# Beyond the Nugget:

## *The Hidden Health Risks of Industrially Produced Animal Proteins—and the Path Toward Better School Lunches*

Friends of the Earth

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# Table of Contents

# EXECUTIVE SUMMARY

School meals are one of our nation's most important public health investments. Nearly 30 million children eat a school lunch every day, and, for many of them, school meals are the healthiest and most reliable meals they receive. Over the past fifteen years, stronger nutrition standards have meaningfully improved the quality of school meals by increasing whole grains, fruits, and vegetables while reducing sodium. However, most schools' lunch entrées are still dominated by highly processed, meat- and cheese-laden foods including pizza, hamburgers, chicken nuggets, and deli meat sandwiches. Typically sourced from large-scale industrial supply chains, these foods likely carry a significant—and largely undisclosed—burden of contaminants. These include:

- residues of hormones, antibiotics, and pesticides;
- dioxins, PFAS and heavy metals; and
- ingredients of concern like nitrates and sodium phosphate.

Given the evidence on the health risks associated with diets high in processed, industrially-produced meat and cheese—among them increased risk of overweight, certain cancers, and heart disease—it is more important than ever to continue to improve the quality of school meals to protect and promote the health of our nation's children.

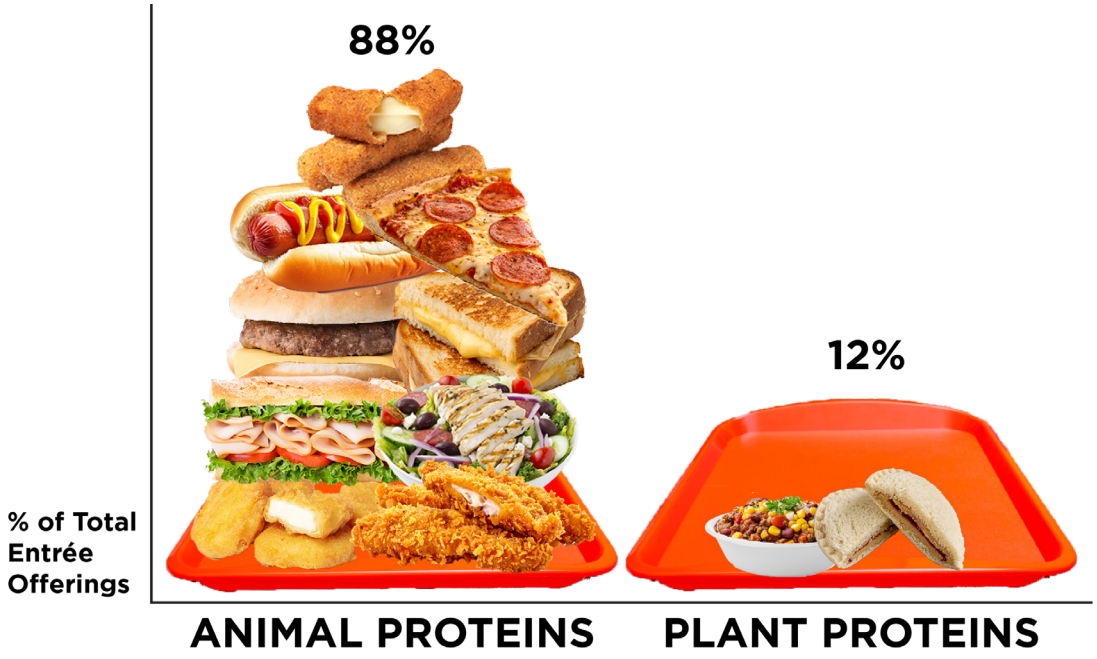
To better understand what's served in cafeterias across the nation—and the associated health implications—we reviewed school lunch menus from a sample of 45 K-12 public school districts representing more than 10,000 identifiable entrées. We identified the most frequently served entrées, characterized the diversity of protein offerings, and quantified the prevalence of red meat, processed meat, plant-based entrées, and meat- and cheese-centered entrées.

To assess labeled ingredients of concern, undisclosed contaminants, and chronic disease risk in the most commonly served lunch entrées, we identified representative products for ten of the most commonly offered entrée categories from companies participating in USDA's National Processing Agreement Program, as publicly available school food menus do not list ingredients or specific products used to prepare meals. For each of these ten products, we assessed potential health concerns based on labeled ingredients, the product's nutrition facts panel, documented food safety concerns with the product's vendor, and a review of the scientific literature, as well as federal and third-party testing and reporting related to undisclosed contaminants.

# Key Findings

**Meat and cheese dominate school lunch menus.** An overwhelming majority (88%) of all entrées offered contained animal products as the primary protein source. More than half of all entrées (53%) contained dairy, and nearly half of all entrées (47%) contained cheese. Excluding nut butter and jelly sandwiches, which are commonly offered as a grab-and-go item rather than as a featured entrée, only 5% of entrées were fully plant-based, underscoring the lack of protein diversity in school meals.

**Red and processed meats are ubiquitous in school meals.** Breaded chicken products (e.g., chicken nuggets and patties) were the single most frequently served entrée category, appearing on more than half of school days. Overall, 39% of entrées contained either red or processed meat. At least 28% of entrées contained processed meat, and 27% of entrées contained red meat, which the International Agency for Research on Cancer (IARC) has classified as a known carcinogen and probable carcinogen to humans, respectively.




School lunch entrées are dominated by meat and cheese-based entrées, particularly red and processed meats, while plant-based options are rare.

**Of the ten representative products we profiled for ten of the most commonly offered entrée categories**:

- **Seven** contain processed meat, a known carcinogen
- **Seven** contain sodium or potassium phosphates, additives that are known to impair kidney function
- **Seven** contain more than 400 mg of sodium, which is more than one-quarter of the American Heart Association's "ideal" daily limit for children
- **Seven** contain added sugars, two of which contain more than one-quarter of the American Heart Association's recommended daily limit of 25 g for children
- **Six** are from vendors we identified as the subject of significant USDA food safety recalls within the past five years, including foreign matter contamination, *Listeria*, and *Salmonella*
- **Four** contain sodium nitrate or nitrite, which are probable carcinogens that are commonly used in processed meats
- **Three** contain red meat, a probable carcinogen

# WHAT'S REALLY IN A CORN DOG?

## LABELED INGREDIENTS OF CONCERN

**Mechanically Separated Chicken**
Meat paste made from chicken bones using high-pressure processing.

**Sodium Phosphate**
Linked to kidney disease and hardening of blood vessels.

**Sodium Nitrite**
Can form cancer-causing compounds during digestion.

## POTENTIAL UNDISCLOSED CONTAMINANTS

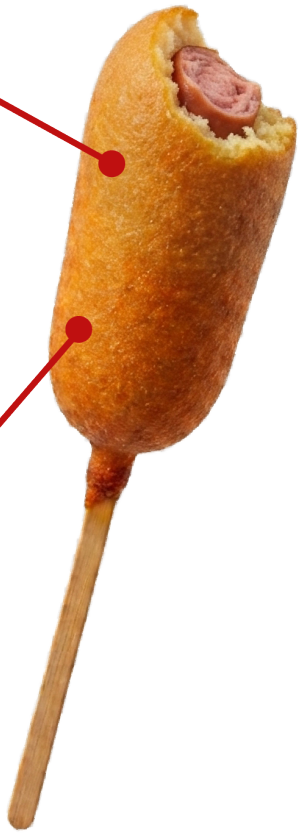
**Antibiotic Residues**
Routine antibiotic use in poultry contributes to antibiotic resistance—one of the CDC's top public health threats.

**Salmonella**
Foster Farms was linked to a 634-person Salmonella outbreak across 29 states and Puerto Rico.

**Heavy Metals**

**Dioxins**

**Pesticide Residues**



## NUTRITION FACTS
Per 1 Corn Dog (112g)

| | |
|---|---|
| **Calories** | **240** |
| **Total Fat** 9g | **12%** |
| Saturated Fat 2.5g | **13%** |
| Trans Fat 0g | |
| **Cholestrol** 40mg | **13%** |
| **Sodium** 470mg | **20%** |
| **Total Carbohydrate** 30g | **11%** |
| Dietary Fiber 2g | **7%** |
| Total Sugars 8g | |
| Includes 7g Added Sugars | **14%** |
| **Protein** 9g | |
| Vitamin D 0mcg 0% • Calcium 100mg 8% | |
| Iron 1.5mg 8% • Potassium 240mg 6% | |

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice

FOSTER FARMS

Hot dogs and corn dogs were the 12th most commonly served school lunch entrée. This report profiled a Foster Farms corn dog, a USDA-approved processor product representative of those served in schools.

**The most commonly offered school lunch entrées likely expose children to multiple health risks.** Nearly all of the representative products assessed in this report contained ingredients of concern, particularly sodium phosphates and sodium nitrites, as well as high sodium, added sugars, and saturated fat. All of the meat in the representative products was processed meat, which poses a cancer risk, and diets high in red and processed meat and low in fiber-rich plant proteins are known to increase the risk of multiple chronic diseases, including cardiovascular disease and type 2 diabetes. Furthermore, because these products are almost certainly sourced through industrial livestock supply chains, they also are likely to contribute to children's dietary exposure to undisclosed contaminants associated with industrial animal agriculture—including residues of veterinary drugs, pesticides; dioxins, PFAS, and heavy metals; and microbial pathogens.

