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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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.

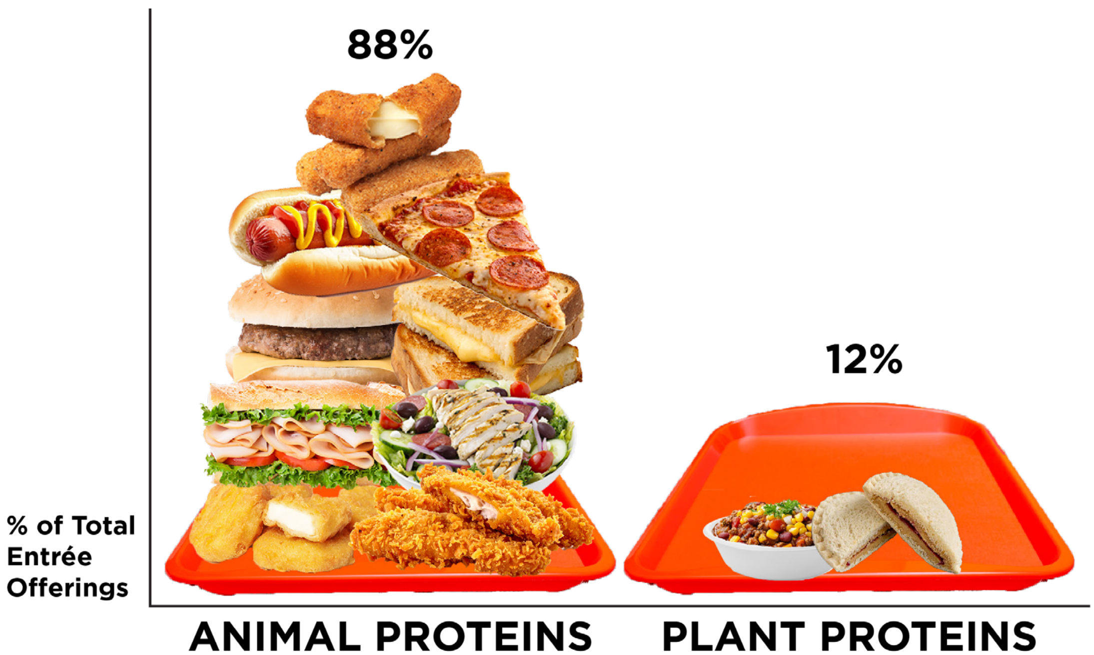
To better understand what's served in cafeterias across the nation—and the associated health implications—we reviewed school lunch menus from a sample of 45 K-12 public school districts representing more than 10,000 identifiable entrées. We identified the most frequently served entrées, characterized 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 (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

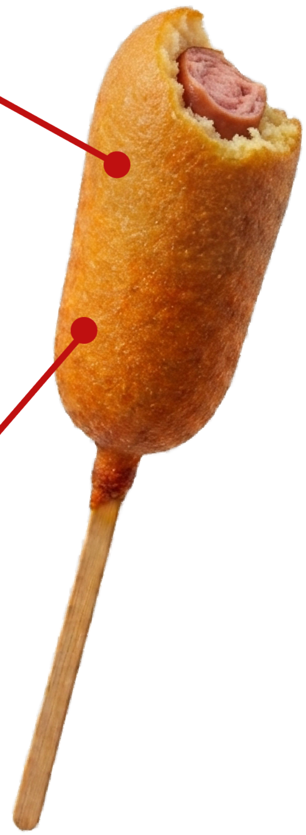
Antibiotic Residues
Routine antibiotic use in poultry contributes to antibiotic resistance—one of the CDC's top public health threats.

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 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.

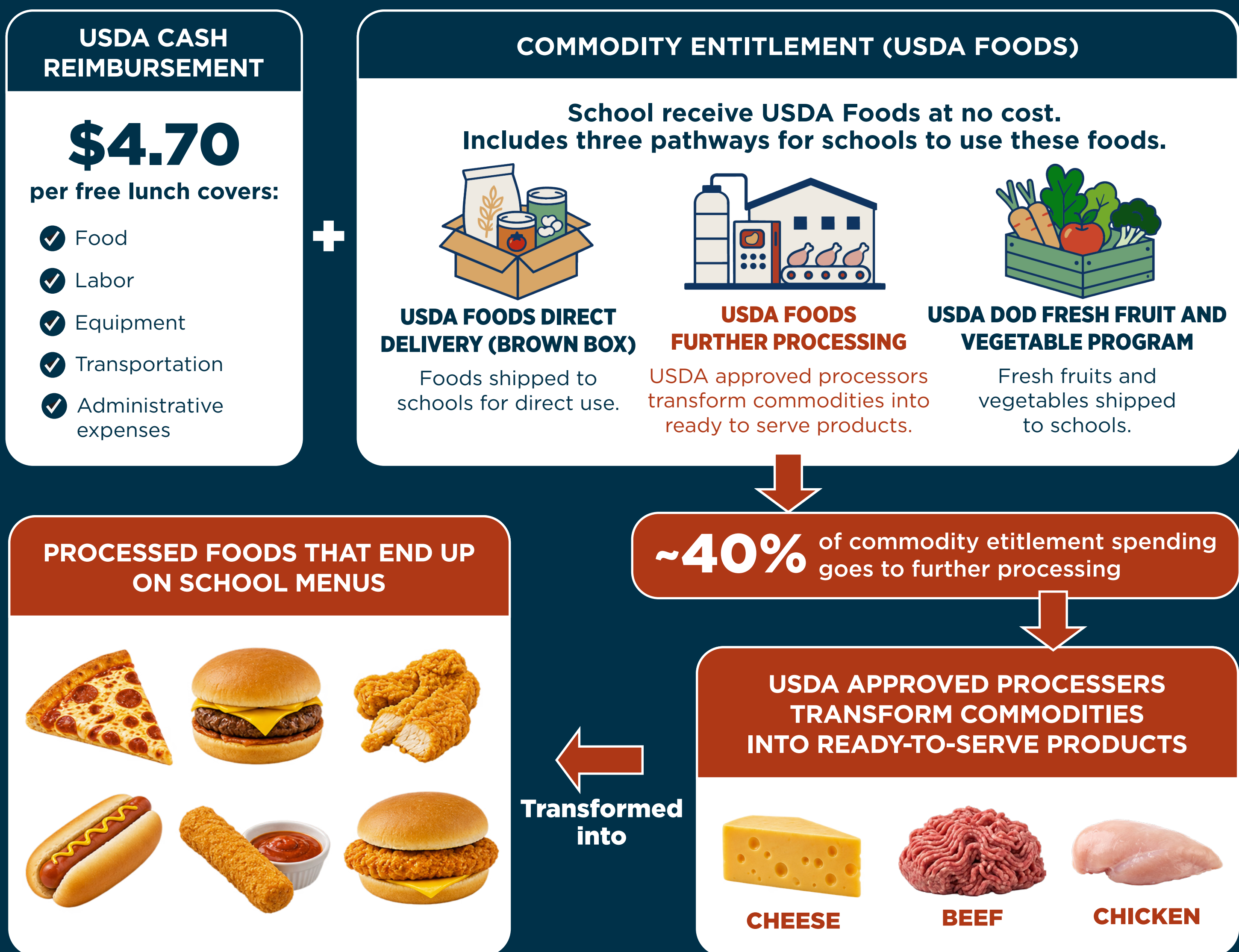
By subsidizing the procurement of processed meat and dairy products from a handful of suppliers, the USDA commodity entitlement program steers schools toward industrially-produced, low-cost animal products rather than supporting the purchase of diverse, minimally processed proteins. Friends of the Earth's 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.



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

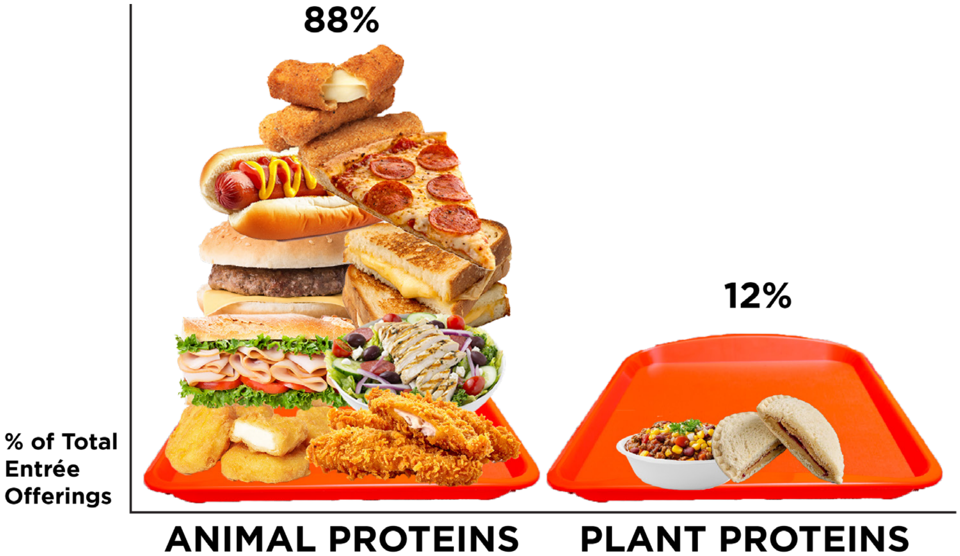
Findings from the Menu Analysis

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.

