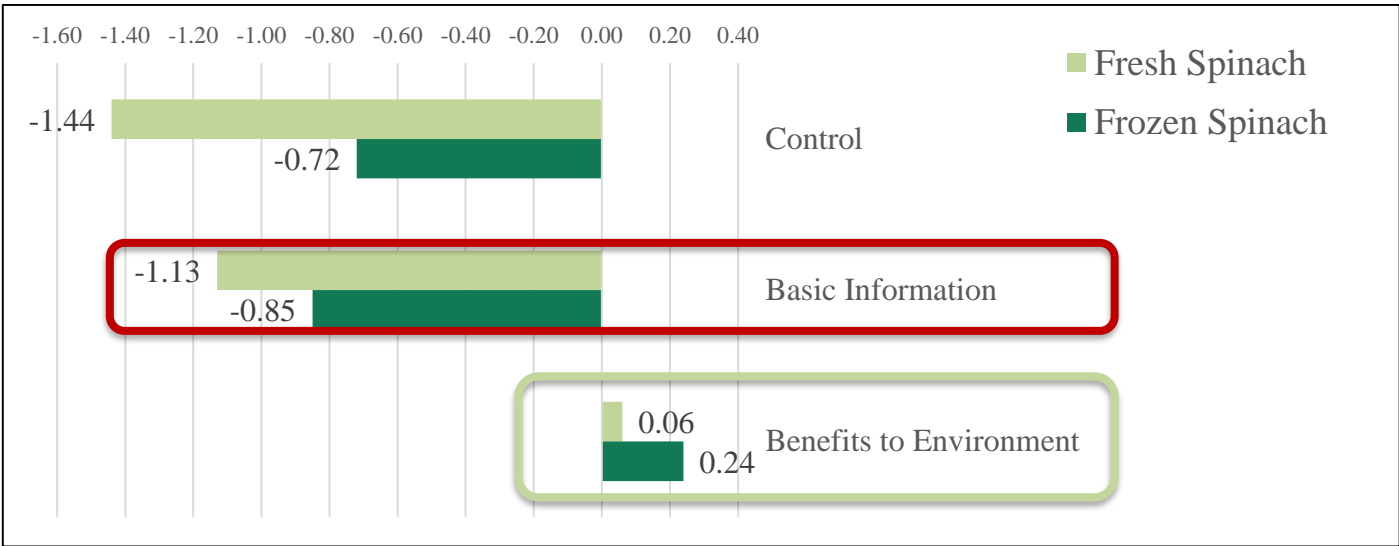
Graph 9: Marginal WTPs, Bacon

Key Findings: Information Effects

- ◆ **Basic Information** about how the technology works has **limited effects** on consumers' WTP for gene-edited products.
- ◆ While, specific information about the ability of the technology to provide a **benefit to consumers, farmers, or the environment** improved acceptance of gene-editing relative to GMOs (bioengineered label)