These contaminants have been linked to serious health concerns, including antimicrobial resistance, cancer, endocrine disruption, neurodevelopmental harm, immune dysfunction and foodborne illness. While USDA routinely monitors meat and poultry for microbial hazards and selected chemical residues, its testing covers only a small fraction of the U.S. meat supply. Products purchased for the National School Lunch Program are routinely tested for microbial pathogens, but not comprehensively screened for the broad range of environmental contaminants discussed in this report.

Government and independent testing continue to detect veterinary drugs, pesticides, PFAS, heavy metals and other contaminants in meat, dairy and school meals. Although most detected residues are below current U.S. regulatory limits, violations continue to occur. Independent studies often find contaminants to be more widespread than federal monitoring suggests, and current safety standards do not adequately account for cumulative or synergistic exposure to multiple chemicals over a lifetime. U.S. standards are also generally less protective than those in the European Union, particularly for children, whose developing bodies are more vulnerable to chemical exposures.

These findings underscore the need for stronger chemical testing, greater transparency, and procurement policies that reduce children's exposure to harmful contaminants in school meals. These exposures and associated health risks are not unique to school meals; they reflect broader patterns in the food system. However, because school meals are the nation's largest publicly funded food source for children and a near-daily source of food for tens of millions of children, reforming school meals offers a uniquely powerful lever for improving children's diets, reducing children's cumulative dietary exposure to contaminants, and moving the broader animal supply chain in a healthier direction.

## A Systems Problem Requires Systems Solutions

The ubiquity of processed, industrially-produced meat and cheese on school menus is not a failure of individual school districts: it is the predictable result of inadequate federal funding, outdated procurement policies, regulatory failures, and a broader food system that incentivizes inexpensive, processed foods produced through industrial supply chains. School meal programs operate on extremely tight margins (about $4.70 per free lunch), which two-thirds of school nutrition directors across the nation find insufficient to cover their costs. On top of this federal per-meal reimbursement, schools receive a USDA commodity entitlement that supplies 15-20% of the food on children's trays. Approximately 40% of these entitlement dollars are directed to companies approved by USDA to further process ingredients like chicken, beef, and cheese into the nuggets, patties, and pizzas that are so common on school lunch menus. In effect, federal commodity dollars intended to support agricultural producers end up subsidizing the highly processed entrées served in schools and examined in this report.

The findings of this report are not a criticism of school nutrition professionals, many of whom are leading remarkable innovations despite significant constraints. Instead, they expose the need for system-wide and targeted investments and policy transformation in order for school districts to reduce their reliance on heavily processed animal proteins. Across the country, districts are already implementing effective strategies such as expanding scratch cooking, increasing plant-based offerings, and sourcing higher-quality, values-aligned foods (e.g., organic foods and locally sourced, pasture-raised animal products). Their successes demonstrate that healthier school meals are both feasible and popular when adequate resources and training are available. A companion resource to this report, **Building a Better Tray**, highlights these successes and illustrates the changes already underway in diverse school settings across the nation.

Scratch-made chana masala from Palo Alto Unified School District

Among these are three key strategies that directly address the health concerns identified in this report:

1. **Scratch cooking with whole foods**, which can reduce reliance on processed products containing ingredients of concern and enable the use of more fresh, minimally processed ingredients.
2. **Expanding plant-based options**, which helps diversify protein offerings while reducing reliance on carcinogenic processed meats, decreasing exposure to contaminants unique to or higher in industrial meat and dairy production (e.g., veterinary drug residues, antibiotic residues, dioxins), and decreasing chronic disease risk.
3. **Procuring and serving organic foods**, which reduces children's exposure to pesticide residues and, for animal products, residues of routinely-used antibiotics and growth-promoting hormones.

No single approach can address every health concern identified in this report. When implemented together, these strategies complement one another to reduce children's exposure to harmful ingredients, contaminants, food safety risks, and dietary patterns associated with chronic disease while also supporting healthier, more resilient school food systems. However, current federal funding, procurement policies, and nutrition standards do not adequately support these approaches.

To achieve this systems change, we recommend three complementary policy interventions.

| Key Policy Recommendations | |
|---|---|
| 1 | **Invest in schools' capacity to serve scratch-cooked meals** by increasing federal meal reimbursement rates, supporting investments in kitchen infrastructure and workforce development, and expanding farm-to-school programs. |
| 2 | **Strengthen school nutrition standards to reflect current science** by phasing out processed meats and other ingredients of concern; increase plant protein offerings to diversify protein offerings and increase fiber; and continue reducing levels of nutrients associated with chronic disease (e.g., saturated fat, sodium). |
| 3 | **Reform USDA commodity procurement** by excluding processed meats and other ingredients of concern from the USDA commodity entitlement programs; phasing out animal products from supply chains that routinely use antibiotics and growth-promoting drugs; setting targets for sourcing third-party certified products (e.g., USDA Organic, Regenerative Organic Certified, American Grassfed Certified, certified humane); and giving schools flexibility in spending entitlement funds on local, minimally processed foods. |

Ultimately, improving school meals is not about eliminating any single food or ingredient. It is about aligning federal policy, procurement, and public investment with current nutrition science and ensuring schools have the resources to serve meals built around minimally processed, high-quality ingredients and more diverse protein sources that support lifelong health.

# I. INTRODUCTION

Nearly 30 million children eat school lunch each day, and for the nearly three-quarters of children who qualify for free or reduced-price meals, school lunch may be the most nutritious—and, in some cases, the only—meal they receive each day.[1] A substantial body of research links children's participation in the National School Lunch Program (NSLP) to better diet quality, reduced food insecurity, and improved academic performance.[2]

The passage of the Healthy, Hunger-Free Kids Act of 2010 and subsequent updates to school meal standards have substantially improved the nutritional quality of school meals by increasing whole grains, increasing vegetable variety, lowering sodium, and limiting added sugars.[3] But despite this progress, industrially produced and often processed meat- and cheese-centered entrées like chicken nuggets, pizza, hamburgers, and deli meat sandwiches continue to dominate school lunch menus. This has resulted from multiple overlapping policies and factors, including:

- A complex regulatory environment that largely incentivizes pre-made products formulated to meet nutrition standards rather than supporting scratch cooking;
- Persistent challenges related to procurement, budgets, and kitchen infrastructure and capacity; and
- Food environments and dietary patterns beyond the school setting, in which highly processed foods are ubiquitous.

Using a national sample of school lunch menus, we examined the most commonly served school lunch entrées in the United States to better understand the health implications of the foods that dominate children's school meals. By integrating evidence on ingredients of concern, potential undisclosed contaminants and food safety concerns, and chronic disease risk, the report provides a roadmap for modernizing school meal funding, food procurement, and nutrition standards to better support children's health.

Industrially produced and highly processed meat- and cheese-centered entrées often contain ingredients of concern such as sodium phosphates and nitrites; may contribute to children's cumulative dietary exposure to contaminants associated with industrial animal production, including veterinary drugs, antibiotic use, dioxins, PFAS, pesticides, and heavy metals; and contribute to dietary patterns associated with increased risk of obesity, cardiovascular disease, type 2 diabetes, and certain cancers. While the pizza, burgers, and chicken nuggets served in schools across the nation are of better nutritional quality than their fast food counterparts, they still normalize highly processed food as everyday options, thereby

potentially reinforcing dietary patterns in ways that are inconsistent with current public health recommendations to consume more minimally processed foods and a greater diversity of protein sources.

The coming years present an important opportunity to reshape federal school meal policies to incentivize meals that are built around minimally processed, high-quality ingredients. The *2025–2030 Dietary Guidelines for Americans,* released in January 2026, will inform the next iteration of nutrition standards for child nutrition programs, including the National School Lunch and School Breakfast Programs. At the same time, growing interest among policymakers in improving school food quality creates a timely opportunity to broaden the conversation beyond individual nutrients and food additives to include ingredient quality, protein diversity, nutrient composition, and procurement practices. This broader conversation is already beginning to take shape.

In recent years, there has been a wave of state and federal legislation aimed at improving the quality of the U.S. food supply, including school meals. Since 2024, more than 240 bills have been introduced across at least 41 states to limit the use of additives in foods or to restrict ultra-processed foods, with at least 70 specifically targeting or including school meals.[4,5] While these proposals represent important progress—and more than 20 have been enacted to date—most focus narrowly on synthetic food dyes and a small number of other additives, such as potassium bromate and titanium dioxide.[6,7] Among this legislation, comparatively little attention has been paid to the broader health implications of the industrially produced and often highly processed meat- and cheese-centered entrées that are mainstays of school lunch menus, including their contribution to children's exposure to ingredients of concern, potential contaminants and food safety hazards, and dietary patterns associated with chronic disease. California's AB 1264 represents an important exception by directing the California Department of Public Health to identify "particularly harmful ultra-processed foods" to be phased out of school meals, creating an opportunity to address processed meats and prevalent ingredients of concern, such as sodium phosphates and nitrites.[8]

Fortunately, broader discourse on school meals has begun to expand beyond food additives to the quality and diversity of protein served in school meals**.** In March 2026, a bipartisan coalition of 13 organizations and child nutrition advocates sent a letter to USDA Secretary Rollins calling for improved quality and processing standards for animal products in school meals and cautioning against increasing protein requirements in school meals without addressing protein quality.[9] That same month, more than 160 school food service professionals, school districts, medical professionals, educators, industry groups, companies, and non-profit organizations also wrote to Secretary Rollins, urging the establishment of a plant protein subgroup within the protein category in NSLP to diversify protein offerings and expand students' access to plant-based proteins.[10]

As school meal stakeholders and policymakers address growing concerns about food safety and quality, including additives and contaminants, they must include in their considerations animal products—especially the processed meat, poultry, and cheese so common on school lunch trays. Reforming school meals will require 1) focusing on ingredients of concern and contaminants most prevalent in animal products in school meals, particularly those in the most commonly served entrées; and 2) moving beyond nutrient standards alone by investing in scratch cooking and sourcing higher-quality products. This will require new investments in kitchen infrastructure and workforce development to enable schools to prepare meals that include more whole foods, diverse protein sources, more fiber, and fewer ultra-processed foods.