Monday

Chicken Nuggets

Tuesday

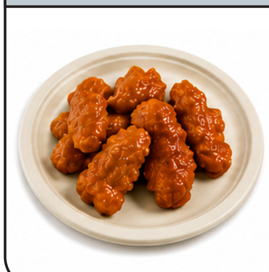
Popcorn Chicken

Wednesday

Crispy Chicken Sandwich

Thursday

Boneless Wings



Friday

Chicken Tenders

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

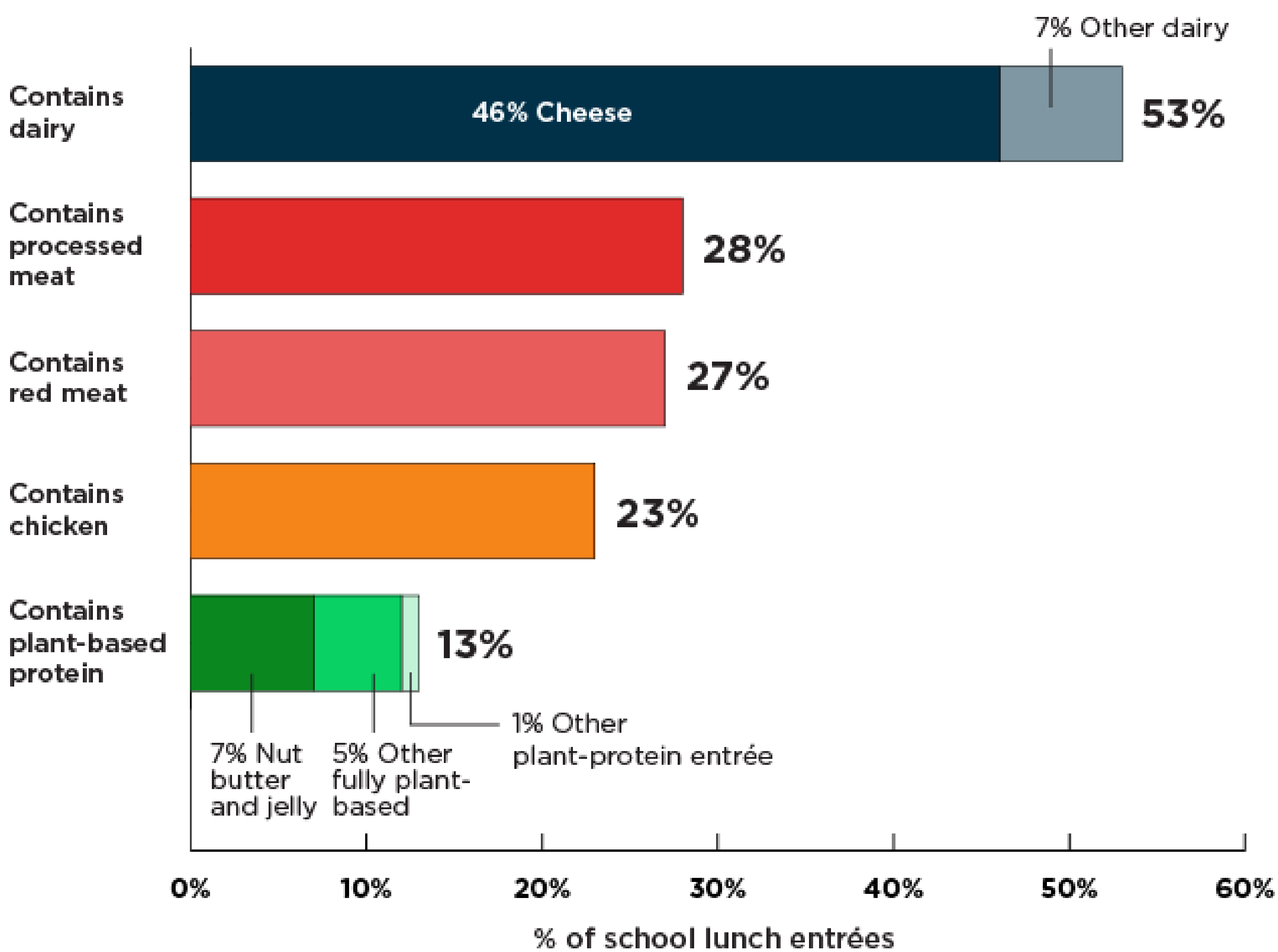
Rank	Entrée Type	Number of Entreés (n=10,226)	% of Total Entreés Served
1	Breaded chicken products (e.g., chicken nuggets or tenders)	1063	10.4%
2	Deli meat sandwich or wrap (e.g., turkey or ham)	1061	10.4%
3	Cheese pizza	885	8.7%
4	Hot cheese entrée (e.g., grilled cheese, mozzarella sticks)	809	7.9%
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.

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

NO_2 **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.

HM **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

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 • High in saturated fat, sodium, and added sugar • Low in fiber • Heat and serve preparation • Sourced from industrial supply chains	• Greater use of plant proteins • Lower saturated fat, sodium, and added sugar; higher fiber • Speed scratch preparation • Some higher quality ingredient sourcing	• No processed meats • Plant-rich proteins • Fiber-rich • Low in saturated fat, sodium, and added sugar • Scratch cooked • 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.

Appendix A: Health Risks of Industrially Produced and Processed Animal Proteins in School Meals

A. Disclosed Ingredients, Nutrients, and Food Categories of Concern

Sodium nitrites and nitrates are used as curing and preservative agents in processed meats, including deli meats, pepperoni, and hot dogs, all of which are among the most frequently served school lunch entrées. Nitrates added to processed meats slowly break down into nitrites.[134] When consumed, nitrites can form molecules called nitrosamines, which are highly carcinogenic.[135] The World Health Organization's International Agency for Research on Cancer (IARC) has classified nitrates and nitrites as a Group 2A carcinogen (likely to cause cancer).[136] In recent decades, manufacturers have begun to replace synthetic nitrates and nitrites with plant-derived, non-synthetic nitrites, most frequently cultured celery extract because of celery's high nitrate content.[137] However, plant-derived nitrates and nitrites are bioidentical to synthetic versions, resulting in the same risks.[138] Federal school meal standards do not prohibit or limit nitrates or nitrites.

Sodium and potassium phosphates are used in processed chicken products, re-formed beef patties, processed cheese, and deli meats to improve moisture retention, texture, and shelf life. Unlike naturally occurring phosphorus in whole foods, about half of which is absorbed by the body, phosphate as a food additive is completely absorbed.[139] Chronic high phosphate intake has been linked to impaired kidney function, hardening of blood vessels, calcification, and an increased risk of death from cardiovascular disease.[140] Federal school meal standards do not prohibit or limit sodium or potassium phosphates.

Sodium and added sugar are nutrients that, when consumed in excess, are known to increase the risk of hypertension, cardiovascular disease, diabetes, overweight, and inflammation.[141,142,143] The level of these ingredients is often high in processed meats and ultra-processed foods. Current child nutrition standards do restrict sodium and added sugar, but regulations could be strengthened to better align with nutrition science.[144,145]

Saturated fat is another nutrient that, when consumed in excess and particularly from processed food sources, increases the risk of cardiovascular disease, diabetes, overweight, inflammation, and certain cancers.[146,147,148] Saturated fat is found in nearly all animal products and in just a small percentage of plant foods, particularly palm and coconut oils. Although school meals must limit saturated fat to 10% of calories, the Whole Milk for Healthy Kids Act of 2025 exempts milk, including whole and 2% milk, from counting toward this saturated fat limit.[149]

Red meat itself is classified as a Group 2A carcinogen by IARC (likely to cause cancers in humans).[150] Numerous studies have shown that diets high in red meat are associated with an increased risk of colorectal, breast, pancreatic, and prostate cancers.[151,152,153] Beyond cancer, higher red meat consumption has also been associated with increased risk of cardiovascular disease and type 2 diabetes.[154]

Processed meats are defined by the IARC as "any meat that has been transformed through one or several of the following processes: salting, curing, fermentation, smoking, or other processes to enhance flavor or improve preservation."[155] There is a vast variety of processed meat products, including hot dogs, deli meats, cured meats, sausage, and pepperoni, as well as fresh processed meat products such as chicken nuggets and beef patties that are not 100% ground beef. Processed meats are classified by IARC as a Group 1 carcinogen (carcinogenic to humans) based on conclusive evidence that they cause colorectal cancer, with every daily 50 gram (1.75 oz) serving of processed meat increasing colorectal cancer risk by 18%.[156,157] While USDA's 2024 Child Nutrition Rule includes a voluntary recommendation for schools to limit servings of processed meats, there is no federal standard prohibiting or restricting processed meat.

Mechanically separated meat is produced by using high pressure to remove muscle remnants from animal bones to create a paste for products such as chicken nuggets, hot dogs, and corn dogs.[158] This high pressure significantly degrades muscle fiber and leads to a release of nutrients, which creates favorable conditions for harmful microbial growth.[159] These types of products cannot be created by home- or scratch-cooking and have a significantly different nutritional profile from whole meat.

B. Contaminants not Disclosed on Ingredient Labels

Contaminants Specific to Animal Products

Hormones and growth promoters: Growth-promoting steroid hormones—including estradiol, progesterone, testosterone, zeranol, trenbolone acetate, and melengestrol acetate—are widely used in conventional U.S. beef production to accelerate growth and improve feed efficiency. These compounds are administered through implants and can remain active for several months before slaughter.[160] Their use for growth promotion is prohibited in the European Union and many other countries around the world but remains approved by the U.S. Food and Drug Administration.[161] While U.S. regulators consider low residue levels safe, the scientific literature and the European Union's precautionary risk assessments have raised concerns that chronic exposure to exogenous hormones may contribute to endocrine disruption and could increase the risk of hormone-sensitive cancers, particularly during vulnerable stages of development such as childhood. [162,163,164]

Beta-adrenergic receptor agonists (or **beta agonists**) are synthetic compounds that are widely used and added to animal feed to increase lean muscle mass in beef, pork, and turkey produced in the United States.[165] Three beta agonists are FDA-approved for animal use, including ractopamine, which is banned or restricted in nearly 160 countries because of concerns about potential human health effects, including possible cardiovascular impacts.[166,167,168,169] The FDA permits ractopamine residues up to 50 parts per billion (ppb) in pork and 30 ppb in beef—5 and 3 times higher than the International Codex Alimentarius standard of 10 ppb for both pork and beef, respectively.[170,171] The widespread international restrictions reflect ongoing scientific and regulatory disagreement about the safety of chronic dietary exposure to ractopamine residues, particularly for vulnerable populations.