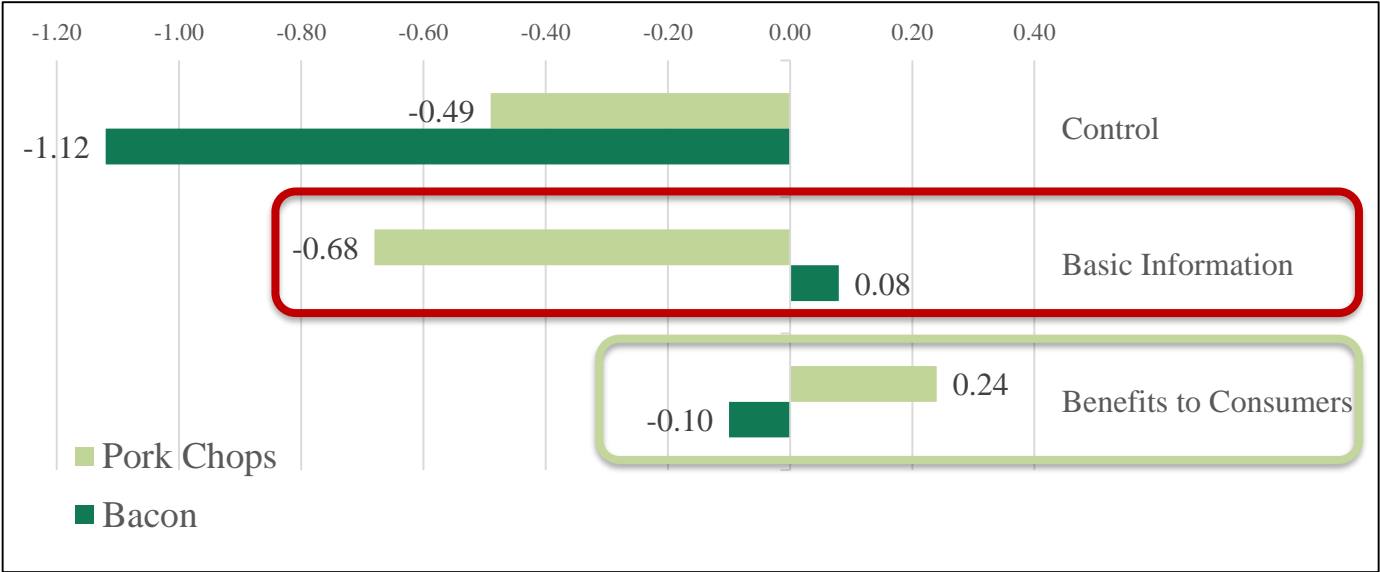


Graph 10: Marginal WTPs of gene-edited vs. GMO, Fresh Tomatoes & Pasta Sauce



Graph 11: Marginal WTPs of gene-edited vs. GMO (bioengineered label), Fresh Spinach & Frozen Spinach

Graph 12: Marginal WTPs of gene-edited vs. GMO (bioengineered label), Pork Chops & Bacon



Key Findings: Option to Buy Gene-Edited Food

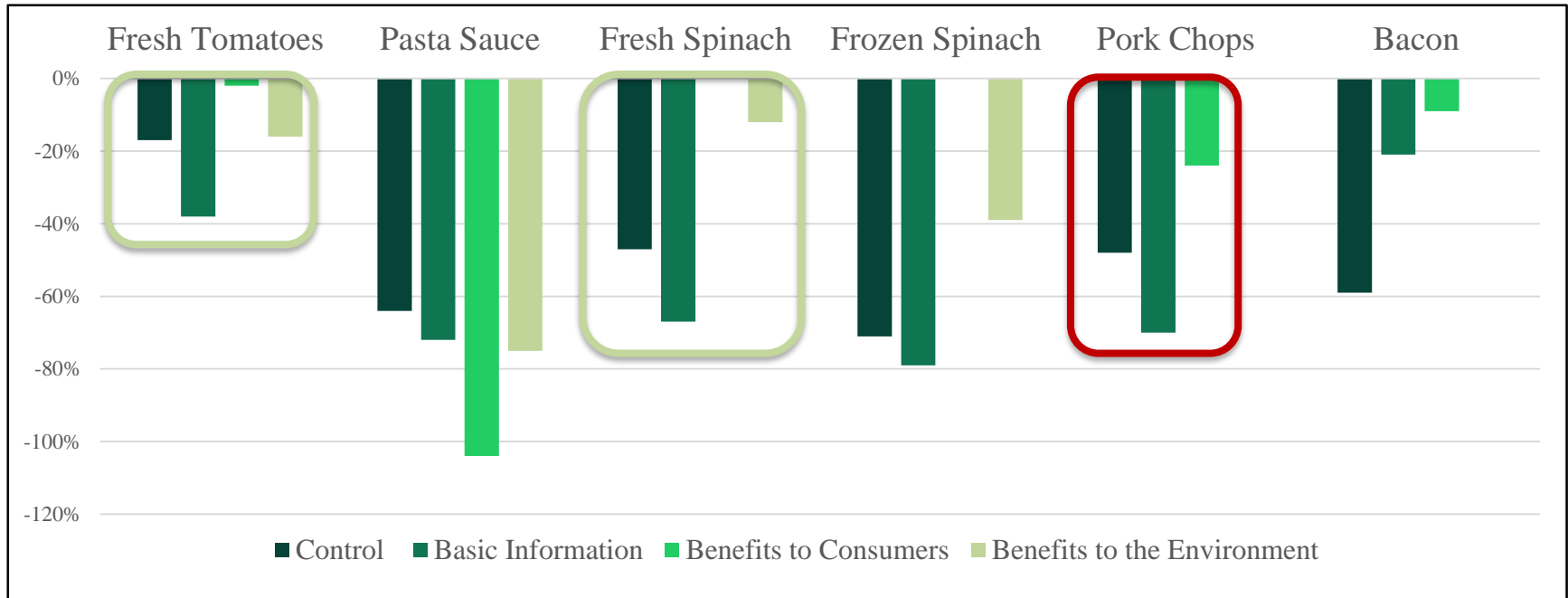
- ◆ Despite the general negative perception about the gene-editing technology, **consumers are willing to pay** up to \$0.23 per choice to have the **option of buying gene-edited** food products when informed about the benefits implied by the technology



