

Original Scholarship

Legal Feasibility of US Government Policies to Reduce Cancer Risk by Reducing Intake of Processed Meat

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Policy Points:

- High-profile international evidence reviews by the World Health Organization, the World Cancer Research Fund, the American Institute for Cancer Research, and the American Cancer Society concluded that processed meat consumption increases the risk of cancer.
- The red meat and processed meat industries are influential in the United States and in several other nations. The US federal government supports public-private partnerships for commodity meat promotion and advertising.
- Four potential policy options to affect consumption of processed meat are taxation, reduced processed meat quantities in school meal standards, public service announcements, and warning labels. Feasibility of these options would be enhanced by an explicit and science-based statement on processed meat in the *2020-2025 Dietary Guidelines for Americans*.

Context: The World Health Organization, the World Cancer Research Fund, and the American Cancer Society have each in recent years concluded that processed meats are probable carcinogens. The *2015-2020 Dietary Guidelines for Americans* did not separately evaluate health effects of processed meat, although it mentioned lower processed meat intakes among characteristics of healthy diets.

Methods: We summarized the international scientific literature on meat intake and cancer risk; described the scientific and political processes behind the

periodic *Dietary Guidelines for Americans*; described the US red meat and processed meat industries and the economic structure of government-supported industry initiatives for advertising and promotion; and reviewed and analyzed specific factors and precedents that influence the feasibility of four potential policy approaches to reduce processed meat intake.

Findings: Based on a review of 800 epidemiological studies, the World Health Organization found sufficient evidence in humans that processed meat is carcinogenic, estimating that each 50-gram increase in daily intake increases the risk of colorectal cancer by 18%. Among the four policy responses we studied, legal feasibility is highest in the US for three policy options: reducing processed meat in school meals and other specific government-sponsored nutrition programs; a local, state, or federal tax on processed meat; and public service announcements on health harms of processed meats by either the government or private sector entities. Legal feasibility is moderate for a fourth policy option, mandatory warning labels, due to outstanding legal questions about the minimum evidence required to support this policy. Political feasibility is influenced by the economic and political power of the meat industries and also depends on decisions in the next round of the *Dietary Guidelines for Americans* about how to assess and describe the link between processed meat consumption and cancer risk.

Conclusions: Public policy initiatives to reduce processed meat intake have a strong scientific and public health justification and are legally feasible, but political feasibility is influenced by the economic and political power of meat industries and also by uncertainty about the likely treatment of processed meat in the 2020-2025 *Dietary Guidelines for Americans*.

Keywords: processed meat, cancer risk, Dietary Guidelines for Americans, nutrition policy.

IN 2015, THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC), a research agency of the World Health Organization of the United Nations, classified processed meat as a Group 1 carcinogen.¹ Separately, the Continuous Update Project (CUP) from two not-for-profit research organizations, the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR), in 2017 confirmed that there is convincing evidence that consuming processed meat increases the risk of colorectal cancer.² The 2012 nutrition and physical activity guidelines from the American Cancer Society recommend that consumers “minimize your intake of processed meats such as bacon, sausage, lunch meats, and hot dogs.”^{3,4}

The evidence about cancer risk from processed meat raises important questions about potential federal, state, and local policy responses.^{5,6} If the growing evidence about processed meat intake and cancer risk motivates policymakers to seek such a response, they will need a road map. This article covers the scientific evidence itself, the policy process of reviewing and summarizing that evidence in the *Dietary Guidelines for Americans*, the influence of the beef and pork industries, and specific legal and political factors that may affect the feasibility of four types of potential policy response to reduce processed meat consumption.

Methods

First, we researched the international evidence on cancer risk from processed meat and red meat, including the systematic reviews conducted for the World Health Organization, the World Cancer Research Fund, and USDA's Center for Nutrition Policy and Promotion, supplemented by citation search for more recent studies through March 2018. Second, we described the distinct process that led to a weaker statement in the 2015-2020 *Dietary Guidelines for Americans*, which has an important role in US nutrition policy at the federal level. Third, we reviewed key features of the processed meat and red meat industries, focusing on characteristics that make policymaking related to meat distinct from other food groups.

Fourth, because we found future debate on new policies more imminent for processed meat than for red meat, we assessed potentially feasible policy options to reduce processed meat consumption, drawing on policy responses to other public health concerns such as sugar-sweetened beverages (SSBs) and tobacco for precedent.⁷⁻¹¹ The policy options we considered included (1) nutrition standards reducing processed meat or red meat in school meals, (2) local, state, or federal taxes on processed meat or red meat, (3) public service announcements or media campaigns, coordinated either by government public health agencies or by nongovernmental organizations, and (4) warning labels. For each policy, we researched (a) potential definitional questions, including any difficulties in distinguishing covered and noncovered products, (b) legal feasibility, including questions about governmental authority to adopt a policy using LexisNexis, the Rudd Center's Legislative Database, and the internet, (c) precedent for such proposals, or, when there has been no

precedent for processed meat and red meat policy adoption, comparable proposals for other public health challenges, including tobacco and SSBs, and (d) political modifiers that increase or decrease political feasibility. Throughout, we focused on processed meat rather than total red meat or unprocessed red meat due to differences in the strength of scientific evidence reviewed.