Overuse of antibiotics: Antibiotics are used extensively in industrial livestock production to treat, control, and prevent disease, especially in concentrated animal feeding operations.[172] Sales of antibiotics for cattle and swine have grown significantly over the past decade, with a 28% increase from 2017 to 2024, including a 16% increase from 2023 to 2024 when meat production increased only by 1%.[173] The use of antibiotics and antimicrobials in livestock is recognized by the World Health Organization as a major driver of antimicrobial resistance, one of the world's urgent global public health threats.[174,175,176]

While antibiotic residues have been found in U.S. meat, dairy, and poultry products mostly at levels below FDA tolerance limits, public health concerns stem primarily from the use of antimicrobials in livestock production, which contributes to the development and spread of antibiotic-resistant bacteria. These resistant bacteria can reach people through food, environmental pathways (including water and soil), and direct contact with animals.[177] Antibiotic-resistant infections are associated with increased illness severity, higher health care costs, and more than 35,000 deaths annually in the United States.[178]

Dioxins: Dioxins are among the most toxic persistent organic pollutants found in animal products. They are formed as byproducts of combustion and certain industrial processes, such as waste incineration and chemical manufacturing, and enter the food chain through environmental deposition and contamination of animal feed.[179] Because they are highly persistent organic pollutants, dioxins do not break down easily in the environment or in human and animal bodies, where they accumulate in fatty tissues. According to the U.S. Environmental Protection agency (EPA), more than 90% of human exposure to dioxins occurs through food, primarily dairy and meat products, fish, and shellfish.[180] These toxic compounds are associated with an increased risk of cancer, immune dysfunction, and adverse reproductive developmental problems.[181,182]

Other Contaminants

Synthetic pesticides: Residues of synthetic pesticides can be detected in many animal products.[183] Residues of pesticides are associated with an increased risk of various cancers, endocrine disruption, neurodevelopmental disorders, and other serious health concerns.[184,185] Some pesticides, particularly banned classes like organochlorines (e.g., DDT), still persist in the environment and continue to accumulate in animal tissues.[186,187,188] While most pesticides used in the U.S. today do not strongly bioaccumulate, there are some exceptions, including certain fat-soluble pyrethroids like bifenthrin. A 2024 study conducted in China found that animal products contribute significantly to human pesticide exposure, with livestock and poultry accounting for 39% and whole milk and dairy products accounting for 22% of all exposures.[189] Glyphosate is the most widely used herbicide in the United States and is commonly applied to crops used in bread and grain products that are often served with meat and dairy entrées (e.g. pizza, grilled cheese, chicken nuggets).[190] Glyphosate has been linked to cancer, endocrine disruption, reproductive harm, and impacts on the gut microbiome.[191,192] It has been banned in Mexico, Germany, France, Austria, Malawi, Oman, Saudi Arabia, Kuwait, United Arab Emirates, Bermuda, Thailand, Vietnam, Bahrain, Qatar, and St Vincent and the Grenadines.[193]

Heavy metals: Heavy metals such as lead, cadmium, mercury, and arsenic are toxic elements that can accumulate in the body over time and are associated with neurological damage, developmental delays, kidney dysfunction, and increased cancer risk.[194],[195] Children are particularly vulnerable to these effects, and there is no safe blood lead level for children.[196] These metals enter the food supply through contaminated soil, water, and animal feed, and can accumulate in animal tissues, particularly in organ meats and fatty products.[197]

Per- and polyfluoroalkyl substances (PFAS): Known as "forever chemicals" because they break down very slowly, PFAS are persistent environmental contaminants that can enter the food supply through contaminated soil, water, animal feed, packaging, and biosolids applied to agricultural land. PFAS have been detected in a variety of animal-derived foods including beef, pork, poultry, milk, eggs, and seafood, with consumption of these animal products being the primary pathway for human exposure.[198,199] Recent research has found that higher consumption of processed meats is associated with higher concentrations of per- and polyfluoroalkyl substances (PFAS) in human blood.[200] Because PFAS persist in the environment and can accumulate in living organisms, they have become a growing concern for food safety and public health. PFAS exposure is associated with numerous health harms, including hormone disruption, reduced immune function, liver toxicity, elevated cholesterol, reproductive harm, increased risk of certain cancers, and developmental delays and disorders in children.[201,202,203]

In addition to these risks specifically associated with animal proteins, pesticide residues, heavy metals, foodborne pathogens, and PFAS can be present in all foods. However, animal-based foods typically pose a higher risk of exposure, particularly for compounds like PFAS that accumulate in animal and human tissues.[204,205] These compounds can persist in the environment and, while present in plants, accumulate over time in the fatty tissues of animals, resulting in higher concentrations in meat and dairy products.[206]

Microbial hazards: *Salmonella*, *Listeria*, and *E. Coli* are among the most common and consequential bacterial foodborne pathogens and contributors to foodborne illness in the U.S.[207] Although most foodborne illnesses due to these pathogens are a result of consuming contaminated produce, the most severe and fatal of these infections are associated with contaminated meat and poultry.[208] Much of the meat and poultry in America—and subsequently served in schools—comes from large-scale industrial operations, where high animal density can facilitate the rapid spread of these pathogens.[209]

Salmonella is one of the leading causes of hospitalization and death from foodborne illness in the U.S. and is frequently detected in poultry processing facilities.[210] USDA performance testing has identified recurring instances over multiple years of *Salmonella* exceedances in poultry facilities, including some which supply school meal programs.[211] While the USDA's FSIS sets performance standards and conducts oversight, contaminated products may still enter the food supply, including schools, prior to detection.[212] Children are particularly vulnerable to severe outcomes from *Salmonella* infection, including hospitalization.[213]

Listeria monocytogenes is a pathogenic bacteria that can survive refrigeration and thrives in unsanitary food production environments.[214] *Listeria* is one of the leading causes of death from foodborne illness in the U.S.[215] Despite USDA's zero-tolerance policy for *Listeria* in ready-to-eat chicken products, which includes some items purchased for school meals, in October 2024, BrucePac—a leading precooked meat producer in Oklahoma—recalled nearly 12 million pounds of ready-to-eat meat and poultry products after USDA testing detected *Listeria* in chicken distributed across the nation, including to schools in 16 states and the District of Columbia.[216,217,218] The recall was categorized as Class I, which is USDA's highest risk level and for situations in which "there is a reasonable probability that the use of the product will cause serious, adverse health consequences or death."

Pathogenic E. coli O157:H7 (commonly referred to as *E. Coli*), most commonly found in beef products, produces Shiga toxin, which can cause severe gastrointestinal illness, kidney failure and death.[219] Because USDA maintains a zero-tolerance policy for E. Coli in beef, school recalls are rare: The most recent one was in 2008, in which nearly 144 million pounds of beef products—37 million pounds of which were purchased for federal food and nutrition programs—were recalled.[220]

Although foodborne illness from *Salmonella, Listeria,* and *E. coli* remain rare in schools, the scale and structure of industrial meat production and processing continue to pose ongoing contamination risks.

Foreign matter contamination often occurs as a result of equipment failures in processing facilities, leading to pieces of plastic, glass, metal, rubber, or wood in food products. When such contamination is detected, all products suspected to be contaminated must be recalled. FSIS issued 32 such recalls in 2025, more than half of which were classified as Class I (high or medium risk of serious, adverse health consequences or death if the product is used).[221]

Testing Results of Contaminants in the Meat Supply

USDA's Food Safety and Inspection Service (FSIS) administers the National Residue Program (NRP) in consultation with FDA, EPA and other federal agencies. Under the program, FSIS tests meat, poultry, catfish, and egg products for veterinary drug residues, pesticide residues, and environmental contaminants to determine compliance with residue tolerances and action levels established by FDA and EPA.[222,223,224,225,226] Growth hormones, which are approved for routine use in U.S. beef cattle, but banned in Europe and many other countries, are not part of NRP's standard residue testing.[227,228,229] Moreover, the program's testing is not specific to products purchased for school meals and other federal nutrition assistance programs. Animal products purchased for the National School Lunch Program are routinely tested for microbial pathogens but are not comprehensively screened for the broad range of environmental contaminants discussed in this report.

Routine surveillance sampling is conducted at slaughter facilities, and additional testing is conducted at such facilities suspected to have animals with violative residue levels. However, this sampling and testing is inadequate for the nearly 10 billion animals raised and slaughtered for food in the U.S. each year. Although the NRP provides important surveillance, it relies on risk-based sampling rather than comprehensive testing. In FY 2025, FSIS analyzed 6,205 routine surveillance samples and 99,056 targeted samples for chemical contaminants, a small fraction of meat produced in the U.S.[230]

The following section presents findings from recent FSIS testing as well as the results of other academic and third-party analyses of undisclosed contaminants in meat.

Pesticides: Recent independent laboratory testing of 43 school lunch samples from 18 public schools across 15 states found that 74% contained at least one of 29 different harmful pesticides, including thiabendazole (an immune suppressant found in 28% of samples) and piperonyl butoxide, which was detected in 41% of samples, all of which contained animal products. 93% of the samples contained glyphosate, with the highest levels found in items containing dairy, beef, and pork. Glyphosate is classified by the IARC as a Class 2A (probable) carcinogen.[231,232]

The FY 2025 NRP surveillance testing analyzed 6,205 samples of domestically produced meat, poultry, and catfish products and identified 21 samples in which residues exceeded applicable regulatory tolerances and resulted in a violation.[233] Of these, 11 were pesticide violations: eight for piperonyl butoxide (PBO), a pesticide synergist associated with developmental toxicity and adverse neurodevelopmental effects; two for atrazine; and one for propiconazole. Half of the PBO violations were detected in market swine pork, while the atrazine and propiconazole violations were detected in catfish, which is not routinely served in school meals. The remaining 10 violations were for veterinary drugs and antibiotics used routinely in industrial livestock production, including flunixin (2), sulfamethazine (2), and one violation each for amoxicillin, ciprofloxacin, enrofloxacin, diclofenac, fenbendazole, and sulfadimethoxine. FSIS surveillance also identified 50 non-violative positive samples (i.e., residues detected below legal tolerances), which do not trigger regulatory action but still represent dietary exposures to residues of veterinary drugs and pesticides.