Graph 13: Willingness to pay to have gene-edited foods available (\$/choice)

Key Findings: Fresh vs. Processed

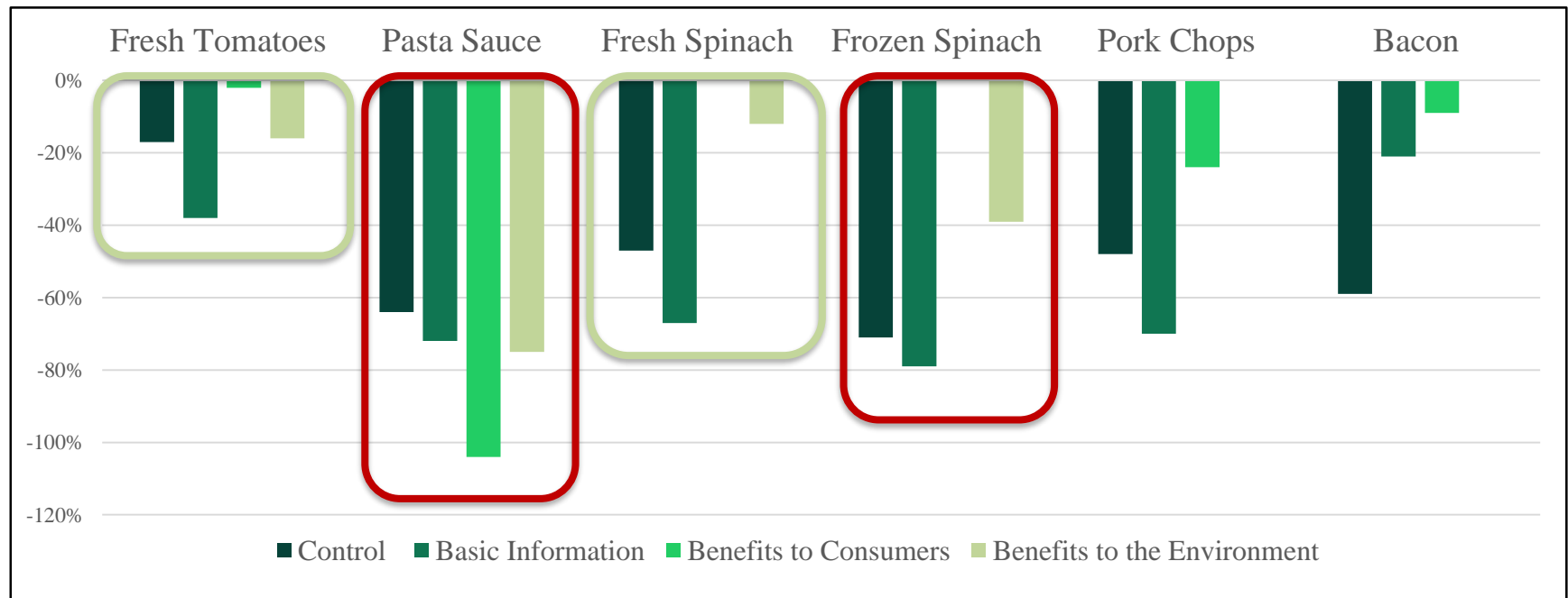
- ◆ WTP for **fresh** gene-edited **plant** products > WTP for **fresh meat** when information is provided to them.