# School Food 101

School meals in the United States are primarily funded through the federal National School Lunch Program (NSLP) and the School Breakfast Program (SBP), which are administered by the U.S. Department of Agriculture (USDA). Schools receive a reimbursement from USDA for each meal served, with higher rates for meals served for free or at a reduced price to students from lower-income households. For the 2025-2026 school year, federal reimbursement is approximately $4.70 per free lunch.[11] This amount must cover the full cost of producing a compliant meal, including food, labor, equipment, transportation, and administrative expenses—which means that school nutrition programs often operate on extremely tight margins.[12]

In addition to cash reimbursement, schools receive support through USDA commodity entitlement (also known as USDA Foods), a separate funding stream that provides schools with funds to purchase USDA-selected and procured ingredients; this ultimately comprises about 15-20% of the food on students' lunch trays.[13] Schools can utilize three pathways for spending their commodity entitlement: 1) USDA Foods Direct Delivery ("Brown Box"), through which ingredients from a USDA-selected list are ordered directly by school districts; 2) USDA Foods Further Processing, through which schools can order foods from approved processors that convert bulk commodities (e.g., chicken, cheese) into ready-to-serve products (e.g., chicken nuggets, pizza), which accounts for approximately 40% of entitlement spending; 3) and the USDA Department of Defense Fresh Fruit and Vegetable program (USDA DoD Fresh), through which schools can purchase fresh produce.[14] USDA Foods does not offer higher-quality or sustainably sourced options like organic foods, pasture-raised animal products, hormone-free animal products, or animal products raised without routine antibiotics.

Together, reimbursement and commodity entitlement provide the core funding and purchasing support for school meal programs—and they also shape what foods are most readily available and affordable for schools to serve.

By subsidizing the procurement of processed meat and dairy products from a handful of suppliers, the USDA commodity entitlement program steers schools toward industrially-produced, low-cost animal products rather than supporting the purchase of diverse, minimally processed proteins. Friends of the Earth's 2025 analysis of USDA Foods purchasing across the nation found that, in FY 2024, USDA's Agricultural Marketing Service spent $4.77 billion on direct food purchases, with nearly half (46%) directed toward animal products. Additionally, nearly half of all USDA food spending went to just 25 companies,

with Tyson Foods receiving the single largest share despite its history of food safety and environmental concerns.[15]

These funding and regulatory structures mean that school food programs must deliver nutritionally-compliant meals at very low cost; with substantial labor, budget, and infrastructure constraints; and at massive scale—which often results in school districts relying on large food vendors, pre-made products, and industrially produced animal proteins.

Figure 1

## How School Meals Are Funded—and What Ends up on the Tray

Federal funding and procurement policies shape what school can afford—and drive how federal dollars steer school meals toward processed meat and cheese.

**USDA CASH REIMBURSEMENT**

**$4.70**

**per free lunch covers:**

- Food
- Labor
- Equipment
- Transportation
- Administrative expenses

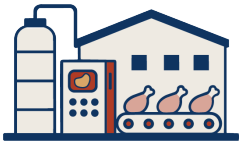
+

**COMMODITY ENTITLEMENT (USDA FOODS)**

**School receive USDA Foods at no cost. Includes three pathways for schools to use these foods.**

**USDA FOODS DIRECT DELIVERY (BROWN BOX)**

Foods shipped to schools for direct use.



**USDA FOODS FURTHER PROCESSING**

USDA approved processors transform commodities into ready to serve products.

**USDA DOD FRESH FRUIT AND VEGETABLE PROGRAM**

Fresh fruits and vegetables shipped to schools.

**~40%** of commodity etitlement spending goes to further processing

**USDA APPROVED PROCESSERS TRANSFORM COMMODITIES INTO READY-TO-SERVE PRODUCTS**

CHEESE

BEEF

CHICKEN

**Transformed into**

**PROCESSED FOODS THAT END UP ON SCHOOL MENUS**

Cash reimbursement and USDA commodity entitlement together provide the primary federal support for school meal programs. Schools can spend their commodity entitlement through three USDA Foods pathways, including further processing into ready-to-serve products. In some cases, states provide additional funding.

# II. HEALTH RISKS OF INDUSTRIALLY-PRODUCED AND PROCESSED ANIMAL PRODUCTS IN SCHOOL MEALS

The processed meat and cheese-centered entrées that are mainstays of school lunch trays often expose children to overlapping health risks across three dimensions: labeled ingredients of concern, undisclosed contaminants and potential food safety risks, and chronic disease risk. A more detailed review of the evidence for each is presented in Appendix A.

## Labeled Ingredients of Concern

Labeled ingredients of concern include sodium nitrites and nitrates, sodium phosphates, and mechanically separated meat, as well as excessive sodium, added sugars, and saturated fat, all of which are common in school foods and are associated with various health risks.

Processed meats (e.g., deli meats, pepperoni, hot dogs) form compounds linked to colorectal cancer, and the International Agency for Research on Cancer (IARC) classifies them as a Group 1 (known) carcinogen, with each daily 50-gram serving increasing colorectal cancer risk by 18%.[16,17,18,19,20] Red meat itself, as well as sodium nitrates and nitrites often found in processed meats, are classified by IARC as a Group 2A (probable) carcinogen.[21] Sodium phosphate, used as a moisture-retention agent in processed meats, is fully absorbed by the body (unlike phosphorus from whole foods), and chronic exposure is linked to kidney dysfunction.[22,23] Consuming high levels of sodium, sugar, and saturated fat is strongly associated with increased risks of cardiovascular disease, type 2 diabetes, and certain cancers, respectively, with recommended limits much lower for children than for adults.[24,25,26,27,28,29,30,31]

## Key Findings on Health Harms and Testing of Undisclosed Contaminants

Meat, poultry, and dairy can contain residues of veterinary drugs, pesticides, PFAS, dioxins, heavy metals, microbial pathogens and other contaminants that are not disclosed on product labels. USDA routinely monitors meat, poultry, catfish, dairy, and eggs for these contaminants to verify compliance with federal standards.[32] However, federal monitoring provides only limited surveillance. In FY2025, USDA tested just over 105,000 meat and poultry samples.[33] This represents just a tiny fraction of the meat produced from the nearly 10 billion food animals slaughtered annually in the United States. While most detected residues were below U.S. regulatory limits, violations continue to occur, and independent studies often find contaminants to be more widespread than federal monitoring suggests.

The routine testing used for USDA Foods procurement primarily focuses on microbiological safety and product specifications rather than comprehensive screening for the broad range of chemical contaminants discussed in this report (e.g., PFAS, dioxins, heavy metals, and many veterinary drugs).[34,35]

Current U.S. safety standards have important limitations. They are often less protective than those adopted by the European Union, which bans substances such as ractopamine and growth-promoting hormones and sets much lower tolerances for pesticides and dioxins.[36] [37] In addition, U.S. safety assessments generally evaluate contaminants individually rather than considering cumulative and synergistic exposure to multiple chemicals over a lifetime—a particular concern for children, whose developing bodies are more vulnerable to endocrine-disrupting, neurotoxic, and carcinogenic chemicals.[38]

**Appendix A** provides a detailed overview of the health risks and results of USDA monitoring and independent testing for the following major contaminant categories.

1. **Growth-promoting hormones and beta-agonists** such as ractopamine remain widely used in U.S. animal production despite being banned in over 160 countries.[39,40,41,42] Hormone residues have been linked to endocrine disruption and hormone-sensitive cancers, while ractopamine has been linked to cardiovascular issues.[43,44,45, 46,47,48,49] The overuse of antibiotics in industrial animal production is a major driver of antimicrobial resistance, an urgent public health threat.[50,51,52] In FY 25, USDA detected veterinary drug residues in 1,723 samples, including 275 exceeding federal limits, most involving antibiotics.[53] USDA also detected ractopamine in 18 livestock samples, while independent testing found ractopamine in 13 of 53 retail beef samples, although all were below current U.S. tolerance levels.[54]
2. **Pesticide residues** are associated with increased risks of cancer, endocrine disruption, and neurodevelopmental disorders, while persistent pesticides such as DDT continue to accumulate in animal tissues decades after being banned.[55,56,57,58,59] USDA found pesticide residues in 50 samples, including 20 exceeding regulatory tolerances, and detected pesticide residues in 60% of butter samples tested.[60,61] Independent testing by Moms Across America of 43 school meals in 15 states detected glyphosate in 93% of samples and at least one additional pesticide residue in 74% of samples, with the highest glyphosate levels in meals containing beef, pork and dairy and wheat products.[62]
3. **Dioxins** accumulate in animal fat, and more than 90% of human exposure occurs through food, primarily dairy and meat products, fish, and shellfish.[63] Exposure has been linked to cancer, immune dysfunction, and endocrine disruption;[64,65,66] USDA monitoring shows dioxin levels in meat have declined over time, but because dioxins remain in the body for years, European health authorities continue to consider current dietary exposure a concern, particularly for young children.[67]
4. **PFAS** ("forever chemicals") enter the food supply through contaminated soil, water, animal feed, and have been linked to immune dysfunction, endocrine disruption, liver toxicity, developmental harm, and certain kinds of cancer.[68] In 2024, FDA detected one or more PFAS compounds in 7% of foods tested, including beef, chicken, pepperoni, milk, and cream, while a separate USDA grocery store study detected PFAS in 25% of retail beef samples.[69,70] Although levels were generally below safe thresholds, even low-level PFAS contamination is a concern because many PFAS persist and can accumulate in the human body over time with repeated exposure.[71]
5. **Heavy metals,** including lead, cadmium, arsenic, and mercury, can enter the food supply through contaminated soil, water, and animal feed and tend to accumulate in animal fat and in the body over time. Exposure is linked to neurological damage, developmental delays, kidney dysfunction, and increased cancer risk.[72,73] [74] Government monitoring found lead and cadmium in 1.5% and 8% of retail samples,

respectively, while independent testing identified at least one heavy metal in every school meal tested.[75,76] While most detections did not exceed government safety standards, there is no level of lead exposure considered safe for children.[77]

6. **Microbial pathogens,** including *Salmonella, E. Coli,* and *Listeria*, cause an estimated 10 million illnesses, 53,000 hospitalizations, and more than 900 deaths annually in the United States—nearly one-third of which are from eating contaminated meat and poultry.[78,79] In 2025, nearly one-third of recalls for microbial contamination involved animal products, primarily because of *Listeria* and *Salmonella*.[80,81,82]
7. **Foreign matter**, such as plastic, metal, and rubber, can be present in industrially produced foods as a result of equipment failures.