Although DDT was banned in the early 1970s in the United States and many countries around the world, DDT residues are still measurable in foods like butter and meat as well as in human breast milk.[234,235,236] While most pesticides used in the U.S. today do not strongly bioaccumulate, there are some exceptions, including certain fat-soluble pyrethroids like bifenthrin, a potent neurotoxic insecticide. USDA Pesticide Data Program testing of 531 butter samples in 2022 found that more than 60% contained at least one detectable pesticide residue, and nearly 42% contained two or more different pesticide residues. The most frequently detected compounds included novaluron (36%), p,p'-DDE (35%)—the persistent breakdown product of DDT—and the pyrethroid insecticides bifenthrin (27%) and cyhalothrin (26%), along with permethrin and several other pesticides.[237] A 2021 USDA Pesticide Data Program (PDP) analysis also found bifenthrin—a pesticide classified as Restricted Use Pesticide by the EPA in 1985 and banned in the EU in 2019—in 37% of 177 U.S. butter samples tested.[238,239] Overall, the 2021 PDP analysis detected 15 different residues for 14 distinct pesticides in the butter samples. The most prevalent pesticides were DDE (a metabolite of DDT, which was banned in 1972), novaluron, permethrin, bifenthrin, piperonyl butoxide, and cyhalothrin. Also present in less than 5% of the butter samples were ametoctradin (V-1), buprofezin, difenoconazole, diphenylamine (DPA), fenpyroximate, flubendiamide, methoxyfenozide, pyraclostrobin, and thiabendazole.[240]

Veterinary Drugs: Targeted FY 2025 USDA testing for chemical residues under the NRP identified 1,723 positive samples, 275 of which were at violative levels of residues.[241,242] Among dairy cows, 246 samples contained violative chemical residues—more than 80% of which were antibiotic residues, primarily ampicillin and metabolites of ceftiofur. Across all species, the majority of positive but non-violative levels were for veterinary drug residues, particularly antibiotics, anti-parasitics, and anti-inflammatory drugs. In a nationwide retail meat surveillance study, researchers found bacteria resistant to one or more antibiotics on 69% of pork chop samples sold in U.S. grocery stores.[243]

USDA testing also detected ractopamine, a beta agonist growth-promoting drug, administered as a feed additive, in 18 of the samples from swine and beef cattle. All 18 detections were below the U.S. regulatory tolerance. A recent study by USDA researchers that tested beef sold at retail outlets found that 13 of the 53 beef samples tested positive for ractopamine at levels well below FDA maximum residue limits (MRLs).[244] Trenbolone-17β and estradiol were also found in beef but remained within MRLs. Although all these residues were below U.S. tolerance levels, ractopamine, trenbolone-17β, and estradiol are prohibited or subject to strict restrictions in more than 160 countries, including all European Union member states, reflecting substantial international differences in residue standards and food safety policies. Additionally, independent laboratory testing of 43 school lunch samples found four different veterinary drug residues across nine of 11 tested samples. These included nicarbazine, an aviary contraceptive drug used in poultry production, which was detected in four samples; thiabendazole and clopidol, anti-parasitic agents each found in one sample; and the antibiotic sulfamethazine, found in one sample.[245]

Heavy Metals: Heavy metals of concern were detected infrequently in USDA's FY 2025 surveillance testing. Among approximately 1,050 metal analyses, FSIS detected cadmium in 14 samples, arsenic in five samples, and lead in four samples. Between 2017 and 2022, NRP tested nearly 14,000 samples from slaughterhouses and processing facilities; lead was detected in 0.4% of beef and poultry samples and in 0.3% of pork samples. Additionally, cadmium was detected in 0.2% of samples.[246] Testing of 2,902 meat, poultry, and catfish samples collected at retail stores through the FDA's Federal Emergency Response Network (FERN) between 2018 and 2022 detected lead in approximately 1.5% of samples and cadmium in about 8%.[247] While most USDA and FDA detections occurred at relatively low concentrations below violative levels, no level of lead exposure is considered safe for children. Additionally, cadmium is a bioaccumulative toxic metal associated with kidney, skeletal, and developmental effects following chronic exposure.[248,249] Additionally, independent laboratory testing of 43 school lunch samples collected in 15 states found that 100% contained at least one heavy metal (e.g., arsenic, cadmium, lead, and mercury), with many levels exceeding federal benchmarks, including EPA drinking water standards and FDA guidance levels. Typical foods tested included pizza, beef taco, cheeseburger, chicken nuggets, and a chicken sandwich.[250]

PFAS: Since 2019, FDA has conducted testing for PFAS in food samples as part of its Total Diet Study, which tests food as prepared for consumption (e.g., peeled oranges, cooked meat) for various contaminants and nutrients.[251] Because the sample size for each individual food is limited, testing results cannot be generalized to the broader food supply, much less to school foods, but they can help identify foods that may be more likely to be contaminated with PFAS. The FDA's 2024 study detected trace amounts of one or more PFAS analytes in 39 (7%) of 542 samples, including various seafood, beef, chicken, pepperoni, milk and cream, and kale.[252] More recently, a 2025 USDA Agricultural Research Service study analyzing 86 food samples from grocery stores in the Philadelphia area found PFAS in 25% of the 20 beef samples, although at levels below the threshold set by the European Food Safety Authority; no PFAS were detected in the 20 samples each of eggs, chicken, and pork.[253] However, even low-level PFAS contamination is a concern because many PFAS persist in the environment and can accumulate in the human body over time with repeated exposure.[254]

Dioxins*:* Every five years, USDA's FSIS, in partnership with EPA and HHS, tests the domestic meat and poultry supply to assess dioxin levels and to assess trends over time.[255] The USDA's FY 2018–2019 survey measured dioxins and dioxin-like PCBs in approximately 600 samples of beef (steers and dairy cows), pork, chicken, and turkey and found relatively low levels across all meat types; the highest concentrations were detected in beef, where levels measured 26% higher than in the 2012–2013 survey.[256] The most recent survey, conducted in 2023-2024, shows that dioxin levels in beef have declined substantially, demonstrating meaningful progress. Of the 145 beef and 143 pork samples tested for 20 different dioxins, the toxic equivalency levels ranged from non-detectable to well below EPA's oral reference doses, with levels significantly lower than in the prior survey and continually declining since its inception 30 years ago.[257]

The USDA Agricultural Research Service dioxin exposure assessment based on the USDA's 2023–2024 meat monitoring data estimated that dioxin exposure from each individual meat category was below the EPA Reference Dose (0.7 pg TEQ/kg body weight/day) when evaluated separately. However, it is important to note that the European Food Safety Authority (EFSA)'s updated 2026 risk assessment, based on newer evidence of developmental and reproductive effects, has established a substantially lower tolerable intake of 0.6 pg TEQ/kg body weight/week (0.086 pg/kg/day)—approximately eight times lower than the EPA reference dose.[258]

Furthermore, EFSA concluded that a significant proportion of the population may exceed its own health-based guidance value despite relatively low contamination levels in individual foods and that current dietary exposure continues to pose a health concern, particularly for fetal and early-life development. In a survey of 284 commercial cheese samples conducted by the Canadian Food Inspection Agency, 100% of samples contained detectable levels of one or more dioxins or dioxin-like compounds.[259]

Children may be especially vulnerable because they consume more food relative to their body weight and are more sensitive to developmental effects. Although dioxin levels in meat have declined substantially over time, even low dietary concentrations matter because dioxins remain in body fat for 7-11 years, and exposure occurs continuously over a lifetime.[260,261,262,263] Because animal-derived foods—including beef, dairy, eggs and poultry–account for 90% of dioxin exposure—and are featured so heavily on school food menus, children are routinely exposed to multiple dietary sources of dioxin.

Risks of chronic and cumulative exposure and impact on child development

Although most of the contaminant residues detected in both USDA and independent studies were at levels far below EPA tolerances, it is well established that cumulative exposure to these contaminants—especially during children's critical years of development and growth—increases the risk of numerous health harms. Numerous studies have shown that repeated and prolonged exposure to many of these contaminants increase the risk of cancers, neurodegenerative disorders, immune system dysfunction, respiratory complications, endocrine and hormonal disruption, reproductive system disorders and disruptions, and birth defects.[264]

Unfortunately, current regulatory frameworks fail to address the cumulative impact of these toxic chemicals and how these multiple

chemical stressors might interact to uniquely harm developing bodies—a key consideration highlighted in the 2025 MAHA Commission Report.[265] It is also notable that European tolerances tend to be much lower or zero for a number of these contaminants.

These exposures carry far greater risks for children. Children's bodies and organs are still developing, so contaminants can affect children differently than adults, including by disrupting typical development of signaling pathways. Children are also less able to remove and excrete toxins than adults' fully mature systems, which leads to accumulation of these toxins in their developing bodies.[266] Additionally, children's brains and reproductive systems are immature and susceptible to the effects of exogenous toxins and hormones.[267,268] Children also eat more food relative to their body weight than adults, resulting in a higher dose of these toxins and toxic chemicals relative to their weight.[269] Finally, cumulative exposure leads to bioaccumulation of many of these compounds. While harmful for anyone, this is particularly dangerous for children, who are undergoing development. Taken together, these factors create a substantial risk for children and underscore the critical need to minimize children's exposures to these contaminants and toxic chemicals.