Results

There is accumulating evidence to support the role of processed meat in cancer risk, including systematic reviews conducted by the World Health Organization and the World Cancer Research Fund. In the US, the Dietary Guidelines for Americans has a weaker statement about processed meat and cancer risk. Possible policy measures to reduce processed meat intake include nutrition standards, taxation, public service announcements, and warning labels.

Scientific Evidence

In 2015, the IARC classified processed meat as “carcinogenic to humans” (Group 1). This conclusion was based on review by a working group of 22 scientists from 10 countries who reviewed more than 800 epidemiological studies that investigated cancer risk in association with consumption of processed meat and red meat in populations from different countries with diverse diets.¹ The working group concluded that there is “sufficient evidence” in humans for the carcinogenicity of the consumption of processed meat. Each 50-gram (~1 serving) daily increase in processed meat consumption was linked to 18% higher risk of colorectal cancer (relative risk [RR] = 1.18, 95% confidence interval [CI]: 1.10-1.28). The working group classified red meat as “probably carcinogenic to humans” (Group 2A) based on “limited evidence” that the consumption of red meat causes cancer in humans (mainly colorectal cancer) (Table 1).

This evidence and the conclusions about processed meat were supported by CUP, led by an independent not-for-profit organization, WCRF, in partnership with AICR. The expert panel of CUP reviewed evidence from 99 studies published worldwide and concluded that there is “convincing evidence” that consuming processed meat increases the risk of colorectal cancer. The risk estimate summarized 10 studies with

Table 1. Scientific Evidence of Cancer Risk for Processed Meat and Red Meat

	Processed Meat	Red Meat
Definition	“[T]ransformed through salting, curing, fermentation, smoking, or other processes”	“All mammalian muscle meat, including beef, veal, pork, lamb, mutton, horse, and goat”
IARC Evidence Grading	Carcinogenic to humans (Group 1)	Probably carcinogenic to humans (Group 2A)
Associated Cancers	Principally colorectal cancer; some evidence for stomach cancer (not conclusive)	Principally colorectal cancer; some evidence of links with pancreatic and prostate cancer
Possible Mechanisms	Heme iron; salting; high fat and saturated fat content; other chemicals (<i>N</i> -nitroso compounds and polycyclic aromatic hydrocarbons, heterocyclic aromatic amines)	Heme iron; salting (less than processed meat); fat and saturated fat; other chemicals that may arise during cooking

Data derived from World Cancer Research Fund; American Institute for Cancer Research (2017).²

10,738 cases of colorectal cancer, suggesting that each 50-gram increase in processed meat consumption increased the risk of colorectal cancer by 16% (RR = 1.16, 95% CI: 1.08-1.26), with low evidence of heterogeneity. For red meat, WCRF/AICR concluded that the evidence is “probable.” Eight studies with 6,662 cases demonstrated a 12% nonsignificant increased risk of colorectal cancer associated with each 100-gram increase in red meat consumption (RR = 1.12, 95% CI: 1.00-1.25). The review included only prospective cohort studies that used validated dietary assessment tools and adjusted major confounders.

Multiple mechanisms could contribute to the carcinogenic effects of processed and red meat.^{5,12,13} Heme iron, an easily absorbed form of iron found in blood and muscle tissue of red meat, has been

proposed to act directly on the intestinal epithelium, increasing oxidative damage to DNA. Heme iron may also promote the endogenous formation of N-nitroso compounds (NOCs), several of which are human carcinogens, in the digestive tract.^{2,3} Preserving meat through curing or by adding nitrates or nitrites or smoking can also lead to the formation of NOCs. Nitrates and nitrites are compounds used in food preservation, composed of a nitrogen molecule bound with two (for nitrites) or three (for nitrates) oxygen atoms. Some processed meat products are labeled “nitrite-free,” but these are typically cured with celery juice, a natural source of concentrated nitrates that is misleadingly allowed to be labeled as “nitrite-free” by the Food and Drug Administration (FDA). In addition, cooking meat at a high temperature over an open flame results in the production of heterocyclic amines and polycyclic aromatic hydrocarbons, both of which are found to cause DNA damage and increase the risk of cancer. As with other harmful factors such as tobacco, the cancer risk from processed meat intake may be multifactorial, and these mechanisms may further interact in complex ways. Overall, IARC considered the evidence about the mechanism for the effect on cancer risk to be “strong” for processed meat and “moderate” for red meat.

The Dietary Guidelines for Americans

The *Dietary Guidelines for Americans* (DGA) serves as an important input for federal nutrition policy, including food-labeling rules and quality standards for meals programs. To produce the *Dietary Guidelines*, first, the scientific evidence on important diet and health relationships is summarized in systematic literature reviews from the federal government’s Nutrition Evidence Library. Second, the agencies commission a scientific report from the external Dietary Guidelines Advisory Committee (DGAC). Third, after soliciting public input, the final DGA report is produced by staff at the US Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) and released jointly by the department secretaries.