Figure 2

# IT'S NOT JUST BEEF

**Even if a beef patty contains a single ingredient, there are potential undisclosed contaminants not listed on the ingredient label.**

## What's Not on the Label, but **Could** be in the Beef

**IARC GROUP 2A RED MEAT DESIGNATION**
Red meat is classified by the World Health Organization as a probable human carcinogen.

**SYNTHETIC HORMONE RESIDUES**
Growth-promoting hormones used in beef production may disrupt normal hormone signaling in the body.

**BETA AGONISTS LIKE RACTOPAMINE**
Beta agonists are linked to cardiovascular issues.

**ANTIBIOTIC RESIDUES**
Routine antibiotic use in livestock contributes to antibiotic resistance, a growing public health threat.

**PESTICIDE RESIDUES**
Residues from pesticides used to grow animal feed and produce wheat (especially glyphosate) have been linked to cancer, reproductive, and developmental harms.

**DIOXINS**
Toxic industrial pollutants that accumulate in animal fat and have been linked to cancer and reproductive harm.

**MICROBIAL PATHOGENS**
Beef can harbor harmful bacteria such as E. coli that can cause severe illness and kidney damage.

**PFAS**
"Forever chemicals" that persist in the environment and may impact the immune system, hormones, and increase cancer risk.

**Chronic disease risks** associated with diets high in animal products—particularly red and processed meats—and low in whole or minimally-processed, plant-based, fiber-rich foods are well-documented in the scientific literature. Meta-analyses and large prospective cohort studies among adults consistently link these dietary patterns to elevated risk of cardiovascular disease, type 2 diabetes, overweight and obesity, and multiple cancers, including colorectal, breast, prostate, and pancreatic cancers.[83,84,85,86,87,88,89,90,91,92] Diets high in red and processed meats are also associated with gut microbiome disruption and chronic inflammation, while higher intake of meat and dairy protein is associated with higher concentrations of Insulin Growth Factor-1 (IGF-1) and increased cancer mortality in adults under 65.[93,94]

Conversely, diets higher in plant foods and lower in red and processed meat are associated with lower all-cause mortality and improved long-term health outcomes.[95,96] Diets high in animal products are often low in fiber-rich plant foods that are critical for gut, cardiovascular, metabolic, and immune health.[97] Fiber is identified in the Dietary Guidelines for Americans as a nutrient of public health concern, yet the average American child consumes only about 13 grams per day—approximately half the recommended intake.[98,99]

Additionally, diets high in ultra-processed foods—which provide nearly two-thirds of daily calories for U.S. children aged 6–18—are associated with morbidity in nearly every system in the body, including overweight, type 2 diabetes, cardiovascular disease, depression, and all-cause mortality.[100,101,102]

For children who regularly eat school meals, these exposures can accumulate across the approximately 180 school days per year over 13 years of K–12 schooling. While children's most rapid development occurs in the earliest years, the school-age years are critical windows for brain maturation, endocrine and hormonal development, and metabolic function, all of which can be affected by chronic dietary exposures.[103] However, these harms can likely be mitigated by shifting dietary patterns. Prospective studies show that even modest reductions in red and processed meat intake and increases in plant-based protein sources are associated with a decreased risk of type 2 diabetes, cardiovascular disease, and all-cause mortality.[104,105,106]

# III. OVERVIEW OF METHODS

For this report, we conducted two complementary analyses.

First, we conducted an analysis of school lunch menus from districts across the nation to characterize the foods most commonly offered to students and assess patterns in protein offerings, including the prevalence of processed meat, red meat, and plant-based offerings. Second, we combined representative product assessments with a targeted review of the scientific literature to evaluate ingredients of concern, potential undisclosed contaminants, documented food safety concerns, and chronic disease risks associated with the most frequently served entrée categories.

We analyzed lunch menus from November 2025 from a sample of 45 K-12 public school districts across the nation. We included 15 large, 15 medium, and 15 small districts, with the sizes based on USDA Food and Nutrition Service enrollment thresholds. The 15 largest districts were identified using 2024–2025 enrollment data from the Urban Institute's Education Data Portal; medium and small districts were randomly selected from the same source. Within each district, we randomly sampled menus from one elementary, one middle, and one high school site.

Menus were processed using a custom-built AI-assisted classification tool that extracted individual lunch entrées, counted their frequency, and categorized each item by both mutually-exclusive entrée type (e.g., breaded chicken products, cheese pizza, hot dogs/corn dogs) and non-mutually-exclusive product attributes (e.g., contains beef, contains processed meat, plant-based). All AI outputs were manually reviewed and validated; a spot check of 20 randomly selected items yielded no classification errors. After excluding 533 unclassifiable items, our analytical sample comprised 10,226 entrées. This menu analysis was used to identify the most frequently served entrée categories and assess the prevalence of processed meat, red meat, plant-based entrées, meat- and cheese-centered entrées, and the diversity of protein offerings across school lunch menus.

To better characterize the foods represented by the most frequently served entrée categories, we developed representative product assessments for 10 of the 12 most commonly offered entrée types. Two entrée types that appeared in the top 12 – yogurt-based entrée and salad with meat – were not profiled because they are not carried by USDA-approved processors as ready-to-eat products and their composition varies widely across districts.

Because publicly available school menus do not identify the specific products, manufacturers, ingredient formulations, or recipes used by school districts, we selected representative products from companies

participating in USDA's National Processing Agreement Approved Processor Program for SY2025–26. Participation in this program requires processors to demonstrate an established commercial market for K-12 schools, making these products a reasonable proxy for foods commonly available through both USDA commodity entitlement and the broader school food marketplace. For each of the 10 entrée types, we selected a representative product with publicly available ingredient and nutrition information. Because the National Processing Agreement Approved Processor Program consists of a curated set of vendors whose products are widely used across K-12 school food programs, these ten items are representative of the categories they exemplify rather than of any specific district's menu. Together, they reflect the broader industrial supply chain that shapes what schools are able to purchase and prepare.

For each representative product, we documented the manufacturer, product name, ingredient list, Nutrition Facts information, and ingredients of concern (sodium phosphate, sodium nitrite, mechanically separated meat, IARC carcinogen classifications, sodium, saturated fat, and added sugar) drawn from the latter two items. We then conducted a targeted review of the peer-reviewed literature, government publications, and other publicly available sources to identify potential undisclosed contaminants associated with each product category, as well as documented food safety, recall, contamination, and other public health concerns related to the representative manufacturers.

Limitations include: 1) publicly available menus do not identify preparation methods, recipes, or vendor-level purchasing data, requiring the use of representative products as proxies for the most common entrée categories; 2) menu frequency of entrées does not reflect actual student selection or consumption and may overestimate prevalence of items like nut butter sandwiches that are offered daily; 3) the analysis was limited to lunch entrées offered during November 2025 and did not include breakfast, beverages, or side dishes; and 4) geographic, cultural, and regional variation in school meal offerings may not be fully captured in our sample.

The full methodology, including the entrée classification schema, is in Appendix B.

# IV. RESULTS

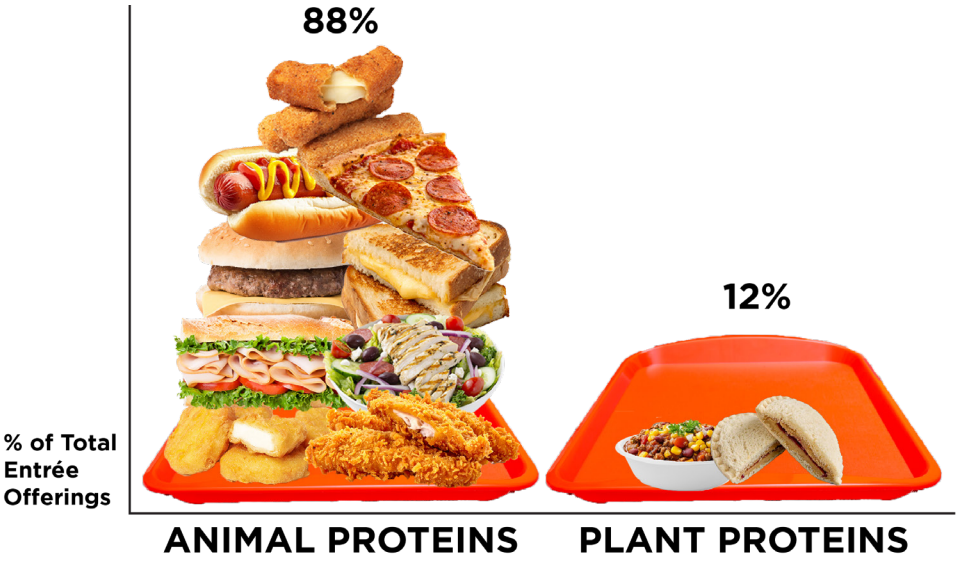
## Findings from the Menu Analysis

Our analysis of 10,226 lunch entrées from 45 public K–12 school districts provides a snapshot of the foods most commonly offered on school lunch menus across the United States. The findings below are drawn directly from the menu analysis and characterize the prevalence and diversity of entrée types and protein sources served in schools.