Through daily dietary intake, all people are routinely exposed to a wide range of pesticides linked to numerous health concerns. However, those harms can be reduced by limiting the consumption of foods treated with pesticides. A recent Friends of the Earth study found that switching to a completely organic diet for just six days reduced pesticides detected in participants' urine by an average of 60%, with some pesticide levels reduced by 95%.[270,271,272] Additionally, recent research has shown that organic diets reduce the risk of multiple health harms, including cancers, diabetes, and fertility outcomes.[273,274,275,276]

Standards for school foods, which make up a substantial portion of many children's diets, are regularly assessed and updated at the federal level to ensure that they reflect the latest nutrition science. However, child nutrition standards do not account for most of the ingredients of concern or contaminants described in this section that are commonly found in the industrially-produced meat and dairy in school meals and are known to be harmful to human health—and especially the health of children. Years of eating school meals during a child's K-12 school career can lead to significant exposure to harmful ingredients and contaminants, representing a serious public health issue—but also an opportunity for change.

Table A1. Effects of pesticide and veterinary drug residues on human health

Target	Pesticides	Veterinary Drug Residues
Nervous system	Neurodegenerative disorders, brain cancer	Neurodegenerative disorders
Endocrine system	Endocrine disruptors, thyroid cancer,	Endocrine disruptors
Cardiovascular system	Coronary and peripheral arteries disease	Tachycardia
Respiratory system	Respiratory complications, lung cancer	Allergies, Asthma
Mammary gland	Breast cancer	NA
Urinary system	Nephrotoxicity	Nephrotoxicity
Gastrointestinal system	Colorectal cancer, gluten intolerance,	Modification in microbiota species,
Musculoskeletal system	Locomotion impairment	Myalgia
Female genital system	Ovarian cancer	NA
Male genital system	Prostate cancer, testicular cancer	Prostate cancer
Blood	Acute myeloid leukemia	Aplastic anemia

Adapted from: Colopi A, Guida E, Cacciotti S, et al. Dietary exposure to pesticide and veterinary drug residues and their effects on human fertility and embryo development: a global overview. Int J Mol Sci. 2024;25(16):9116.

C. Chronic Disease Risks from Frequent Consumption of Animal Products

Decades of research have shown that diets high in foods of animal origin, particularly red and processed meats, are associated with increased risk of numerous chronic diseases. Meta-analyses and large prospective cohort studies show that diets higher in plant foods and lower in animal foods are associated with approximately 10–20% lower risk of all-cause mortality and that replacing animal protein with plant-based protein sources is associated with increased longevity.[277,278]

Among the most well-documented risks associated with high intake of certain animal-based foods are:

- **Cardiovascular disease**: Diets high in red and processed meat in particular are associated with an elevated risk of cardiovascular disease. A meta-analysis of prospective cohort studies found that each additional 50 grams per day of processed meat was associated with a 42% higher risk of incident coronary heart disease.[279] Unprocessed red meat also carries this risk: a prospective cohort study of nearly 30,000 American adults found that eating just two servings per week of unprocessed red meat was associated with a 3–7% higher risk of cardiovascular disease.[280] Additionally, a prospective study of 96,000 people found that diets highest in red meat as well as red and processed meats, as compared to those with no meat, were associated with a 26% and 34% higher risk, respectively, of death from cardiovascular disease.[281]
- **Type 2 diabetes:** Diets high in red and processed meats are associated with an elevated risk of type 2 diabetes.[282] Most recently, a 2023 study that followed 216,000 adults in the U.S. found that those who had the highest red meat intake had a 62% higher risk of type-2 diabetes as compared to those with the lowest intake.[283] Moreover, replacing just one daily serving of red meat with legumes or nuts was associated with a 30% reduction in this risk. This association is well-documented: A meta-analysis of 53 prospective studies found that every daily 100 g serving of red meat was associated with a 17% higher risk of type-2 diabetes, and each 50 g serving of processed meat with a 37% higher risk.[284]

- **Certain cancers:** Beyond the IARC Group 1 and Group 2A classifications for processed and red meat described in Section A, there is a wealth of evidence linking meat consumption to various cancers. Systematic reviews and meta-analyses of prospective studies have shown that high consumption of red meat and processed meat is associated with an increased risk of colorectal and breast cancers.[285,286,287] Additionally, higher intake of saturated fat can contribute to chronic inflammation and weight gain, both of which are known cancer risk factors.[288]
- **Overweight and obesity:** Diets high in animal proteins, particularly red and processed meats, are associated with weight gain and higher BMI, including in children.[289,290] Researchers have found that the same dietary patterns increase markers of inflammation, leading to excess weight gain.[291,292]
- **Gut microbiome disruption:** Recent research has shown that diets high in animal products and low in fiber-rich plant foods are associated with gut dysbiosis, a condition in which bacteria associated with inflammation become more prevalent than beneficial bacteria that regulate immune function, intestinal barrier integrity, and metabolic health.[293,294] These shifts can result in systemic inflammation, which has consequences for immune function, metabolic health, and chronic disease risk.
- **Hormonal and growth signaling disruption:** Animal products, particularly dairy products, contain naturally occurring hormones and bioactive compounds, including insulin-like growth factor 1 (IGF-1).[295] Diets high in animal protein, especially dairy protein are associated with higher circulating levels of insulin-like growth factor 1 (IGF-1), a hormone that plays a central role in regulating cellular growth, proliferation, and development.[296] Elevated IGF-1 levels have been associated with an increased risk of several hormone-sensitive cancers, including breast, prostate, and colorectal cancers.[297,298]
- **Displacement of fiber-rich foods:** Diets high in animal products often are lower in plant-based, fiber-rich foods, which are critical for gut and cardiovascular health and immune function.[299,300] The median dietary fiber intake of U.S. children is approximately 13 g per day, which is about half of the *Dietary Guidelines for Americans*' recommended daily intake.[301] In fact, the *Dietary Guidelines for Americans* identifies fiber as a nutrient of public health concern.[302] Diets rich in animal-based foods—like the school lunch entrées described in this report that are low in dietary fiber—contribute to this deficit.

Fortunately, these harms can 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.[303,304]

Appendix B: Methods and Limitations

Questions and Design

We conducted two complementary analyses designed to answer two specific research questions.

Our first aim of the menu analysis was to identify the entrée types most commonly served in U.S. public schools and quantify the prevalence of processed meat, red meat, plant-based entrées, meat- and cheese-centered entrées, and protein diversity. To this end, we conducted an analysis of school lunch menus from across the nation to characterize the foods most commonly offered to students and to assess patterns in protein offerings.

Second, we sought to assess ingredients of concern, potential undisclosed contaminants, documented food safety concerns, and chronic disease risks associated with the most frequently served entrée categories. Because publicly available school menus do not identify the specific products, manufacturers, or ingredient formulations used by individual school districts, this assessment characterized the nutritional composition and potential health concerns associated with these commonly served entrées. We combined assessments of representative products for the most commonly served lunch entrées with a targeted evidence review to evaluate these risks.

Menu Analysis

Definition of an entrée: Consistent with USDA's definition, we defined an entrée as any food item containing, at minimum, a protein component ("Meat/Meat Alternate") paired with a grain, vegetable, and/or fruit aligned with NSLP meal pattern requirements, or a meat/meat alternate alone with the exception of yogurt, low-fat or reduced fat cheese, nuts, seeds and nut or seed butters, and meat snacks.[305]

Sample selection: School districts were categorized by size using enrollment thresholds aligned with USDA Food and Nutrition Service definitions: small (<2,500 students), medium (2,500–9,999 students), and large (>10,000).[306] The 15 largest U.S. school districts were identified using 2024–2025 enrollment data from the Urban Institute's Education Data Portal. New York City Public Schools was not included because the Urban Institute's database lists its 32 community school districts separately rather than as a single district. An additional 15 small and 15 medium districts were then randomly selected, resulting in a total sample of 45 districts. Within each district, one elementary school, one middle school, and one high school were randomly selected. Lunch menus from November 2025 were downloaded from each school.

Menu Classification: Menus were processed using a custom-built AI-assisted classification tool to extract entrées, assign frequency counts based on how many times it appeared across menus, and classify each item using two complementary classification systems:

1. Product attributes (non-mutually exclusive)

- Contains processed meat
- Contains beef
- Contains chicken
- Contains pork
- Contains turkey
- Contains fish
- Contains cheese
- Contains dairy
- Contains egg
- Contains a plant-based protein (e.g., beans, lentils, chickpeas, soy foods)
- Plant-based (contains no animal products)
- Unknown protein source

2. Entrée category (mutually exclusive)

Category	Examples
Bean and cheese entrée	Burritos, tacos, pupusa, chalupa, bean burger with cheese
Beef and cheese entrée	Burritos, taquitos, beef nachos
Beef burger	Hamburger or cheeseburger
Beef entrées, other	Beef crumbles, salisbury steak
Breaded chicken products	Nuggets, chicken fingers, popcorn chicken, breaded chicken sandwich
Breakfast for lunch	Sausage, pancakes, french toast, cereal, bagels, waffle
Cheese entrée, hot	Grilled cheese, mozzarella sticks, mac and cheese
Chicken entrées, other	Mandarin chicken, teriyaki chicken, grilled chicken
Chicken with cheese entrées	Burritos, tacos
Deli meat sandwich or wrap	Turkey or ham
Egg-based entrée	Egg salad, scrambled eggs
Fish-based entrée	Fish sticks
Hot dogs/corn dogs	–
Hummus entrée and protein packs with hummus	Hummus and string cheese box
Nut butter and jelly sandwich	Sun butter and jelly sandwich, Uncrustable
Pizza with meat	Pepperoni, ham, or sausage pizza
Pizza, cheese	–
Pork and cheese entrées	Tacos with pork and cheese
Pork entrées, other	BBQ pulled pork
Protein pack	String cheese with crackers
Salad with meat	Grilled chicken salad
Salad, vegetarian	Salad with cheese
Turkey entrée, other	Turkey burger
Unknown	Build your own burrito, “Chef’s Special”
Vegan burger or hot sandwich	Veggie burger
Vegan entrée, speciality	Curry bowl with tofu, bean and veggie burrito
Vegan processed chick’n product	Veggie nuggets, BBQ veggie patty
Yogurt-based entrées	Parfait

All AI-generated outputs were manually reviewed and corrected. After resolving systematic classification errors, a validation spot check of 20 randomly selected entrées yielded no errors. After excluding 533 unclassifiable entrées, the final analytical sample comprised 10,226 lunch entrées.