Graph 15: Median marginal willingness to pay for gene-edited foods vs. conventional alternatives by product

Key Findings: Fresh vs. Processed

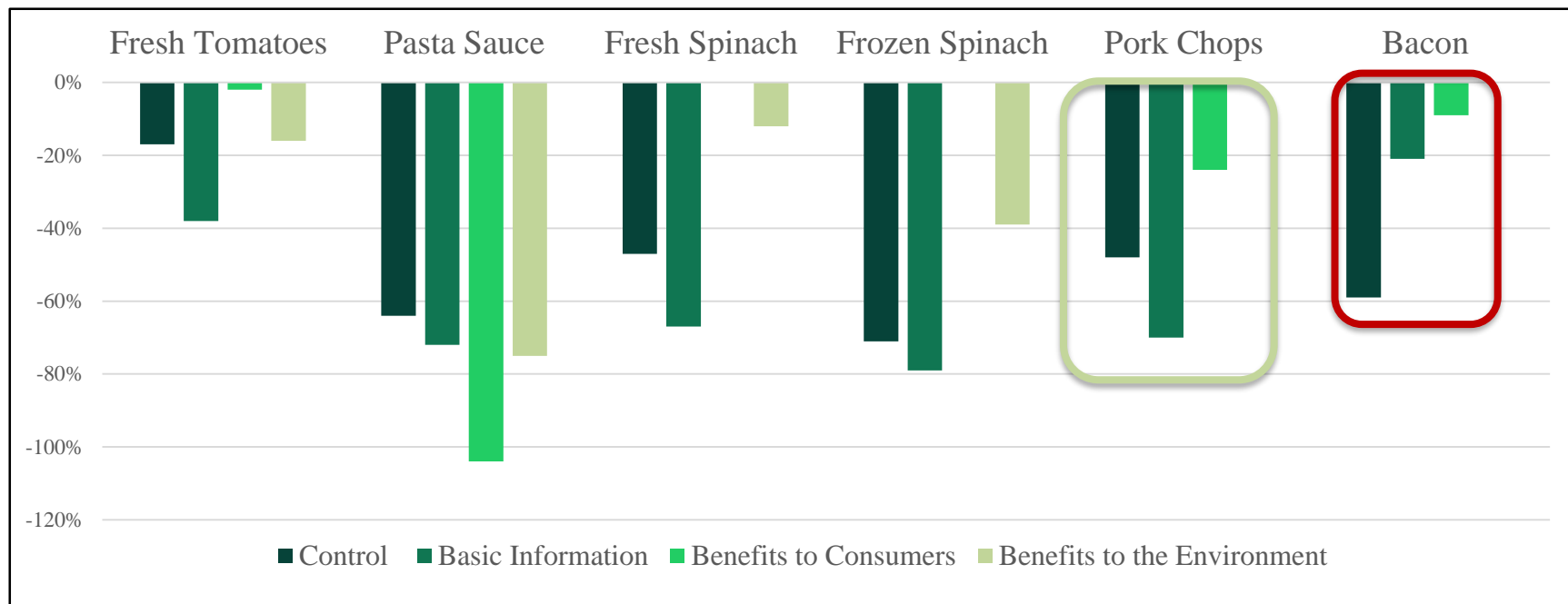
- ◆ WTP for fresh gene-edited plant products > WTP for fresh meat when information is provided to them.
- ◆ WTP for **fresh** gene-edited **plant** products > WTP for **processed** gene-edited **plant** products



Graph 15: Median marginal willingness to pay for gene-edited foods vs. conventional alternatives by product

Key Findings: Fresh vs. Processed

- ◆ WTP for fresh gene-edited plant products > WTP for fresh meat when information is provided to them.
- ◆ WTP for fresh gene-edited plant products > WTP for processed gene-edited plant products
- ◆ WTP **processed meat** > WTP for **fresh meat**



Graph 15: Median marginal willingness to pay for gene-edited foods vs. conventional alternatives by product

- ◆ Respondents have **low levels of knowledge** and **awareness** about gene-editing and associated predominantly **negative feelings** with the technology
- ◆ Information about gene-editing technologies needs to be supplemented with specific **benefit messages** if the technology is to be more widely accepted.
 - ⇒ **Benefits to the environment** and **consumers** show an overall stronger impact than benefits to the farmers
- ◆ Future **marketing efforts** need to be directed and adapted to the **specific food product** in question and cannot be guided by a single, overall approach.



Thank you for your kind attention.