- **Animal products dominate school lunch menus.** Most entrées (88%) contained animal products as the primary protein source. While 12% of entrées were plant-based, half of these were nut butter and jelly sandwiches, which are commonly offered daily as grab-and-go alternatives to a hot meal rather than as the featured entrée. After excluding nut butter and jelly sandwiches, only 5% of all entrées were fully plant-based, and just 6% listed any plant-based protein, underscoring just how limited plant-based protein offerings are in school meals.[107]

Figure 3

## Animal Proteins Dominate School Lunch Entrées



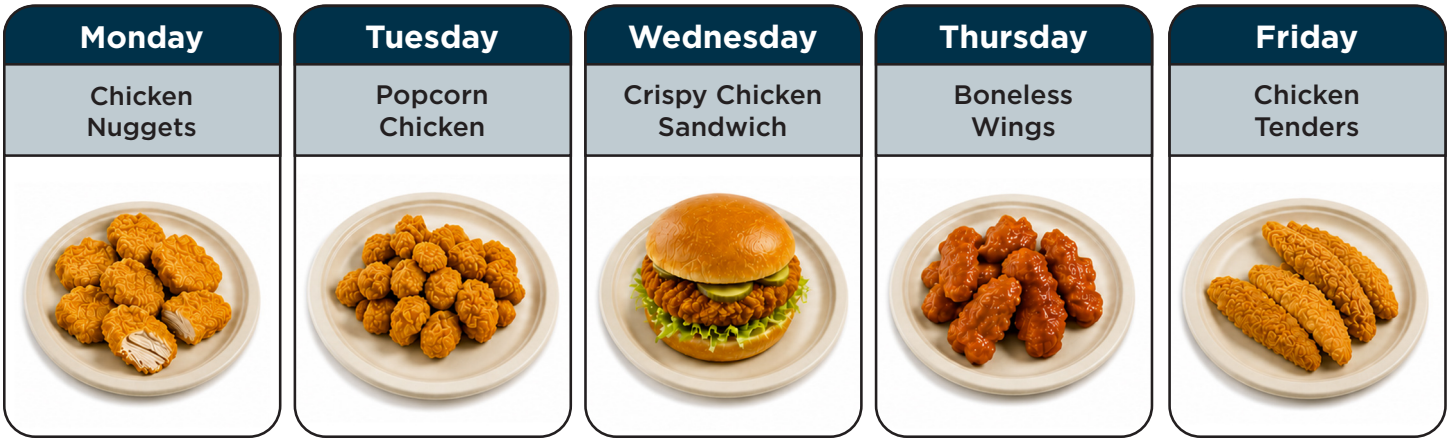

School lunch entrées are dominated by meat and cheese-based entrées, particularly red and processed meats, while plant-based options are rare.

- **Breaded chicken products were the single most frequently served entrée.** Breaded chicken products (e.g., chicken nuggets, chicken patties, popcorn chicken) appeared on lunch menus on more than half (53%) of school days, making them the most common entrée category across the sampled districts. These products are considered a Group 1 carcinogen—known to cause cancer in humans according to the World Health Organization's International Agency for Research on Cancer (IARC).[108]

Figure 4

## America's Most Common School Lunch Entrée

**More than 1 in every 10 school lunch entrées is a breaded chicken product.**




Breaded chicken products were the single most common school lunch entrée category in our sample. Although these menu items appear diverse, they are all variations of the same processed breaded chicken product that typically contains sodium phosphate and excess sodium and is classified as a processed meat, a known carcinogen.

### Table 1. Most Frequently Served Lunch Entrées in Sampled US Schools, November 2025

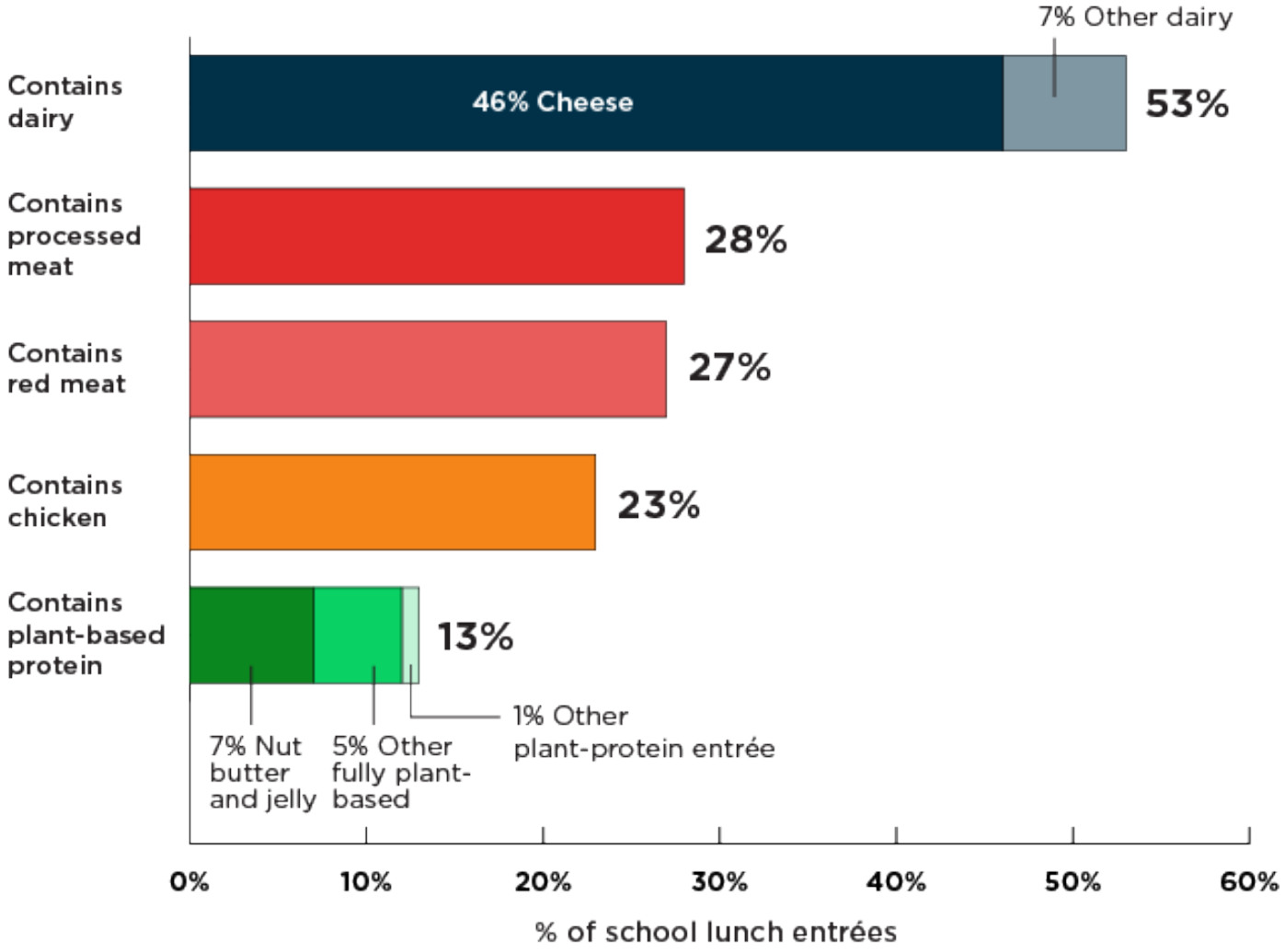
| Rank | Entrée Type | Number of Entreés (n=10,226) | % of Total Entreés Served |
|---|---|---|---|
| 1 | Breaded chicken products (e.g., chicken nuggets or tenders) | 1063 | 10.4% |
| 2 | Deli meat sandwich or wrap (e.g., turkey or ham) | 1061 | 10.4% |
| 3 | Cheese pizza | 885 | 8.7% |
| 4 | Hot cheese entrée (e.g., grilled cheese, mozzarella sticks) | 809 | 7.9% |
| 5 | Nut butter and jelly sandwich | 751 | 7.3% |
| 6 | Yogurt-based entrée (e.g., parfait) | 738 | 7.2% |
| 7 | Beef burger (hamburger or cheeseburger) | 706 | 6.9% |
| 8 | Pizza with processed meat (e.g., pepperoni, sausage) | 683 | 6.7% |
| 9 | Other chicken entrées (e.g., mandarin chicken, teriyaki chicken) | 602 | 5.9% |
| 10 | Salad with meat | 547 | 5.3% |
| 11 | Other beef entrées (e.g., beef crumbles, chili) | 546 | 5.3% |
| 12 | Hot dogs and corn dogs | 229 | 2.2% |

- **Red and processed meats are common features of school lunch menus.** Nearly four in ten (39%) entrées contained either red or processed meat. More than one quarter (28%) of all entrées included processed meat—including deli meats, pepperoni, and breaded chicken products—and more than one quarter (27%) contained red meat. Processed meat is classified by the World Health Organization's International Agency for Research on Cancer (IARC) as carcinogenic to humans (Group 1), while red meat is classified as probably carcinogenic to humans (Group 2A). Because items were classified as processed meat only when this was apparent from the menu description, the true prevalence of processed meat on school lunch menus is likely higher.
- **Cheese and other dairy products are common components of school entrées.** More than half of all entrées (53%) contained dairy, and nearly half of all entrées (47%) contained cheese.