For the 2015-2020 edition, the DGAC did not separately evaluate any health effects of processed meat. Rather, the committee used a systematic review of scientific evidence showing the effects of overall dietary patterns on risk of cancer. The committee concluded that healthy dietary patterns, such as the DASH diet (Dietary Approaches to Stop Hypertension, an eating plan developed by the federal government’s

National Heart, Lung, and Blood Institute) and healthy versions of the Mediterranean diet, are associated with reduced risk of cancer, compared with typical American diets. Among multiple characteristics, the DGAC noted that these healthy dietary patterns also had comparatively low amounts of red and processed meat. Thus, the DGAC review supported the earlier conclusions of the IARC and CUP, but it was less precise about the specific cancer risk from either processed meat or red meat. For example, out of the eight studies of processed meat that had greatest weight in the CUP meta-analysis, only two studies were referenced in the DGAC evidence review. The other six studies were conducted during the right time period for the DGAC evidence review and had relevant information about processed meat and cancer risk, but because no DGAC question on the specific health effects of processed meat was considered, these studies were excluded.

Following the DGAC report, the final USDA and HHS 2015-2020 *Dietary Guidelines for Americans* report weakened the DGAC's recommendation about healthful dietary patterns having less processed meat and red meat. The DGA did state, "Lower intakes of meats, including processed meats; processed poultry; sugar-sweetened foods, particularly beverages; and refined grains have often been identified as characteristics of healthy eating patterns." However, the final DGA absolved processed meats of specific harm, as long as overall nutrient intakes were within certain limits. The DGA concluded that processed meats "can be recommended as long as sodium, saturated fats, added sugars, and total calories are within limits in the resulting eating patterns," which contradicts the evidence on specific harms and mechanisms from the IARC and CUP. In many other respects, the final DGA adhered closely to the dietary recommendations of the DGAC; the weakening of scientific conclusions and recommendations about red meat and processed meat was a notable exception.

In addition to the DGAC recommendations, the final DGA report explicitly reflected public input, including from the beef and pork industries as well as scientific and public health associations. The departments requested public comments on the DGAC report and reviewed thousands of submissions. In their submissions, comments from the National Pork Producers Council, the North American Meat Institute, and other meat industry organizations strongly criticized the DGAC conclusions about processed meat and red meat. National industry organizations coordinated comments by regional organizations and individual producers.

These comments on the DGAC report built on the meat industry organizations' previous support for research more specifically casting doubt on the links between meat intake and cancer.¹⁴ According to the Cattlemen's Beef Board, whose structure and financing are discussed in the next section, "Based on the evidence, there is no cause and effect between consuming beef and cancer."¹⁵ Similarly, the North American Meat Institute argued that the strength of association found by the WCRF is weak and that even WCRF reported finding no biologically plausible mechanism. These claims were inconsistent with the IARC and CUP evidence reviews summarized earlier.

In contrast with the input from the beef and pork industries, several public health organizations strongly supported the DGAC recommendations. For example, the American Cancer Society's public comments on the DGAC report supported language to lower intake of red and processed meat, because of "consistent evidence of the link between regular consumption of red meats and processed meats and certain types of cancer, especially colorectal cancer."

Because the DGAC report recommended dietary patterns with lower red meat and processed meat, it may initially have seemed inconsequential that it had not conducted a systematic review specifically about cancer risk from processed meat or red meat. However, DGAC's decision to summarize evidence about cancer risk associated with dietary patterns broadly, rather than processed meat or red meat consumption specifically, may have facilitated the later weakening of the meat recommendations in the final DGA report.

A 2017 report from the National Academies, *Redesigning the Process for Establishing the Dietary Guidelines for Americans*, calls for improvements in how such evidence is evaluated.¹⁶ The report made recommendations about transparency, management of conflicts of interest for the DGAC and federal agency staff, and improvements in the scientific evidence review. In particular, the report recommended that the protocol for systematic reviews be published in advance, for greater clarity about decisions over which research to include and exclude. Recent public comments from scientists have also highlighted the need for specific questions in the 2020-2025 DGAC review on health effects of processed meat and red meat consumption.¹⁷ For the 2020-2025 *Dietary Guidelines*, conclusions about red meat and processed meat will depend on decisions about whether the evidence in the IARC and CUP reports summarized earlier are correctly determined to be in scope.

Table 2. Processed Meat and Red Meat, Consumer Spending (2016) and Intake (2015-2016)

Type of Meat	Spending ^a		Intake	
	\$ Millions	% of Protein Category	Mean Grams per Day	% of Protein Category
Processed meat	1,812	22.82	26.66	10.2
Luncheon meat	435	5.48	10.47	4.4
Sausage	386	4.86	6.50	2.3
Bacon	307	3.86	1.23	0.5
Ham	288	3.63	2.51	0.9
Hot dog	192	2.41	2.51	1.0
Smoked/dried meat	53	0.67	1.10	0.4
Other processed meat	151	1.91	2.34	0.8
Red meat	2,046	25.80	40.53	16.1
Beef	1,580	19.91	24.55	10.6
Pork	467	5.89	7.68	2.9
Other	n/a	n/a	1.24	0.4
Unspecified	n/a	n/a	7.06	2.2

Data derived from US Department of Agriculture (2016)⁶⁸ and the National Health and Nutrition Examination Survey.⁶⁹

^aFood and Nutrition Service spending estimates are from scanner data for a single super-market chain (not identified).

