

# Redefining Protein

ADJUSTING DIETS TO PROTECT PUBLIC  
HEALTH AND CONSERVE RESOURCES



# EXECUTIVE SUMMARY

“ How we eat determines, to a considerable extent, how the world is used. ”

– Wendell Berry

Most food produced in the United States, and increasingly around the world, comes from an industrial agricultural system. This system has considerably increased the food supply over the past century to feed the growing population and has met the rising demand for resource-intensive foods such as meat and dairy. However, it is based on assumptions of climate stability; cheap and plentiful fossil fuel energy; abundant water, land, and other natural resources; and the willingness of the public to accept mounting externalized costs. As these assumptions continue to splinter, this increasingly precarious agricultural system threatens public and environmental health and lacks resiliency to tackle impending threats to global food security.<sup>1</sup>

Transitioning to diets with more plant-based ingredients is an essential action to promote health, food security, and long-term environmental sustainability. However, the impact

on health and sustainability outcomes can vary depending on the types of foods with which meats are replaced.

**This report aims to guide the complex decision-making process encountered when applying an environmental nutrition approach to food purchases, specifically when reducing and replacing meat on the plate.**

While this report analyzes individual food categories, diets should be considered in their entirety when assessing health and environmental impacts. We acknowledge that the nutritional quality and environmental impact of foods consistently vary within food categories depending upon the methods of production used. As such, nutrition and consumption recommendations cannot be separate from recommendations on production changes. Doing so segregates our food choices from potential health risks generated by our agricultural decisions.

An environmental nutrition approach recognizes that healthy food cannot be defined by nutritional quality alone, rather it must come from a food system that conserves and renews natural resources, advances social justice and animal welfare, builds community wealth, and fulfills the food and nutrition needs of all eaters now and into the future.

Health Care Without Harm aims to construct a food system that acknowledges and remedies the public health impact of the entire food lifecycle from production to disposal. Throughout this report, we repeatedly call out examples of integrated crop-livestock systems—a form of mixed production that grows crops and raises livestock primarily on pasture in a way that they can complement each other and maximize resource use. When an integrated farming system applies a regenerative agriculture approach—a model which taps into the strengths of the ecosystem through healthy soil microbiology to reduce the use of synthetic inputs, sequester carbon and preserve clean air, water, and other natural resources—the potential for optimal social, environmental, and human health impacts is amplified.

Fundamental to these well-managed production systems is the cultivation of soil for which pasture-raised animals

and nitrogen-fixing, fiber-rich legumes are integral. This promising agricultural model reinforces the need to first reduce our current rates of meat consumption and production while increasing that of nutrient-rich legumes for optimal human and environmental health.

This report summarizes and analyzes the available academic literature on the impacts of whole food protein options alternative to meat, with an emphasis on legumes, nuts and seeds, eggs, seafood, and dairy. The associated resource, “[Purchasing Considerations](#)” assists healthcare institutions and others in the foodservice sector in distilling this research into values-driven purchasing guidance to support transitioning menus and purchases to protein options that may optimize health, environmental, social justice, and animal welfare outcomes.

### **Legumes (pulses and soy)**

Legumes, particularly whole legumes and not necessarily processed legume-derived proteins, provide extensive health benefits to consumers. Compared to other food groups, they score the best across indicators of environmental impacts, including greenhouse gas (GHG), land, and water footprints, and—with the exception of soybeans—pesticide and fertilizer use. They also have relatively few social justice concerns directly associated with their production.

### **Nut and seeds**

Nuts and seeds provide many health-promoting nutrients, and regular consumption has been associated with a reduced risk for certain chronic diseases. Due to their caloric density, and environmental and social justice concerns (including water use in almond, walnut, and pistachio production as well as labor concerns with cashew production) associated with increasing their production, nuts should be consumed in moderation. In some cases, seeds may be a healthy and environmentally sustainable alternative to nuts.

### **Eggs**

While the egg white provides most of the protein found in an egg, the yolk contains most of its other key nutrients. Health experts have agreed that moderate whole egg consumption is not likely to lead to an increased risk of cardiovascular disease and mortality for the general population. Eggs have relatively low environmental impacts associated with their production compared to other food groups, though their production contributes to social justice concerns for workers and surrounding communities. The intensification of the egg industry over the past half-century has also elevated key animal welfare concerns about how hens are raised and fed.