Frequency Analysis: Entrées were ranked according to the total number of times they appeared across all sampled menus. These data were used to identify the most frequently served entrée categories and assess:

- prevalence of processed meat
- prevalence of red meat
- prevalence of meat- and cheese-centered entrées
- prevalence of plant-based entrées
- diversity of protein offerings

When reporting the percentage of school days on which a given entrée category was served, we summed the frequency of all entrées within that category across sampled menus. Because individual menu days could include more than one entrée within the same category (e.g., multiple breaded chicken products), these estimates reflect category-level offering frequency rather than deduplicated calendar days.

Processed meat classification: Processed meat was classified using the International Agency for Research on Cancer's (IARC) definition of "any meat that has been transformed through one or several of the following processes: salting, curing, fermentation, smoking, or other processes intended to enhance flavor or improve preservation."[307]

Entrées whose menu descriptions clearly indicated the presence of processed meat, such as hot dogs, pepperoni pizza, deli meat sandwiches, and breaded chicken products, were classified accordingly.

Because publicly available menus do not provide ingredient lists or product specifications, we adopted a conservative approach and classified items as processed meat only when the menu description provided sufficient evidence to do so. In the absence of product-level information, we did not classify such items as processed meat. For example, hamburgers were not classified as processed meat because they may represent either scratch-prepared 100% ground beef patties or commercially processed patties containing preservatives, fillers, or other additives.

As a result, our estimates likely understate the prevalence of processed meat in school meals. Many entrées likely contained processed meat products even when this was not apparent from the menu name alone. Accordingly, the findings presented here should be interpreted as a conservative estimate of the prevalence of processed meat in school lunch menus.

Representative Product Assessment and Targeted Evidence Review

The menu analysis identified the most frequently served entrée categories but could not identify the specific branded products, manufacturers, ingredient formulations, recipes, or preparation methods used by school districts.

To better characterize the foods represented by these entrée categories, we developed representative product assessments for the most frequently served entrée types.

Two of the 12 most commonly offered entrée types were not profiled—yogurt-based entreés and salad with meat —because they are not carried by USDA-approved processors as ready-to-eat products and their composition varies widely across districts.

Selection of representative products: Representative products were identified using USDA Food and Nutrition Service's National Processing Agreement Approved Processor list for School Year 2025–2026.[308]

Under the USDA further processing pathway, School Food Authorities can divert bulk USDA Foods commodities, such as raw chicken, beef, or cheese, to approved commercial processors, which convert them into ready-to-use products such as chicken nuggets, pizza, grilled cheese, and other entrées commonly served in the K-12 setting. This system is widely used by school districts, comprising 40% of commodity spending in FY 2022, because it reduces labor and equipment needs and allows schools to serve products that are easy to prepare.

Participation in the National Processing Agreement Program requires processors to demonstrate an established commercial market within school nutrition programs. Consequently, products offered through this program serve as reasonable proxies for foods commonly available through both USDA Foods processing and the broader K–12 commercial marketplace.

For each entrée category, one representative product was selected from an approved processor offering a matching product with publicly available ingredient and nutrition information.

Representative product assessment: For each of the ten representative products, we documented the following: product name, manufacturer, ingredient list, Nutrition Facts information, and labeled ingredients of concern (from the ingredient list and Nutrition Facts panel).

Selection of ingredients of concern: This report does not provide a comprehensive assessment of all potentially concerning food additives, processing aids, or ingredients that may be present in school meals. Rather, we focused our analysis on a narrow set of labeled ingredients and product characteristics for which there is substantial evidence linking them to chronic disease, cancer, endocrine disruption, and other serious health risks. This targeted approach allowed us to focus on ingredients and product characteristics with the strongest evidence base, greatest relevance to children's cumulative exposure through school meals, and clearest connection to current school food procurement and nutrition policy discourse. The exclusion of other ingredients or additives from this analysis—including ingredients identified in broader food purchasing frameworks or school food ingredient guides (e.g., certain food dyes, emulsifiers, gums, and preservatives)—should not be interpreted as evidence of safety or a lack of concern but rather a reflection of this report's specific scope and focus.

Targeted evidence review: Because representative products were not laboratory tested as part of this study, we conducted a targeted evidence review to characterize additional health concerns associated with each item as a representative of its entrée category. The review included peer-reviewed literature, government publications, FDA and USDA recall notices, public health investigations, and other publicly available sources.

For each representative product assessment, we identified potential undisclosed contaminants and documented food safety, contamination, recall, and other public health concerns involving the manufacturers.

Potential undisclosed contaminants are intended to illustrate contaminant concerns associated with the representative product category and conventional production systems. They should not be interpreted as evidence that the selected representative product or foods served by any specific school district contained those contaminants.

Limitations

This analysis has several important limitations

Sample Selection

Our sample was limited to 45 schools out of more than 13,000 school districts across the U.S. Because we sampled by district size, our findings may not fully capture geographic, cultural, or regional variation in school meal offerings. Menu offerings were drawn only from November 2025, which may not reflect seasonal variation, holiday-shortened months, or other considerations during the school year

Menu Analysis

First, this analysis relied on publicly available school menus, which do not include ingredient lists, recipes, preparation methods, or vendor-level purchasing data. Consequently, the menu analysis characterizes entrée categories rather than the exact foods served by individual school districts. This constrained our ability to assess the degree of processing of menu items. For example, some items (e.g., chicken nuggets) can reasonably be assumed to be ultra-processed, whereas others (e.g., a beef burger) may be either minimally processed (e.g., scratch-made from whole muscle meat) or highly processed (e.g., pre-formed patties with additives), distinctions that cannot be determined from menu descriptions alone.

Second, the sourcing practices underlying the products profiled in this analysis are largely opaque. Publicly available school menu data and USDA-approved vendors generally do not disclose farm-level production practices, including whether products were produced with routine antibiotic use, growth-promoting hormones, beta-agonists, or other conventional industrial livestock practices. This lack of transparency is itself a significant limitation of the current school food procurement system and makes it difficult for researchers, schools, and families to fully assess the health and environmental attributes of foods served in schools. However, because the vast majority of meat and dairy produced in the United States originates from conventional industrial production systems in which the use of antibiotics, growth-promoting drugs, and other intensive production practices is common, and because school meal procurement is heavily driven by cost constraints and large-scale commodity supply chains, it is reasonable to conclude that most of the animal products represented in this analysis likely originated from such systems unless explicitly labeled otherwise (e.g., organic, raised without antibiotics, or grass-fed).

Third, this analysis focused exclusively on lunch entrées and did not assess other meal components, including fruits, vegetables, or milk. Entrées typically include the meat/meat alternate and grain components of the meal and were selected as the focus because they are generally the centerpiece and primary protein source of school lunches and, according to USDA research, are among the most consistently consumed components of the meal.[309] Accordingly, our findings characterize the composition of school lunch entrées rather than the nutritional quality or composition of the complete school meal.

Fourth, menu offerings do not reflect actual food consumption. We did not have access to student selection, consumption, or waste data, and therefore cannot assess the extent to which listed entrées are eaten by students. Because our analysis is based on menu frequency, it may overestimate the prevalence of items that are offered daily or as "grab-and-go" options. For example, items such as nut butter and jelly sandwiches are often available every day as a default or backup option and therefore appear frequently in menus, even if they are likely not among the most commonly selected or consumed entrées.

Finally, entrée classification required interpretation of menu descriptions, which may be incomplete or ambiguous. While AI-assisted classification was manually validated, some degree of misclassification may persist, particularly for composite or minimally described items.

Representative Product Assessment

Representative products were selected to characterize commonly served entrée categories rather than identify the exact products served by participating school districts. Ingredient composition, nutritional characteristics, and manufacturing practices may vary among vendors and product formulations.

Because we selected a single representative product per entrée category rather than surveying all products offered through the USDA National Processing Agreement Approved Processor list, our findings should be interpreted as illustrative of the industrial supply chain that shapes school food procurement, not as evidence that any specific district served the products profiled.

Likewise, publicly available information generally does not disclose farm-level production practices, including antibiotic use, growth-promoting hormones, or other livestock management practices. Consequently, representative product assessments characterize concerns associated with the broader product category and conventional production systems rather than any specific product or school district.

Finally, this report did not include laboratory testing of representative products. Potential undisclosed contaminants were identified through a targeted review of the scientific literature and other publicly available evidence describing comparable products and production systems. Similarly, documented recalls, food safety events, and other public health concerns describe publicly reported events involving representative manufacturers and should not be interpreted as evidence that the specific products selected for this report were affected.

Appendix C: Product Profiles

Introduction

To better characterize the health implications of the foods most commonly served in America's school cafeterias, we developed detailed profiles of ten products, each corresponding to one of the most frequently served entrée categories identified in our menu analysis . These profiles are intended to illustrate the ingredients, potential contaminant exposures, and food safety concerns that characterize the industrial supply chain from which most schools purchase these foods.

Each profile draws on publicly available product specifications, USDA Food Safety and Inspection Service recall records, USDA Agricultural Marketing Service residue testing data, peer-reviewed literature, and investigative reporting on the supply chains that serve K–12 schools. The evidence base for each contaminant and health risk discussed in these profiles is presented in full in Appendix A.