The Processed Meat and Red Meat Industries

People in the United States consumed 71 pounds of red meat per capita in 2015 (including both processed and unprocessed), enough to provide 236 kilocalories per person per day, according to the USDA's loss-adjusted food availability estimates (including imports and excluding exports, nonfood uses, and estimated food losses).¹⁸ While the USDA estimates that Americans consumed less than the recommended amount of fruits, vegetables, and dairy products, they consumed more than recommended amounts of protein foods.¹⁹

Processed meat and red meat were responsible for large percentages both of consumer expenditure and food intake in the protein category (Table 2). The leading processed meat categories were luncheon meats, sausage, hot dogs, ham, and bacon. Among unprocessed red meats, beef

and pork were responsible for nearly 97% of intake, and lamb, goat, and other products were responsible for the remainder.

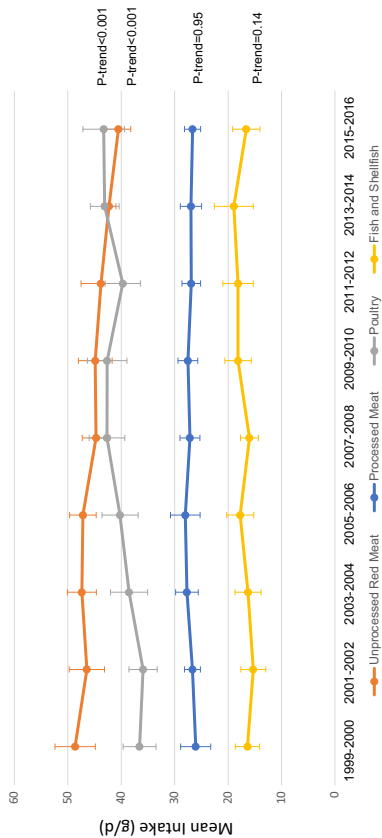
Due to changes in both supply and demand conditions, people in the United States greatly increased their intake of poultry products from 1970 to 2016, while decreasing their consumption of red meat. Food intake data show that the decline from 1999-2000 to 2015-2016 was concentrated in unprocessed beef, while consumption of processed meat intake has remained unchanged (Figure 1).²⁰

Processed meat products are economically important partly because consumers desire them, but also because these products make profitable economic use of lower-value meat components. Offal or variety meats (including liver, heart, and stomach) can be used in sausages, hot dogs, and other processed meat products, especially internationally. In the United States, such “variety meats” must be mentioned on the ingredients list, and US consumers do not prefer them, so much of US edible offal production is exported.²¹ These exports account for 26% of the volume and 15% of the value of US beef, pork, and veal exports (supplying 28% of all edible offal exports globally in 2010).²¹

Economists have long estimated that food safety and health concerns also affect meat demand.²²⁻²⁴ Previously, the principal concerns were foodborne illness and heart disease, but more recently cancer risk has been included in discussion of health concerns that influence consumer demand.⁶ A 2018 economic analysis funded by the Cattlemen’s Beef Board found that the effect of prices on beef demand has fallen over time, while the effect of media coverage and consumer concerns has increased.²⁵ The study reported that relevant media coverage of cancer and health increased sharply from the 1990-2007 period to the 2008-2017 period. The authors described consumer concerns about cancer as a “key determinant” of beef demand, along with beef quality, food safety, animal welfare, sustainability, nutrition topics, household income, and demographic changes. They encouraged beef industry organizations to pay attention to media coverage of these issues, because the tone of such coverage can change in ways that alter its effect on beef demand.

One key characteristic of the US beef and pork industries, different from many other food sectors, is the role of semipublic government-sponsored checkoff organizations. These congressionally established programs are administered by producer boards appointed by the secretary of agriculture and overseen by the USDA’s Agricultural Marketing Service (AMS). Using the federal government’s authority to tax, the

Figure 1. Trends in Processed Meat, Unprocessed Red Meat, Poultry, and Fish and Shellfish Consumption among US Adults, NHANES 1999-2016 [Color figure can be viewed at wileyonlinelibrary.com]



Data derived from the National Health and Nutrition Examination Survey,⁶⁹ Bowman (2016),⁷⁰ Friday (2006),⁷¹ and Friday (2008).⁷²

Cattlemen's Beef Board collected \$40.9 million²⁶ and the National Pork Board collected \$76.5 million²⁷ in 2017 mandatory assessments from producers and importers. These boards then contract with the leading trade associations, including the National Cattlemen's Beef Association and National Pork Producers Council, respectively, to carry out activities related to advertising, marketing, product development, research, and public relations. The checkoff boards support high-profile information dissemination and public relations activities saying that processed meat does not increase risk of cancer. The USDA's AMS must review and approve every public relations campaign supported by the checkoff programs, so these campaigns could be affected if a future 2020-2025 edition of the *Dietary Guidelines* more specifically assesses the effects of processed meat on cancer.