Figure 5

## Protein sources in school lunch entrées

Share of lunch entrées for each attribute (n=10,226)



## Findings from the Representative Product Assessment and Evidence Review

Publicly available school lunch menus do not identify the specific commercial products or ingredients used to prepare meals. To better understand the composition of the most commonly served entrées identified in the menu analysis, we selected representative products for ten of the twelve most frequently served entrée categories using products available through USDA-approved processors. These ten entrée categories together account for the majority of entrées served across the sampled menus. These representative products are shown in Table 2. Detailed profiles for each product—including ingredient lists, nutrition facts, ingredients of concern, documented food safety recalls, and, where applicable, other public health concerns associated with the manufacturer—are provided in **Appendix C**.

**Table 2: Representative Products from USDA-Approved Processors for the Most Frequently Served Lunch Entrées in Sampled U.S. Schools, November 2025**

| Rank | Item | Representative Product | Manufacturer |
|---|---|---|---|
| 1 | Breaded chicken products (e.g., chicken nuggets or tenders) | Tyson Fully Cooked Whole Grain Breaded White Meat Chicken Nuggets | Tyson Foods |
| 2 | Deli meat sandwich or wrap (e.g., turkey or ham) | Turkey Ham & Cheese Sub on Whole Grain Homestyle Bun | Classic Delight, Inc. |
| 3 | Cheese pizza | BIG DADDY'S™ Primo 16" WG Rising Crust Four Cheese Pizza | Schwan's Food Service, Inc. |
| 4 | Hot cheese entrée (e.g., grilled cheese, mozzarella sticks) | Grilled Cheese Sandwich on Whole Grain Bread | Integrated Food Service |
| 5 | Nut butter and jelly sandwich | Smucker's 2.6 Ounce Uncrustables Peanut Butter And Strawberry Wheat | The J.M. Smucker Company |
| 6 | Beef burger (hamburger or cheeseburger) | AdvancePierre Fully Cooked Flame Grilled Beef Patties, 2.01 oz | AdvancePierre (a Tyson Foods company) |
| 7 | Pizza with meat (e.g., pepperoni, sausage) | TONY'S® SmartPizza® 51% Whole Grain 4"x6" Pork Pepperoni Pizza 50/50 | Schwan's Food Service, Inc. |
| 8 | Other chicken entrées (e.g., mandarin chicken, teriyaki chicken) | Fully Cooked Diced ½" White and Dark Chicken Meat | Pilgrim's Pride (JBS) |
| 9 | Other beef entrées (e.g., beef crumbles, chili) | Rotini w/ Italian Meat Sauce | JTM |
| 10 | Hot dogs and corn dogs | Whole Grain Chicken Corn Dogs | Foster Farms |

**Note**: This table does not include yogurt-based entrees or meat salads, as they are not available in a ready-to-serve formats from USDA-approved processors

**Among the ten representative products assessed:**

- **Seven** contain processed meat, which IARC classifies as a Group 1 carcinogen.
- **Seven** contain sodium or potassium phosphates, additives associated with impaired kidney function.
- **Seven** contain more than 400 mg of sodium, exceeding one-quarter of the American Heart Association's recommended daily sodium limit for children.
- **Seven** contain added sugars, including two that contain more than one-quarter of the American Heart Association's recommended daily limit of 25 g for children.
- **Six** are manufactured by vendors that were the subject of significant USDA food safety recalls within the past five years, including recalls involving foreign matter contamination, *Listeria*, and *Salmonella*.
- **Four** contain sodium nitrate or sodium nitrite, ingredients associated with increased cancer risk.
- **Three** contain red meat, which IARC classifies as probably carcinogenic to humans (Group 2A) and which has been associated with increased risk of cardiovascular disease and other chronic diseases.
- Only **one** representative product—the nut butter and jelly sandwich—is fully plant-based. No other representative product contained a plant-based protein as its primary component.

The representative product assessment demonstrates that the foods most commonly served in schools frequently contain ingredients of concern, are manufactured by vendors with recent food safety recalls, and are sourced through industrial livestock supply chains. As discussed in **Section II**, these production systems have been associated in the scientific literature and government monitoring programs with contaminants including veterinary drug residues, pesticide residues, PFAS, dioxins, and heavy metals. Although this study did not directly measure contaminants in school foods, the prevalence of these representative products on school menus highlights the importance of understanding potential exposure pathways for children.

Figure 6

# WHAT'S REALLY IN A CORN DOG?

## LABELED INGREDIENTS OF

**Mechanically Separated Chicken**
Meat paste made from chicken bones using high-pressure processing.

**Sodium Phosphate** ($PO_4$)
Linked to kidney disease and hardening of blood vessels.

**Sodium Nitrite** ($NO_2$)
Can form cancer-causing compounds during digestion.

## POTENTIAL UNDISCLOSED CONTAMINANTS

**Antibiotic Residues**
Routine antibiotic use in poultry contributes to antibiotic resistance—one of the CDC's top public health threats.

**Salmonella**
Foster Farms was linked to a 634-person Salmonella outbreak across 29 states and Puerto Rico.

**Heavy Metals** (HM)

**Dioxins**

**Pesticide Residues**

## NUTRITION FACTS
Per 1 Corn Dog (112g)

| | |
|---|---|
| **Calories** | **240** |
| **Total Fat** 9g | **12%** |
| Saturated Fat 2.5g | **13%** |
| Trans Fat 0g | |
| **Cholestrol** 40mg | **13%** |
| **Sodium** 470mg | **20%** |
| **Total Carbohydrate** 30g | **11%** |
| Dietary Fiber 2g | **7%** |
| Total Sugars 8g | |
| Includes 7g Added Sugars | **14%** |
| **Protein** 9g | |

Vitamin D 0mcg 0% • Calcium 100mg 8%

Iron 1.5mg 8% • Potassium 240mg 6%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice

FOSTER FARMS

Hot dogs and corn dogs were the 12th most commonly served school lunch entrée. This report profiled a Foster Farms corn dog, a USDA-approved processor product representative of those served in

# V. DISCUSSION

## School meals reflect the broader food system.

The findings of this report should not be interpreted as a critique of school nutrition professionals or individual school districts. Rather, they reflect the cumulative effects of decades of public policy decisions, funding constraints, procurement systems, and commercial food markets that have made industrially produced meat- and cheese-centered foods dominant in schools. Limited reimbursement rates, widespread reliance on USDA commodity processing, labor shortages, and inadequate kitchen infrastructure all create strong incentives to purchase ready-to-eat products rather than prepare meals from minimally processed ingredients. As a result, the foods served in school cafeterias today are best understood as the predictable outcome of the systems in which schools operate.

## The foods that dominate school lunch entrées do not reflect current nutrition science.

Despite substantial improvements in school meal nutrition standards over the past 15 years, our findings indicate that the entrées most commonly served to students remain dominated by industrially produced, often highly processed meat and cheese.

This pattern is inconsistent with the best available nutrition science, which increasingly emphasizes dietary patterns built around minimally processed foods, fiber-rich plant foods, and more diverse protein sources while limiting processed meat. Our analysis illustrates the gap between current scientific recommendations and the entrées most commonly offered to students.

## Children's cumulative dietary exposure deserves greater attention.

Most discussions of school meals focus on whether individual meals meet federal nutrition standards. This report considers the broader pattern of foods children are repeatedly exposed to throughout their K–12 education. For many students, school lunch is consumed five days per week over more than a decade. While the presence of any individual ingredient of concern or contaminant may not, by itself, pose a significant health concern, repeated exposure over time contributes to children's cumulative dietary exposure to processed meats, ingredients of concern, and contaminants associated with industrial food production. Evaluating school meals through this broader lens better reflects how dietary exposures influence long-term health and highlights the importance of preventing avoidable exposures during critical periods of growth and development.

## Improving protein quality offers multiple pathways to healthier school meals.

Protein sources exist along a continuum that varies in nutritional profiles, processing, and production practices, with corresponding differences in ingredients of concern, contaminant exposure, and chronic disease risk. Industrially produced processed meats generally present the greatest combination of these risks, while higher-quality animal products, plant proteins, and using whole proteins can each help reduce different aspects of risk. For example, certified organic and certain other third-party certified animal products generally contain lower levels of many contaminants than conventionally produced meat and dairy because they are produced without routine use of antibiotics, synthetic growth hormones, beta-agonists such as ractopamine, or most synthetic pesticides used in feed production. Plant-based foods also eliminate exposure to veterinary drugs, growth hormones, and beta-agonists, and they generally contain much lower levels of persistent pollutants such as dioxins and PFAS, which bioaccumulate in animal fat and tissues through the food chain. Diets centered on whole and minimally processed plant proteins are also associated with lower risks of cardiovascular disease, type 2 diabetes, certain cancers, and all-cause mortality than diets high in red and processed meat. Meanwhile, scratch cooking with whole proteins is a key strategy for avoiding ingredients of concern.