Each product profile is organized as follows:

- **Vendor and product name** identifying the manufacturer and specific product formulation profiled.
- **Ingredients and Nutrition Facts** drawn directly from the manufacturer's publicly available product specification sheet.
- **Ingredients of concern** associated with chronic disease risk or classified as known or probable carcinogens and drawn from the ingredients and Nutrition Facts information above.
- **Potential undisclosed contaminants** that testing and research literature have identified in comparable industrially produced meat, poultry, or dairy products. These are illustrative of the category-level exposure risk and should not be interpreted as evidence that the profiled product was tested or found to contain these contaminants.
- **Documented food safety and vendor concerns** publicly reported FDA and USDA FSIS recalls, food safety investigations; and other public health concerns involving the manufacturer during the past five years.

The ten profiled products represent the ten most frequently served entrée categories from our menu analysis for which USDA-approved processor products were available. Two of the 12 most commonly offered entrée types were not profiled—yogurt-based entreés and salad with meat—because they are not carried by USDA-approved processors as ready-to-eat products and their composition varies widely across districts.

These profiles have limitations, which are discussed fully in Appendix B. Most importantly, publicly available school menus do not identify the specific products or preparation methods used by any given district. Our decision to profile products from the USDA National Processing Agreement Approved Processor list reflects the fact that these vendors constitute the primary supply chain through which schools access USDA commodity further-processed meat and cheese entrées. As a result, these ten products should be interpreted as illustrative of the industrial supply chain that shapes what schools can afford to purchase and serve, not as evidence that any specific school or district in our sample served these particular products.

#1: Chicken Nuggets

Vendor: Tyson Foods

Product name: [Tyson Fully Cooked Whole Grain Breaded White Meat Chicken Nuggets, CN, 0.67 oz]

Nutrition Facts	
Serving Size **5** Pieces (94g)	
Calories per serving	**260**
	Amount Per Serving
Total Fat	14 g
Saturated Fat	3 g
Trans Fat	0 g
Cholesterol	30 mg
Sodium	540 mg
Total Carbohydrate	15 g
Dietary Fiber	2 g
Total Sugars	0 g
Added Sugars	0 g
Protein	17 g
Vitamin D	0 mcg
Calcium	43 mg
Iron	2 mg
Potassium	340 mg

Ingredients

White meat chicken, water, whole wheat flour, enriched wheat flour (enriched with niacin, reduced iron, thiamine mononitrate, riboflavin, folic acid), textured soy protein concentrate, soy protein concentrate, contains 2% or less of the following: corn starch, extractives of paprika, extractives of turmeric, garlic powder, maltodextrin, natural flavors, onion powder, salt, sodium phosphates, spice extractives (including extractives of celery seed), spices (including celery seed), yeast extract. Breading set in vegetable oil.

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Sodium phosphate
- Sodium (540mg)
- Saturated fat (3g)

Potential Undisclosed Contaminants*

- Heavy metal residues (wheat, chicken)
- Pesticide residues, including glyphosate (wheat and chicken)
- Antibiotic residues (chicken)
- Veterinary drug residues, including nicarbazin (chicken)
- PFAS residues (wheat, chicken)
- Dioxin residues (chicken)

Vendor's Documented Contaminant and Food Safety Concerns

- **Antibiotic residues:** Tyson Foods announced in 2023 that it would reintroduce certain antibiotics into portions of its chicken supply chain after previously labeling many products as "No Antibiotics Ever."[310] The company now reportedly permits the use of ionophores, which are antibiotics used to prevent coccidiosis (a common parasitic disease in poultry flocks).[311]
- **Foreign matter contamination:** Tyson chicken nuggets have been the subject of multiple USDA recalls due to foreign matter contamination, although none were confirmed to have been linked to products sent to schools.
  - 2023: ~30,000 pounds of Tyson Fully Cooked Fun Nuggets Breaded Shaped Chicken Patties were recalled for metal piece contamination.[312]
  - 2019: 36,000 pounds of Panko Chicken Nuggets were recalled for rubber contamination.[313]
  - 2016: 132,000 pounds of Panko Chicken Nuggets were recalled due to contamination with hard plastic pieces.[314]
  - 2014: >75,000 pounds of fully cooked white meat chicken nuggets were recalled after a product scraper shed pieces of hard plastic into finished products; Tyson received reports of oral injuries linked to consumption.[315]

**Note: This report did not test this product for antibiotic residues. These examples are intended to illustrate potential exposure concerns associated with industrial poultry production systems.*

#2: Turkey Ham and Cheese Sub

Vendor: Classic Delight, Inc.

Product name: Turkey Ham & Cheese Sub on Whole Grain Homestyle Bun (Item No. 311)

Nutrition Facts	
Serving Size 1 sandwich	
Calories per serving	**270**
	Amount Per Serving
Total Fat	8 g
Saturated Fat	3 g
Trans Fat	0 g
Cholesterol	50 mg
Sodium	600 mg
Total Carbohydrate	28 g
Dietary Fiber	2 g
Total Sugars	5 g
Added Sugars	4 g
Protein	19 g
Vitamin D	1 mcg
Calcium	225 mg
Iron	1 mg
Potassium	193 mg

Ingredients

Whole Wheat Homestyle Bun: Water, Whole Grain Wheat Flour, Enriched Wheat Flour (Wheat Flour, Malted Barley Flour, Niacin, Reduced Iron, Thiamine Mononitrate, Riboflavin, Folic Acid), Sugar, Yeast, Wheat Gluten, Soybean Oil, Contains Less Than 2% Of: Mono- And Diglycerides, Datem, Calcium Sulfate, Calcium Propionate (Preservative), Acacia Gum, Ascorbic Acid, Enzymes, Calcium Phosphate, Salt.

Turkey Ham (5% Water Added): Turkey Thigh Meat, Water, Contains 2% Or Less Lite Salt (Potassium Chloride, Sodium Chloride), Sugar, Sodium Phosphate, Salt, Carrageenan, Sodium Erythorbate, Natural Smoke Flavoring, Sodium Nitrite.

Yellow American Cheese Reduced Fat & Sodium: Cultured Skim Milk And Milk, Potassium Citrate, Sodium Citrate, Paprika And Annatto (Color), Salt, Enzymes, Sorbic Acid (Preservative), Sunflower Lecithin (Anti-Sticking Agent).

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Sodium nitrite (IARC Group 2A – IARC's designation for probable carcinogen)
- Sodium phosphate
- Sodium (600 mg)
- Saturated fat (3 g)
- Added sugar (4 g)

Potential Undisclosed Contaminants*

- Heavy metals (turkey ham, cheese, wheat)
- Pesticide residues, including glyphosate (turkey ham, wheat, cheese)
- Antibiotic residues (turkey ham, cheese)
- Beta-agonist residues, including ractopamine (turkey ham)
- Dioxins (turkey ham, cheese)
- PFAS (turkey ham, cheese)

Vendor's Documented Contaminant Concerns

Listeria: In June 2024, Classic Delight recalled 25 products – including 1,119 cases of the Turkey Ham & Cheese Sub, 1,417 cases of Turkey & Cheese Sub Sandwiches, and 384 cases of Turkey & Cheese on Round Bun – after samples at the company's production facility tested positive for *Listeria monocytogenes*. This Class II recall affected products distributed to 14 states across the nation, but no illnesses were reported in connection with this recall.[316,317,318]

**Note: This report did not test this product for potential undisclosed contaminants. This list is intended to illustrate potential exposure concerns associated with industrial dairy and pork production systems.*

#3: Cheese Pizza

Vendor: Schwan's Food Service, Inc.

Product name: BIG DADDY'S™ Primo 16" WG Rising Crust Four Cheese Pizza (78637)

Nutrition Facts	
Serving Size **1/8** Pizza (147g)	
Calories per serving	**360**
	Amount Per Serving
Total Fat	16 g
Saturated Fat	7 g
Trans Fat	0 g
Cholesterol	35 mg
Sodium	490 mg
Total Carbohydrate	35 g
Total Dietary Fiber	3 g
Sugars	9 g
Added Sugars	2 g
Protein	21 g
Vitamin A	93 mcg
Vitamin D	0 mcg
Calcium	441 mg
Iron	2.1 mg
Potassium	433 mg

Ingredients

Crust: Whole grain blend (white whole wheat flour, whole grain yellow corn flour, brown rice flour, whole grain oat flour), nonfat milk, enriched flour (wheat flour, malted barley flour, niacin, reduced iron, thiamine mononitrate, riboflavin, folic acid), water, yeast, vegetable oil (soybean and/or canola oil), dough conditioner (enzymes, contains one or more of the following: Datem, calcium carbonate, wheat gluten, guar gum, ascorbic acid, cherry powder), sugar, contains 2% or less of: Hydrogenated soybean oil, parmesan cheese (part skim milk, cheese cultures, salt, enzymes), sea salt, dextrose, spice, salt, soy lecithin, natural flavor, wheat starch.

Toppings: Low moisture part skim mozzarella and parmesan cheeses (part skim milk, cheese cultures, salt, enzymes), lite mozzarella cheese (skim milk, cheese cultures, salt, modified food starch*, enzymes, vitamin A palmitate) *Ingredients not in regular mozzarella cheese, provolone and white cheddar cheeses (milk, cheese cultures, salt, enzymes), spice.

Sauce: Tomatoes (water, tomato paste [not less than 28% soluble solids]), contains 2% or less of: Modified food starch, parmesan cheese (part skim milk, cheese cultures, salt, enzymes), sugar, dextrose, salt, dried garlic, spice, dried onion, dehydrated romano cheese (sheep's and cow's milk, cheese cultures, salt, enzymes), paprika, citric acid.