Policy Proposals

As the existing evidence about cancer risk from processed meat gets disseminated, there may be strong motivation to address the processed meat and cancer link in the 2020-2025 *Dietary Guidelines for Americans*, which may lead to other policy changes. Table 3 summarizes results for four possible types of policy response: (1) nutrition standards, (2) taxation, (3) public service announcements, and (4) warning labels.

Producers and manufacturers may question which processed meats are subject to these policies, in particular nutrition standards, taxation, and warning labels. As seen with other products such as tobacco, industry organizations are likely to test the limits of the definition of processed meat in ways intended to highlight uncertainty over the definitions or mechanisms. For example, sellers of a labeled "nitrite-free" processed meat may seek exemption from tightened nutrition standards for processed meat, even if the product uses celery juice that contains high levels of nitrites.

Nutrition Standards. Based on prior legal and practical precedents, the federal government could reduce the provision of processed meat by implementing stricter nutrition requirements for child nutrition and feeding programs, such as the National School Lunch Program (NSLP), School Breakfast Program (SBP), and Child and Adult Care Food Program. In the USDA's most recent School Nutrition Dietary Assessment, from 2012, 14% of daily lunch menus reported hot dogs. For breakfast,

Table 3. Considerations in Political, Economic, and Legal Feasibility for Four Policy Options

Policy Option	(a) Definitional Feasibility	(b) Legal Feasibility	(c) Precedent	(d) Factors That Influence Political Feasibility
1. Nutrition standards	Medium. Likely controversy over which products covered.	High. Government is authorized to set standards.	Sodium, saturated fat, calories, food groups in school meal standards.	Support from <i>2020-2025 Dietary Guidelines for Americans</i> . Innovations to reduce cost and simplify preparation of alternatives to processed meat.
2. Tax	Medium. Likely controversy over which products covered.	High. Federal and state governments are authorized to tax. Local taxation authority varies.	Tobacco, alcohol, sugar-sweetened beverages (SSBs).	Perceived success of SSB taxes as precedent; need for revenue.

Continued

Table 3. *Continued*

Policy Option	(a) Definitional Feasibility	(b) Legal Feasibility	(c) Precedent	(d) Factors That Influence Political Feasibility
3. PSAs Government	High. Broad food group definitions suffice to identify covered products.	High if stand-alone PSA. Government has leeway in “government speech.”	PSAs to reduce tobacco and SSB consumption, use of steroids in youth athletics.	Support from <i>2020-2025 Dietary Guidelines for Americans</i> .
Nongovernment	High. Broad food group definitions suffice to identify covered products.	Medium. Must avoid libel and slander; several states have food disparagement laws but speech is otherwise permitted.	Many precedents in public health nutrition campaigns (SSBs, Meatless Mondays).	Reputation of sponsoring organization; support from scientists; trends in public understanding. Organization may fear litigation even if legally in the right.

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Table 3. *Continued*

Policy Option	(a) Definitional Feasibility	(b) Legal Feasibility	(c) Precedent	(d) Factors That Influence Political Feasibility
4. Warning labels	Low-Medium. Likely controversy over which products covered until the science evolves.	Medium. A warning must meet the First Amendment test for factual disclosure requirements and there are outstanding questions on the evidentiary requirement and what qualifies as controversial.	Success with tobacco. Legal challenge with San Francisco SSB labels.	Support from <i>2020-2025 Dietary Guidelines for Americans</i> . Increased public concern over sustainable diets and cancer risk. Change in political support for meat producers.

Abbreviation: PSA, public service announcement; SSB, sugar-sweetened beverage.

12% of daily menus reported sausage and another 7% included sausage with pancakes.²⁸ There already is no processed meat in food packages under the Special Supplemental Nutrition Program for Women, Infants, and Children, known as WIC. Although no current policies target processed meats in the much larger Supplemental Nutrition Assistance Program (SNAP), a simulation analysis estimated that a combined program to incentivize purchases of healthier foods and disincentivize other foods (including processed meats) would prevent nearly 1 million cardiovascular events and save more than \$60 billion in health care and other government costs over a lifetime of current SNAP participants.²⁹ The government also could reduce processed meat sales in federally operated cafeterias through changes to the Food Service Guidelines for Federal Facilities or food standards at the Department of Veterans Affairs (for veterans) and Department of Defense (for active duty military).