# Where Do Plant-Based Meat Analogs Fit?

Plant-based protein options exist along a spectrum, ranging from whole foods such as beans, lentils, nuts, and edamame to processed meat analogs designed to mimic the taste and texture of meat (e.g., vegan "chick*n" nuggets or soy-based burger patties). Like animal meat, highly processed meat analogs are not nutritionally equivalent to whole or minimally processed plant-based options. However, with regard to the harms described in this section, plant-based meat analogs generally perform better on key health-related metrics than the industrially produced animal products they displace, as shown in Figure 7.[109,110] Even so, some meat analogs may still contain ingredients of concern, such as the thickening agent carrageenan, synthetic food dyes, and other processing-related chemical contaminants. We recommend referring to the Ingredient *Guide for Better School Food Purchasing* for a directory of ingredients to avoid or limit in school foods, whether from animal or plant-based sources.[111]

Figure 7

## Industrial Meat vs. Meat Analogs vs. Whole Plant Proteins

| | Meat | Ultra-Processed Plant-Based Proteins | Whole Plants |
|---|---|---|---|
| Nutrient Profile | Usually worse | Usually better | Even better |
| Saturated Fat | Usually worse | Usually better | Even better |
| Trans Fat | Usually worse | Usually better | Even better |
| Cholesterol | Usually worse | Usually better | Usually better |
| Fiber | Usually worse | Usually better | Even better |
| Calorie Density | Usually worse | Usually better | Even better |
| Phytonutrients | Usually worse | Usually better | Even better |
| Antioxidants | Usually worse | Usually better | Even better |
| Nitrites | Usually worse | Usually better | Usually better |
| Salt | About the same | About the same | Usually better |
| Sugar | About the same | About the same | Usually better |
| Emulsifiers | Usually better | Usually worse | Even better |
| ↑Weight Gain | Usually worse | Usually better | Even better |
| Heartburn | Usually worse | Usually better | Even better |
| ↑Gut Dysbiosis | Usually worse | Usually better | Even better |
| ↑Inflam. (TVP) | Usually worse | Usually better | Even better |
| ↑Inflam. (other) | About the same | About the same | Usually better |
| Salmonella | Usually worse | Usually better | Usually better |
| Campylobacter | Usually worse | Usually better | Usually better |
| Antibiotic Resistance | Usually worse | Usually better | Usually better |
| Antibiotic Residues | Usually worse | Usually better | Usually better |
| Hormones | Usually worse | Usually better | Usually better |
| Pollutants | Usually worse | Usually better | Usually better |
| ↑IGF-1 | About the same | About the same | Usually better |
| ↑TMAO | Usually worse | Usually better | Usually better |
| Mold toxins | Usually better | Usually worse | Usually better |
| Food Allergens | Usually better | Usually worse | Usually better |

Even better · Usually better · About the same · Usually worse

Adapted with permission from Greger, M. *Ultra-Processed Foods: Concerns, Controversies, and Exceptions*. NutritionFacts.org; 2026. https://nutritionfacts.org/book/ultra-processed/

While whole, plant-based foods are the optimal option, processed plant-based meat alternatives can be useful in school settings when offered in moderation as schools move towards whole, plant-based alternatives. These foods can help accommodate students following restricted diets, diversify protein options for all students, and provide plant-based choices in familiar formats, especially in schools with limited capacity for scratch cooking with whole plant-based foods.

Improving school meals does not require an all-or-nothing approach. Districts can make meaningful progress through multiple complementary strategies, including sourcing higher-quality animal products, increasing scratch cooking with minimally processed ingredients, and expanding plant-based protein options. The transitional pathways illustrated in Figure 8 demonstrate how schools can move away from industrially produced, processed meat and cheese-centered meals.

Figure 8

## Transitional Entrées

There are **multiple pathways** toward healthier school meals. The examples below illustrate how incremental improvements in ingredients, preparation methods, protein choices, and sourcing can strengthen school entrées over time.

| Conventional Entrées | Transitional Entrées | Ideal Entrées |
|---|---|---|
|  Hot dog |  Veggie dog |  Falafel sandwich |
|  Chicken nuggets |  Heat and serve white bean and chicken chili |  Scratch-made white bean and chicken chili |
|  Cheese burger |  Heat and serve black bean burger |  Scratch-made black bean burger |
|  Pepperoni pizza |  Pasta with pre-made lentil & beef meatballs |  Pasta with scratch-made organic lentils & grass-fed meatballs |
| • Centered on processed meat and cheese<br>• High in saturated fat, sodium, and added sugar<br>• Low in fiber<br>• Heat and serve preparation<br>• Sourced from industrial supply chains | • Greater use of plant proteins<br>• Lower saturated fat, sodium, and added sugar; higher fiber<br>• Speed scratch preparation<br>• Some higher quality ingredient sourcing | • No processed meats<br>• Plant-rich proteins<br>• Fiber-rich<br>• Low in saturated fat, sodium, and added sugar<br>• Scratch cooked<br>• Organic, raised without routine antibiotics, local, and other sustainable sourcing practices |

## Improving school meals requires a systems approach.

Meaningful improvement in school meals will require structural change. While many districts have undertaken efforts to expand plant-based and organic options, reduce reliance on processed meats and ingredients of concern, and invest in scratch cooking, broader progress will require coordinated action across federal, state, and local levels. Funding, procurement systems, and nutrition standards must also be better aligned with current nutrition science and public health goals.

# VI. POLICY RECOMMENDATIONS

Improving school meals will require coordinated action across federal, state, and school district levels.

## Federal and State Policy Recommendations

### 1. Invest in Scratch Cooking and Sourcing High-Quality Ingredients

When schools have the facilities, equipment, staffing, and skills to prepare food from whole, high-quality ingredients, they can serve meals made from minimally processed components, thereby reducing dependence on the heat-and-serve, processed products from industrial supply chains that currently dominate menus.[112] The most critical barriers to this are not will or awareness, but infrastructure and economics.[113] Key improvements that need to be addressed include:

- **Kitchen infrastructure:** Congress and state legislatures should fund major investments in kitchen and scratch cooking infrastructure. Recent research has shown that School Food Authorities that receive federal or state grants for kitchen equipment are significantly more likely to serve scratch-cooked foods.[114] Equipment such as combination ovens, commercial food processors, and large-batch cooking capacity is necessary for scratch cooking programs to be viable. Many school kitchens were built prior to the 1980s and were designed for reheating pre-made food—not scratch cooking.[115] Although more than two-thirds (71%) of surveyed school nutrition directors across the nation reported that their districts offer scratch-prepared entrées at least once a week, nearly all of them also reported needing additional funding (99%) and updated kitchen equipment and infrastructure (94%) to expand scratch cooking and reduce their reliance on highly processed foods in school meals.[116]
- **School workforce development:** Skilled labor is one of the most significant barriers to scratch cooking: school food teams are frequently understaffed, undercompensated, and lack production-scale culinary training. Congress and state legislatures should invest in school nutrition workforce training and increased wages for these critical employees whose work bears a significant impact on the health of the nation's children.[117] Additionally, USDA should expand technical assistance and peer learning programs for districts moving toward scratch cooking.
- **Higher reimbursement rates:** The federal reimbursement rate of approximately $4.70 per lunch is insufficient for covering food costs, labor, equipment, and overhead. A 2025 survey of more than 1,200 school nutrition directors across the nation found

that more than two-thirds (70%) consider this reimbursement rate insufficient for covering the cost of producing a lunch, an increase from the prior year's survey.[118,119] Nearly all reported they had moderate or significant challenges with food costs (98%) and labor costs (95%), and nearly all (95%) had serious or moderate concerns about the financial sustainability of their school meal program over the next three years. In light of these overwhelming concerns and challenges, the School Nutrition Association has called on Congress to raise reimbursement rates by 40 cents per lunch.[120] To address the need for rising costs of whole, less processed food, labor, equipment, and overhead, we recommend that Congress substantially increase the per-meal reimbursement rate, ideally tied to improvements in school meal quality.

- **Farm-to-School and other high-quality ingredient sourcing:** Congress should restore the Local Food Purchase Assistance Program and Local Foods for Schools program, which USDA cancelled in 2025, eliminating $1.13 billion in contracts supporting over 10,000 farmers.[121] These programs directly funded procurement of fresh, locally grown foods—the building blocks of scratch cooking—and their elimination may lead schools to struggle to afford fresh, high-quality, locally-sourced food.[122] Congress should also significantly increase funding for the Patrick Leahy Farm to School Grant Program. States can further support these efforts by creating incentives for purchasing local, plant-based, organic, and other high-quality ingredients, such as California's 2022 School Food Best Practices Fund, Washington State's plant-based school meals grants program, or the local food purchasing incentives or grant programs active in 16 states and the District of Columbia.[123] USDA should also leverage its commodity procurement to support sourcing of higher-quality ingredients (see Recommendation 3).