### **Seafood**

Regular consumption of seafood—particularly of fatty fish and certain mollusks—has been associated with many health benefits, notably cardiovascular and cognitive function. However, even accounting for the growth of aquaculture, there is not enough fish for everyone globally to consume recommended levels to reap the noted health benefits due to declining wild stocks and loss of marine biodiversity. The diversity of harvesting and farming systems, as well as post-farm processing and transportation choices, also lead to a wide

variety of health, environmental, social justice, and animal welfare impacts. Certain harvesting practices (e.g., bottom-trawling) and transportation options (e.g., air-freighting) have particularly harmful impacts. Eating forage fish such as sardines which are lower on the food chain can limit exposure to contaminants. Forage fish, along with bivalve mollusks, are generally more ecologically sustainable. Both wild harvesting and aquaculture production pose numerous concerns for workers and for export-oriented communities.

### **Dairy**

Cow's milk dairy products (particularly milk and yogurt, not necessarily cheese or butter) provide many nutrients, and moderate consumption has been associated with a reduced risk for certain diseases. While dairy products provide calcium, there is weak evidence that dairy consumption protects bone health. Despite traditional dietary advice, little evidence exists to support low-fat dairy consumption for heart health or weight management. Full fat grass-fed dairy products also contain higher (though low compared to fish) concentrations of beneficial fatty acids. The per serving ecological impacts of dairy products are relatively low compared to ruminant meat. However, dairy farms contribute to other ecological, public health, and animal welfare concerns. Research on plant-based milk alternatives is also considered. With the exception of soy milk, these products do not contain nutrition profiles similar to cow's milk but are included because they are increasingly replacing cow's milk as meal components. Based on the limited research available, these alternatives have significantly lower environmental, social justice, and animal welfare impacts per serving than cow's milk, with a few exceptions.

### **Limitations**

Note that this report does not address the impacts of all food groups, nor the full range of food categories that offer protein (e.g., grains). Additionally, limitations exist in various areas of academic literature, especially research on the health impacts of processed legume-based foods; the environmental and social justice impacts of nut and seed production; antibiotic use in layer hens; the impacts of changing feed ingredients for farm-raised fish; per-serving phosphorus requirements and leaching concerns across food groups; and the health, environmental, and social justice impacts of plant-based dairy and egg alternatives.

**Table 1: Summary of key findings**

Compares relative health, environmental, social, and animal welfare impacts of different food groups. Note that this oversimplifies the large variance in impacts within food groups across species, types of inputs, and regions of production explored further in this report.

	Health	Environmental				Social justice	Animal welfare
		Climate	Land use	Inputs (water, fertilizer, manure, pesticide, antibiotic use)	Biodiversity		
<b>Pulses</b>							
Conventional	SP	SP	SP	MN	MP	N	n/a
Organic	SP	SP	SP	MP	SP	N	n/a
<b>Soybeans</b>							
Conventional	D*	SP	SP	SN	SN	MN	n/a
Organic	D*	SP	SP	MP	MP	N	n/a
<b>Nuts and seeds</b>							
Conventional	MP	SP	MP	SN	MN	MN (SN cashews)	n/a
Organic	MP	SP	MP	MN	MN	MN (unless fair trade)	n/a
<b>Eggs</b>							
Conventional (battery cage)	MP	MP	N	SN	MN	MN	SN
Enriched colony cages	MP	MP	N	SN	MN	MN	MN(D)
Cage-free	MP	N	MN	SN	MN	SN	N (D)
Free-range	MP	N	MN	SN	MN	N	MP (D)
Pasture-raised	MP	N	MN	SN	N	N	MP (D)
<b>Fish+</b>							
Wild (forage fish)	MP <sup>^</sup>	MP	n/a	n/a	MP	N	D
Wild (all other fish)	MP <sup>^</sup>	MN (SN trawled lobster)	n/a (SN bottom trawling: seafloor impact)	n/a	SN	SN	D
Wild and aquaculture (bivalve mollusks)	MP <sup>^</sup>	SP	n/a	SP	SP	N	n/a (D)
Aquaculture (finfish, crustaceans)	MP <sup>^</sup>	MN	MN	SN (D)	SN	SN	D
Aquaculture (recirculating)	MP <sup>^</sup>	SN	MP	SP	MP	N	D
<b>Dairy</b>							
Conventional	MP (D)	MN (D)	MP	SN	MN	SN	SN
Grass-fed	MP (D)	MN (D)	MP	N	SP	N	N
Plant-based milk alternatives	N	SP	SP	MN	MN	N (SN cashew milk)	n/a (MN(D): coconut milk)