For nutrition standards in meals programs, there is little concern about legal feasibility: precedent has well established that the government may set standards for these programs. Yet, recent controversies over sodium standards in the NSLP demonstrate other serious challenges faced by proposals for nutrition standards. The DGA strongly encourages diets with reduced levels of sodium, yet sodium levels in school lunches remain high. The USDA School Nutrition Dietary Assessment reported that three-quarters of schools had lunches that exceeded the DGA sodium recommendation by more than 50%.³⁰ Following the Healthy Hunger-Free Kids Act of 2010, the USDA proposed nutrition standards in 2011 that progressively reduced the upper limits of sodium in school lunches eligible for federal reimbursement over several years. However, these new rules faced concerted opposition from manufacturers of foods sold in school lunches, and to some extent also from the School Nutrition Association, the leading association representing school food authorities (the nonprofit entities that provide the meals), which was concerned about sufficient availability of compliant products. In December 2018, the USDA published the final version of the rules, which further delayed the interim sodium standards through 2023-2024 and altogether eliminated the more ambitious sodium standards.³¹

Similar debates would likely arise for processed meat standards. Most important, policy debates over sodium and other nutrition standards make clear that the DGA plays a central role in federal nutrition policy. Without a recommendation in the 2020-2025 *Dietary Guidelines for Americans* to reduce processed meat consumption, it would be difficult

for the USDA to propose or implement such policies in federal meal programs based on its own separate scientific analysis. Under the NSLP and SBP, states have the leeway to enact more protective guidelines than federal requirements and are not similarly confined by the DGA. In New York City, a resolution introduced in the city council in 2018 seeks to remove processed meat from school meals. From the perspective of influential stakeholders such as the School Nutrition Association, innovations that reduce cost and simplify preparation of alternatives to processed meat would enhance the feasibility of proposals by state and local agencies to amend breakfast and lunch menus for children.³²

Tax. Based on widespread federal, state, and local precedent for tobacco and alcoholic beverages, and local precedent for SSBs, federal, state, or local governments could institute a tax on processed meat.³³ Based on econometric estimates of the consumer response to meat prices, it is likely that a 10% tax on processed meats, passed on to the consumer, would reduce consumption by approximately 6%.³⁴ As with nutrition standards, there would likely be debate and potentially litigation about precisely which processed meat products were subject to a tax.

For federal and state governments, the legal feasibility of a tax proposal is high. The US Constitution grants specific authorities to Congress, including the power to tax. States have a concurrent power to tax and an additional “police power” to safeguard the health, safety, and welfare of the population.³⁵ Local governments are the creation of the state, so their power to tax varies according to state law.³⁶

The Supreme Court has explained that government may use its taxing power to raise revenue or to specifically regulate, discourage, or deter taxed activities.³⁷ The tax does not cease to be valid if the revenue purpose is secondary to the regulatory purposes or if the government does not otherwise regulate the taxed activities. When the government enacts a tax for public health purposes, as opposed to simple revenue generation, it generally uses an excise tax mechanism. Excise taxes may be imposed on the manufacture, distribution, sale, or use of a product and the revenue can be dedicated to a specific purpose. “Excise taxes levied in the name of public health have long been held constitutionally permissible,” even when such taxation burdens a particular industry.³⁸ For example, all 50 states impose excise taxes on tobacco products and several local governments have excise taxes on sugary beverages.

Conversely, sales taxes are levied on the consumer at the point of purchase and the revenue is deposited into the general treasury. States

have a range of sales tax provisions related to food. For example, many states exempt food from their general sales taxes but some states have exceptions for certain products, most commonly soft drinks and candy, that are subject to the general sales tax; this is called differentiated tax status. As of 2017, Maine was the only state to include processed meats in a sales tax broadly on foods generally considered snack or junk foods; the definition of the taxed products explicitly includes pork rinds, meat sticks, meat jerky, and meat bars.^{39,40} Several states proposed bills to tax snack foods, with the definition of *snack foods* including pork rinds⁴¹⁻⁴⁵ or beef jerky and meat bars.⁴⁶ States, as well as local governments with taxing authority, could consider a stand-alone processed meat excise tax, incorporate processed meat into an excise tax on snack foods, or single out processed meat for differentiated tax status.

A leading precedent is SSB taxes, which have been shown to be effective at reducing consumption.^{47,48} There has been experimentation at the municipal level,⁴⁷⁻⁴⁹ and several bills have been introduced at the state and federal levels.⁵⁰ A \$0.01 excise tax per ounce enforced in March 2015 in Berkeley, California, resulted in a 21% decrease in SSB consumption.⁴⁷ Research on SSB taxes has identified political conditions under which adoption is more or less feasible, noting that ballot initiatives may be more successful if new revenue is earmarked for public health purposes, while city councils may favor revenue without earmarking.⁵¹ That said, as of October 2018, three states had preempted, or blocked, the ability of local governments to enact SSB taxes.⁵² Two states had ballot initiatives to preempt local SSB taxes in the November 2018 election (one of which passed), and other state preemption bills have been proposed. The outcome of currently active debates about SSB taxes may influence the political feasibility of similar proposals for processed meats in the future.