Federal bills aligned with these recommendations include:

- The **School Food Modernization Act (H.R.5731)**, which would make key investments in school kitchen infrastructure and staff training to support scratch cooking.[124]
- The **Plant Powered School Meals Pilot Act (H.R.5867/S.3669)**, which would establish a pilot grant program to support school districts to expand and promote plant-based offerings.[125]
- The **Healthy Meals Help Kids Learn Act (H.R.5753),** which would permanently increase the federal reimbursement rate for school lunch by 45 cents and school breakfast by 28 cents, giving schools the financial foundation they need to serve fresh, nutritious meals.[126]
- The **Safe School Meals Act (S.5084 in the 118th Congress)**, which would place limits on heavy metals; ban certain pesticide residues; prohibit PFAS and other "forever chemicals" in school food packaging; require FDA to re-evaluate food additives with known carcinogenic, reproductive, or developmental harms and prohibit their use in school meals during the review period, and increase funding for school meals.[127]
- **The Scratch Cooked Meals for Students Act (H.R.8928/S.4599)**, which would establish a USDA pilot grant program for school districts to purchase cafeteria equipment, train staff, and expand scratch cooking.[128]
- **The Farm to School Act of 2025 (H.R.6065/S. 3127)**, which would reauthorize and expand the Patrick Leahy Farm to School Grant Program by increasing mandatory funding, raising the per-grant cap, and reducing application barriers for Tribal projects and historically underserved producers.[129]

## 2. Strengthen School Meal Nutrition Standards

Regulatory standards for school meals must be strengthened to take into account and minimize the full scope of the health risks documented in this report. To successfully implement these stronger standards, School Food Authorities will require the financial and technical assistance resources described above. Improved child nutrition meal patterns should include:

- **Phase out ingredients of concern:** USDA should phase out sodium nitrites and nitrates, sodium phosphates, processed meats, and other ingredients of concern from school meals, starting with USDA's approved processor program. The presence of these—some of which are known and probable carcinogens—in federally subsidized meals for children, whose developing bodies are uniquely vulnerable, is not acceptable. While some school districts (e.g., NYC Public Schools) have already prohibited several ingredients of concern, this action needs to be undertaken across the nation to protect the health of the millions of children who eat school meals.[130]
- **Establish a minimum fiber standard:** Dietary fiber is critical for gut health, immune function, and metabolic regulation, yet remains a nutrient of public health concern, with more than 95 percent of school-aged children failing to meet recommended intake levels.[131] Just as child nutrition meal patterns include weekly limits for saturated fat and sodium, they should include a weekly minimum standard for fiber, ideally from whole, minimally processed plant foods.
- **Require a plant protein subgroup in the protein (M/MA) category:** While plant-based proteins are already creditable within the M/MA category, there is currently no structural mechanism to ensure they are offered with regularity. As a result—and as demonstrated by our research—school menus remain heavily dominated by animal-based proteins, limiting dietary diversity and contributing to persistently low fiber intake. Just as vegetable subgroups were established to ensure students are exposed to a variety of nutrient-dense foods, a plant protein subgroup would operationalize longstanding Dietary Guidelines for Americans recommendations to diversify protein intake. Establishing a minimum weekly requirement for plant-based protein offerings—such as beans, lentils, peas, and soy foods—would help increase fiber consumption, improve nutritional quality, and ensure these foods are meaningfully incorporated into school meals nationwide, while maintaining flexibility for local menu planning.
- **Strengthen limits on sodium, added sugars, saturated fat, and refined grains:** USDA should maintain and strengthen its limits on sodium, added sugars, saturated fat, and refined grains in school meals over time to better align with nutrition science and recommendations from public health and medical associations.

## 3. Reform USDA Commodity Entitlement

USDA's own commodity procurement is the most direct point of leverage to improve sourcing quality for animal products as well as to diversify plant-based protein foods served in schools. Recommendations include:

- **Reform standards for USDA-approved processors to exclude ingredients of concern:** Products diverted through the USDA commodity entitlement program for further processing should be subject to standards that prohibit the inclusion of sodium nitrites and nitrates, sodium phosphates, and other ingredients of concern. USDA should revise the approved processor program requirements to ensure that our nation's children are not exposed to harmful ingredients, several of which are known carcinogens.
- **Establish standards for USDA commodity procurement to exclude animal products with synthetic hormones and produced with routine antibiotics:** USDA should require that animal products procured directly through the USDA commodity entitlement program are not from supply chains where animals were given routine antibiotics or growth-promoting drugs like ractopamine.
- **Set targets for third-party certified, higher quality animal products:** USDA should establish targets for the procurement of animal products carrying third-party certifications for public health, humane treatment of animals, and environmental sustainability, such as USDA Organic, Regenerative Organic Certified, American Grassfed Certified, or Certified Humane.[132,133] Third-party certification provides one of the only available mechanisms for verifying that animal products served to children were raised without growth hormones, beta agonists, or routine antibiotics and under conditions less likely to generate the exposures described in this report.
- **Expand whole, minimally processed plant-based options in the USDA commodity procurement:** USDA should add whole, minimally processed plant-based ingredients like lentils and tofu to its commodity offerings and encourage approved processors to offer a greater variety of plant-based and plant-forward offerings.
- **Enable school districts to spend USDA commodity entitlement funds on local foods ("Local Food Purchase Option"):** Congress should create a pathway for school districts to use their USDA commodity entitlement dollars to purchase local, minimally processed foods. Districts could direct a portion of their entitlement toward approved local vendors, cooperatives, or food hubs, creating an additional pathway for entitlement spending beyond USDA Foods and DoD Fresh. This would increase flexibility, support regional food economies, and improve access to fresher, higher-quality ingredients at no additional cost to taxpayers.

Organic chicken raised without routine antibiotics being prepared for students at Azusa Unified School District. Organic and other higher quality proteins are not available in the USDA Foods Program.

## School District Recommendations

Friends of the Earth and Chef Ann Foundation recognize that school districts operate within significant financial, operational, and regulatory constraints that make it challenging to transition away from the harmful ingredients, contaminants, and products highlighted in this report—making policy change essential. At the same time, we have seen strong leadership from school districts across the country that are phasing out ingredients of concern, embracing more diversified, plant-forward menus, and expanding scratch cooking with high-quality, minimally processed ingredients.

Moving the needle at scale will require sustained investment in kitchen infrastructure and school food staff, alongside federal and state policy change, but many schools across the nation are already moving toward plant-based and scratch-cooked lunches. A companion resource to this report, *Building a Better Tray*, profiles entrées from school districts spanning urban, suburban, and rural settings from Alaska to Virginia, with enrollments from under 150 to more than 16,000. These school districts have already incorporated scratch-cooked meals into their lunch menu rotations, utilizing whole, high-quality ingredients in dishes students already enjoy, combining federal entitlement dollars with state infrastructure grants and regional supplier relationships to facilitate purchasing, and drawing on partners for technical assistance. Together, they show that better school food is not a pipe dream: it is already being served on lunch trays to millions of children across the country.

*Building a Better Tray* also outlines practical, actionable steps that school districts can take within existing constraints to improve the nutritional quality, safety, and sustainability of school meals, including expanding plant-based and organic offerings, beginning the transition to scratch cooking, and strategically leveraging commodity entitlement.

Bombay Beans and Potatoes from Ithaca City School District is one of the recipes featured in *Building a Better Tray*. Photo Credit: Coalition for Healthy School Food

# VII. CONCLUSION

School meals are one of the most powerful public health interventions in the United States, reaching nearly 30 million children every day and shaping lifelong dietary habits. Over the past fifteen years, federal standards have meaningfully improved the nutritional profile of these meals. Yet, as this report demonstrates, the foods most commonly served in schools remain dominated by processed, meat- and cheese-heavy products that likely expose children to a combination of harmful additives, undisclosed contaminants, and dietary patterns associated with increased risk of chronic disease.

This is not the result of a single failure, but of a system designed to deliver meals at low cost and high volume within significant financial, operational, and regulatory constraints. Low reimbursement rates, outdated kitchen infrastructure, and procurement systems designed to utilize and support industrial commodity processing have made it difficult for many school districts to consistently serve fresh, minimally processed, and diverse foods. At the same time, the science is clear: diets higher in plant-based foods and lower in processed and red meats are associated with better health outcomes, including reduced risk of chronic disease and premature death.

Encouragingly, change is already underway. School districts across the country are demonstrating that it is possible to serve meals centered on whole, high-quality ingredients, expand plant-based offerings, and reduce reliance on ultra-processed foods.

These efforts show that improving school meals is not only necessary but achievable. However, scaling these successes will require a coordinated approach that pairs district-level leadership with stronger federal and state policy support, including significantly increased funding.

The recommendations outlined in this report provide a roadmap for that change: investing in scratch cooking capacity and sourcing of high quality ingredients; strengthening nutrition standards to address ingredients of concern and ensure balanced menus with diverse protein sources; reforming USDA commodity procurement to prioritize clean, minimally processed, and locally sourced foods; and expanding plant-based and higher quality animal protein options to improve nutrition, reduce exposure to harmful contaminants, and align meals with modern dietary guidance. Together, these strategies can shift school meals away from a system reliant on industrially produced foods toward one that prioritizes public health.

At a moment of growing national attention to food quality and child health, there is a clear opportunity to improve school meals. Doing so will not only reduce children's exposure to harmful ingredients and contaminants but also support healthier eating patterns and a healthier food system. The food we serve in schools should reflect our highest standards for children's health. With the right investments and policy changes, it can.

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Friends of the Earth

### About Friends of the Earth

Founded in 1969, Friends of the Earth fights for a more healthy and just world. Friends of the Earth's Climate-Friendly School Food Program supports school districts to expand healthy, organic, plant-forward meals through menu technical assistance, policy advocacy, resources, and peer learning opportunities. Learn more.

CHEF ANN FOUNDATION

### About Chef Ann Foundation

The Chef Ann Foundation gets schools cooking. We help schools replace ultraprocessed foods with fresh, healthy, and delicious scratch-cooked meals that nourish kids and protect the planet. Since 2009, our programs have reached more than 19,000 schools in all 50 states, bringing better meals to 5.9 million kids. Join us.

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