\* Moderate health benefits have been associated with consumption of whole soy foods (e.g., edamame, tempeh, tofu, full-fat soymilk) but not necessarily with processed soy isolates or proteins found in meat analogs, energy bars, and low-fat soy milks, as well as meat extenders.

\* In the case of seafood, labor concerns vary widely between foreign and domestic production. Considering 90% of seafood in the US is imported, ratings pertain to foreign harvesting practices.

<sup>^</sup> Not considering contaminant levels

**Common types of fish in each category**

- Wild (forage fish): sardines, herring, anchovies
- Wild (all other fish): lobsters, flatfish, cod, haddock, hake, tuna
- Wild and aquaculture (bivalve mollusks): clams, mussels, oysters, scallops
- Aquaculture (finfish, crustaceans): salmon, catfish, trout, shrimp, prawns
- Aquaculture (recirculating): salmon, trout, tilapia

Graphic methodology: This graphic compiles and compares the evaluated research on the health, environmental, social, and animal welfare impacts of different food groups considered in this report. Impacts are categorized as *strong positive (SP)*, *moderate positive (MP)*, *neutral (N)*, *moderate negative (MN)*, *strong negative (SN)*, or *debated/uncertain (D)* based on the relative per-serving impact of that food group compared to other food groups on that impact factor. Health rankings were based on the extent of research demonstrating health benefits or risks associated with consuming that food type. When multiple species and production systems pertain to any one category, a rating was given considering the dominant system from which the largest portion of our food is derived. Strong positives were only granted to foods with positive benefits attributed to frequent consumption; foods were ranked as moderately positive if moderate (but limited) consumption is encouraged. Strong environmental positives and negatives were only given when the food type performs significantly well (i.e., has an extremely low or potential net positive relative environmental impact = strong positive) or poor (i.e., associated with significant or synergistic environmental concerns). For the social justice rankings, no categories were ranked “positive” given the generally poor labor standards in both domestic and international food production. However, foods that have been associated with additional labor concerns specific to their production practices have been noted as moderate or strong negative depending on the extent and strength of concerns. For animal welfare rankings, strong negatives were attributed to food types that have been associated with significant welfare harms; relative improvements in welfare practices (while taking into consideration new potential harms from these practices) are noted as moderately negative, neutral, or moderately positive depending on the extent of the difference.

## ACKNOWLEDGMENTS

Content written and coordinated by Raychel Santo and Stacia Clinton. Contributions from Ted Schettler and Madeline Stein. The authors would like to thank Claire Fitch, Jillian Fry, Jim Galloway, Kerry Hughes, Allison Leach, Bob Martin, Colleen Matts, Kristie Middleton, Lucia Sayre, and Allysan Scatterday for the time, effort, and invaluable feedback they contributed in reviewing drafts of this report. We also want to thank Brent Kim for assistance with additional in-house calculations and April Galarza for editorial support and Kevin Conway for design and layout.

Please cite the report as: Health Care Without Harm. (2017). *Redefining Protein: Adjusting Diets to Protect Public Health and Conserve Resources*.

Health Care Without Harm seeks to transform the health sector worldwide, without compromising patient safety or care, so that it becomes ecologically sustainable and a leading advocate for environmental health and justice.



With offices in the United States, Europe, Latin America, and Asia, HCWH is an international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labor unions, environmental and environmental health organizations, and religious groups.

This report was produced by Health Care Without Harm's national Healthy Food in Health Care program, which harnesses the purchasing power and expertise of the health care sector to advance the development of a sustainable food system.

Visit [www.healthyfoodinhealthcare.org](http://www.healthyfoodinhealthcare.org) for more information.

## CONTACT INFO

Health Care Without Harm  
12355 Sunrise Valley Drive  
Suite 680  
Reston, VA 20191