Public Service Announcements. A campaign of public service announcements (PSAs) encouraging Americans to reduce their intake of processed meat could be implemented by the federal or state governments (or locales to the extent they have the authority to do so from states) or nongovernmental organizations. The Government Accountability Office (GAO) defined a PSA as “a prepackaged message intended to influence attitudes or behaviors” that “(1) aims to improve the health, safety, and welfare of the community or promotes the programs, activities, or services of government agencies; (2) is generally presented free

by the media; and (3) does not provide a commercial benefit to the sponsoring agency (ie, revenue is not gained from the sale of a product or service).⁵³ Media harnessed for PSAs could include everything from television to magazines to the Internet.

In contrast with the preceding two policies, PSAs are less subject to definitional disputes over the precise boundaries of covered and noncovered product categories. Moreover, there is little doubt about the government's authority to engage in such campaigns, as long as the PSAs stand on their own (meaning, for example, they are not required during a processed meat advertisement).⁵⁴ Government-sponsored PSAs are a form of "government speech," which is the government's own expression used to communicate a particular viewpoint.⁵⁵ Stand-alone government speech is not subject to First Amendment constraint, meaning the government may "say what it wishes."⁵⁶ Leading precedents include other public health initiatives, such as campaigns to increase seat belt use, reduce smoking, or reduce SSB consumption. An example is California's Tobacco Control Program, which included a media campaign against tobacco products that denormalized smoking; each advertisement also identified the government as the speaker by stating, "Sponsored by the California Department of Health Services."⁵⁸

Although the government can constitutionally discourage unhealthy food consumption through PSAs, it has not historically taken on this role. A GAO report listed 64 PSA campaigns for fiscal year 2003 through March 31, 2005, by the Department of Health and Human Services, and none mentioned healthy eating or reducing the consumption of unhealthy food.⁵³ Moreover, a PSA placing a negative light on the meat industry would be contrary to current government speech in favor of it. The Supreme Court previously upheld the federal government's checkoff assessment on all sales and imports of cattle, which fund USDA-approved promotional campaigns that include messages such as "Beef. It's What's for Dinner."⁵⁷ Of note, the dissenting opinion in this case argued that the promotional campaign conflicted with the *Dietary Guidelines for Americans*. The majority did not decide whether government speech needed to be consistent, but nonetheless found that this was "perfectly compatible with the guidelines' message of moderate consumption."⁵⁷ If the next revision of the DGA recommends reduced consumption of processed meat, these recommendations would increase the government's ability to undertake subsequent public awareness campaigns.

An alternative to a government-sponsored PSA would be for a non-profit entity to engage in a media campaign to communicate information about the link between processed meat and cancer. The First Amendment does not limit the speech of a nongovernment entity, but there are other legal considerations relevant to such a campaign. The primary legal obligation of a private media campaign would be to ensure truth and accuracy to avoid claims of defamation, which is when a false statement purporting to be fact damages another entity. Such a campaign is less likely to be challenged if it avoids disparaging particular brands. Finally, campaigners must be aware that several states have laws that prohibit the disparagement of agricultural products; although there are open questions about the constitutionality of these laws, they could be used as a basis for litigation in those states.⁵⁸ For other topics in dietary guidance, mass media campaigns have been limited in scope and funding. Very few mass media campaigns related to processed meat exist, but Meatless Mondays initiatives that encourage reduced intake of meat one day per week is one prominent example.⁵⁹

Warning Labels. In 2016, the Center for Science in the Public Interest petitioned the USDA to require a warning label on processed meat products.⁶⁰ The department has not yet responded. The petition set forth arguments in favor of the department's authority to require such a warning; alternatively, Congress could require the agency to act. States and localities are preempted from requiring nutrition labeling on packages and shelves that is not identical to federal law related to meat products.⁶¹

Companies have fought vigorously to challenge government attempts to require warnings on their products' packaging as a violation of their First Amendment rights. The First Amendment protects people and companies from government restrictions and compulsions of speech. Unlike nutrition requirements, taxes, and public service campaigns, where the government has the clear authority to act, the Supreme Court has increasingly interpreted the First Amendment to be a barrier to speech regulations.⁶² A warning label for processed meats would likely be challenged in court and reviewed using a standard established in the Supreme Court case *Zauderer v. Office of the Disciplinary Counsel*.⁶³

Zauderer applies to government-mandated factual disclosure requirements, including disclaimers and warnings, in the context of commercial speech (eg, labeling and marketing).⁶³ *Zauderer* requires that warnings

provide accurate, factual, and uncontroversial information about the product itself, be “reasonably related” to the government’s asserted interest in requiring it, not be unduly burdensome, and not be unjustified—meaning it is supported by evidence.⁶³⁻⁶⁵ Under this standard, courts have upheld textual warnings on tobacco products and country-of-origin labeling on meat products, but have struck down graphic warnings on tobacco products and an “18” notice on video games deemed “sexually explicit.”⁶⁵

To demonstrate factual accuracy, a mandatory warning label should follow the language of authoritative evidence reviews, including the IARC and CUP. The Ninth Circuit found that San Francisco’s requirement that SSB advertising bear a health warning was controversial and not necessarily factually accurate, but the court reheard the case en banc; as of December 2018, the court had not issued its opinion, so the final outcome is pending.⁶⁶ Industry would likely challenge the scientific basis of a processed meat warning label, for example arguing that it is controversial and unjustified.⁶² First Amendment case law is not clear regarding what type of evidence is required to satisfy *Zauderer*,⁶⁵ so it is uncertain how a court would rule on these issues. However, the strength of the evidence linking processed meat with cancer, including the consistent and strong conclusions of major international and national organizations, could plausibly lead courts to conclude that policymakers can be considered justified in enacting such a warning, if they tailor the language of the warning accordingly.

As precedent, two government warning requirements related to the association between cancer and consumer products are tobacco-product warnings (for example, “WARNING: This product can cause mouth cancer”⁶⁷) and California’s Proposition 65 warnings for chemicals known to the state to cause cancer, birth defects, or other reproductive harm. Nonetheless, to become politically feasible, proposals for similar warning requirements on processed meats would need a new strategy for overcoming the considerable power of the pork, beef, and livestock industries in the United States.

Discussion

This article sets the groundwork for debates likely coming in the near future about federal, state, and local policy options to reduce processed

meat intake in the United States. First, it reviewed the scientific evidence classifying processed meat as a carcinogen and red meat as a probable carcinogen. Second, it summarized US consumer demand for processed meat and red meat, focusing on the most important products as a percentage of protein category spending and intake. Third, it described the legal feasibility, definitional questions, and precedents for four potential policy responses designed to reduce consumption of processed meat.

In this study, we focused on (1) nutrition standards, (2) taxation, (3) public service announcements, and (4) mandatory warning labels. We found that legal feasibility is high for the first three policy options. Legal feasibility may be more complicated for the fourth policy option, mandatory warning labels, because of manufacturers' anticipated objections on First Amendment grounds and unsettled case law in the area.

Definitional questions are likely to be easily addressed for some policies, such as PSAs, which can rely on broad category definitions for processed meat. By contrast, definitional questions may be challenging for policies such as nutrition standards, taxation, and warning labels, which require regulators to make classification decisions about borderline cases and might result in litigation by the industry. The challenge arises in part because the body of scientific evidence summarized by the IARC and CUP is clearer on the basic conclusion (processed meat is a carcinogen) than it is on the mechanism (for example, nitrites, heme iron, or sodium as the mechanism). However, precedents for other broad product categories (eg, tobacco, SSBs) suggest that effective category-specific policies can be designed and enacted.

Even more than legal feasibility and definitional questions, the key hurdle to policy adoption is likely to be barriers to political feasibility. The processed meat industry has considerable political power. Associated industries (such as the broader red meat industry), input industries (such as feed grains and oilseeds), and distributing industries (such as food retailers and restaurants) also have powerful lobbyists.

A key finding of this investigation is that federal policymaking in this area depends substantially on decisions in the *2020-2025 Dietary Guidelines for Americans*. State governments also may be influenced by the DGA, but have far more leeway to pursue their own policies. States are not preempted by federal law from using nutrition standards, taxes, or public service announcements as policy levers. At the federal level,

because the official DGA for 2015-2020 did not include a strong statement highlighting the cancer risk from processed meat or red meat, the potential for a strong federal policy response appears low unless the 2020-2025 DGA includes stronger conclusions. Congress has the authority to write new legislation sooner, by overriding aspects of the National Nutrition Monitoring and Related Research Act of 1990, which set procedures for the DGA. However, in practice, a more likely path for federal policy development would follow the next revision of the DGA, for 2020-2025. The clarity of the next revision of the DGA on processed meats depends in large part on decisions by the external Dietary Guidelines Advisory Committee, in particular on whether to assess the risk of cancer and other outcomes specifically associated with consumption of processed meat and red meat. The 2017 National Academies report on procedures for the DGA contains recommendations that would help ensure the completeness and transparency of the systematic evidence reviews used in the *2020-2025 Dietary Guidelines for Americans*. It is important that these evidence reviews include the best available research on red meat, processed meat, and risk of major health outcomes such as cancer.

Conclusion

There is strong and growing evidence that processed meat consumption increases the risk of colorectal cancer and other cancers. In the next several years, we anticipate growing interest in policy options, including nutrition standards, taxation, public service announcements, and warning labels, designed to encourage lower processed meat consumption. The legal feasibility for these policy options is generally high. The political feasibility is uncertain but may rapidly change depending on new science, public awareness, new state and local policy actions, and future recommendations in the *Dietary Guidelines for Americans*.

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Funding/Support: This study was supported by NIH/NIMHD 1R01MD011501. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Conflict of Interest Disclosures: All authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dariush Mozzafarian reported outside of the submitted work grants from the National Institutes of Health and the Gates Foundation; personal fees from GEOD, Nutrition Impact, Pollock Communications, Bunge, Indigo Agriculture, Amarin, Acasti Pharma, Cleveland Clinic Foundation, America's Test Kitchen, and Danone; scientific advisory board membership of Elysium Health (with stock options), Omada Health, and DayTwo; and chapter royalties from UpToDate.

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