Ingredients of Concern

- Sodium (490 mg)
- Saturated fat (7 g)
- Added sugar (2 g)

Potential Undisclosed Contaminants*

- Heavy metals (cheese, wheat)
- Pesticide residues, including glyphosate (cheese, wheat)
- Antibiotic and other veterinary drug residues (cheese)
- Naturally occurring hormones, including insulin-like growth factor 1 (IGF-1) (cheese)
- Dioxins (cheese)
- PFAS (cheese)

**Note: This report did not test this product for IGF-1 or other potential contaminants. These examples are intended to illustrate potential health concerns associated with industrial dairy products.*

#4: Grilled Cheese

Vendor: Integrated Food Service

Product name: Grilled Cheese Sandwich on Whole Grain Bread (Commodity Code C70303)

Nutrition Facts	
Serving Size 1 sandwich (119g)	
Calories per serving	**320**
	Amount Per Serving
Total Fat	12 g
Saturated Fat	6 g
Trans Fat	0 g
Cholesterol	30 mg
Sodium	550 mg
Total Carbohydrate	34 g
Dietary Fiber	3 g
Total Sugars	5 g
Added Sugars	2 g
Protein	18 g
Vitamin D	0 mcg
Vitamin A	135 mcg
Vitamin C	0 mg
Calcium	408 mg
Iron	2 mg
Potassium	522 mg

Ingredients

Whole Grain Bread: Flour (Whole Wheat Flour, Unbleached Enriched Flour [Wheat Flour, Malted Barley Flour, Niacin, Reduced Iron, Thiamine Mononitrate, Riboflavin, Folic Acid]), Water, Sugar, Canola Oil, Yeast, Salt, Dough Conditioner (Wheat Gluten, Wheat Flour, Deactivated Yeast, Enzymes, Ascorbic Acid), Wheat Gluten.

Reduced Fat and Reduced Sodium American Pasteurized Process Cheese: Cultured Skim Milk and Milk, Water, Natural Flavor, Nonfat Dry Milk*, Maltodextrin*, Modified Food Starch*, Sodium Citrate, Potassium Citrate, Salt, Annatto and Paprika (Color), Enzymes, Vitamin A Palmitate, Sorbic Acid (Preservative), Soy Lecithin (Anti-Sticking Agent). *Ingredient not in regular pasteurized process American cheese.

Low Moisture Part Skim Mozzarella Cheese: Low Moisture Part-Skim Mozzarella Cheese (Cultured Pasteurized Part-Skim Milk, Salt, Enzymes). Canola Oil.

Ingredients of Concern

- Sodium (550 mg)
- Saturated fat (6 g)
- Added sugar (2 g)

Potential Undisclosed Contaminants*

- Heavy metals (cheese, wheat)
- Pesticide residues, including glyphosate (wheat, cheese)
- Antibiotic residues (cheese, wheat)
- Naturally occurring hormones, including insulin-like growth factor 1 (IGF-1) (cheese)
- Dioxins (cheese)
- PFAS (cheese)

Vendor's Documented Contaminant Concerns

- **Listeria**: In 2016, Integrated Food Service reportedly recalled ready-to-eat sandwiches after FDA sampling detected *Listeria monocytogenes* on multiple food contact surfaces at the company's production facility. The recall was later expanded to include products distributed to foodservice distributors and schools across eight states, but there were no reported illnesses associated with these products.[319]

**Note: This report did not test this product for potential undisclosed contaminants. This list is intended to illustrate potential contaminant concerns associated with industrial dairy and wheat products.*

#5: Nut Butter and Jelly Sandwich

Vendor: Smucker Foodservice (The J.M. Smucker Company)

Product name: [Smucker's 2.6 Ounce Uncrustables Peanut Butter And Strawberry Wheat 72 Count Case]() (5150006961)

Nutrition Facts	
Serving Size 1 sandwich (76g)	
Calories per serving	**300**
	Amount Per Serving
Total Fat	16 g
Saturated Fat	3.5 g
Trans Fat	0 g
Cholesterol	0 mg
Sodium	270 mg
Total Carbohydrate	32 g
Dietary Fiber	4 g
Total Sugars	14 g
Added Sugars	13 g
Protein	9 g
Vitamin D	0 mcg
Calcium	44 mg
Iron	1 mg
Potassium	241 mg

Ingredients

Peanut Butter: Peanuts, Sugar, Contains 2% Or Less Of: Molasses, Fully Hydrogenated Vegetable Oils (Rapeseed And Soybean), Mono And Diglycerides, Salt.

Bread: Unbleached Whole Wheat Flour, Enriched Unbleached Flour (wheat Flour, Malted Barley Flour, Niacin, Ferrous Sulfate, Thiamin Mononitrate, Riboflavin, Folic Acid), Water, Sugar, Yeast, Contains 2% Or Less Of: Wheat Gluten, Soybean Oil, Salt, Dough Conditioner (mono And Diglycerides, Sodium Stearoyl Lactylate, Datem, Enzymes, Ascorbic Acid, Calcium Peroxide).

Strawberry Jam: Sugar, Strawberries, Contains 2% Or Less Of: Pectin, Citric Acid, Potassium Sorbate (preservative).

Ingredients of Concern

- Sodium (270 mg)
- Saturated fat (3.5 g)
- Added sugar (13 g)

Potential Undisclosed Contaminants*

- Heavy metals (wheat, strawberries)
- Pesticide residues, including glyphosate (peanuts, wheat, strawberries)

Vendor's Documented Contaminant Concerns

- **Salmonella:** In 2012, 72-count bulk packs of Uncrustables sandwiches distributed to schools participating in the NSLP were reportedly recalled after the company's peanut butter supplier, Sunland, Inc., was linked to a national Salmonella outbreak that sickened at least 35 people across 19 states.[320] Smucker stated that no confirmed illnesses were linked to the school-distributed product.

**Note: This report did not test this product for undisclosed contaminants. This list is intended to illustrate potential contaminant concerns associated with ingredients in Uncrustables.*

#6: Beef Burger

Vendor: AdvancePierre Foods

Product name: AdvancePierre Fully Cooked Flame Grilled Beef Patties, 2.01 oz. (Product 10000068097)

Nutrition Facts	
Serving Size 1 Piece (59g)	
Calories per serving	**100**
	Amount Per Serving
Total Fat	5 g
Saturated Fat	2 g
Trans Fat	0 g
Cholesterol	20 mg
Sodium	55 mg
Total Carbohydrate	2 g
Dietary Fiber	1 g
Total Sugars	0 g
Added Sugars	0g
Protein	11 g
Vitamin D	0 mcg
Calcium	30 mg
Iron	1 mg
Potassium	340 mg

Ingredients

Ground beef (not more than 20% fat), water, textured vegetable protein product (soy protein concentrate, caramel color), dextrose, potassium phosphates, natural flavors, lite salt (salt, potassium chloride), caramel color.

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Red meat (IARC Group 2A – IARC's designation for probable carcinogen)
- Potassium phosphates
- Saturated fat (2 g)

Potential Undisclosed Contaminants*

- Pesticide residues, including glyphosate
- Antibiotic and veterinary drug residues
- Beta-agonist residues, including ractopamine
- Synthetic hormone residues
- Naturally occurring hormones, including insulin-like growth factor 1 (IGF-1)
- Dioxins
- PFAS

Vendor's Documented Contaminant Concerns

- Foreign matter contamination
  - 2019: AdvancePierre Foods recalled approximately 20,373 pounds of Fully Cooked Flamebroiled Beef Patties due to possible contamination with soft plastic. These products were confirmed distributed to schools nationwide.[321]
  - 2019: AdvancePierre Foods issued a second recall of 15,739 pounds of Fully Cooked Flamebroiled Beef Patties after a foodservice complaint about soft plastic found in a patty. These products were distributed from a single warehouse to institutional customers, including schools.[322]

**Note: This report did not test this product for undisclosed contaminants This list is intended to illustrate potential exposure concerns associated with industrial beef production systems.*

#7: Pizza with Meat

Vendor: Schwan's Food Service, Inc.

Product name: TONY'S® SmartPizza® 51% Whole Grain 4"x6" Pork Pepperoni Pizza 50/50 (78674)

Nutrition Facts	
Serving Size 1 Plate (210.90g)	
Calories per serving	**336**
	Amount Per Serving
Total Fat	16 g
Saturated Fat	6.1 g
Trans Fat	1.0 g
Cholesterol	54 mg
Sodium	452 mg
Carbohydrates	27 g
Dietary Fiber	3 g
Total Sugar	6 g
Added Sugar	1 g
Protein	19 g
Vitamin D	0 mcg
Calcium	49 mg
Iron	3 mg
Potassium	1011 mg

Ingredients

Crust: Flour blend (white whole wheat flour, enriched flour [wheat flour, malted barley flour, niacin, reduced iron, thiamine mononitrate, riboflavin, folic acid]), water, defatted soy flour, yeast, contains 2% or less of: sugar, vegetable oil (soybean and/or canola oil), isolated soy protein, salt, soy lecithin, baking soda, enzymes (contains wheat), ascorbic acid.

Toppings: Low moisture part skim mozzarella cheese (part skim milk, cheese cultures, salt, enzymes), substitute mozzarella cheese (water, corn oil and/or soy oil, casein [milk], modified food starch, whey, nonfat dry milk, natural flavor, sodium aluminum phosphate, salt, lactic acid, sodium phosphate, potassium chloride, citric acid, tricalcium phosphate, sorbic acid [preservative], xanthan gum, vitamin and mineral supplement [magnesium oxide, dicalcium phosphate, zinc oxide, iron, riboflavin (vitamin b2), pyridoxine hydrochloride (vitamin b6), cyanocobalamin (vitamin b12), niacinamide (vitamin b3), thiamine mononitrate (vitamin b1), vitamin a palmitate]), diced fat reduced pepperoni (pork, beef, water, textured vegetable protein product* [soy protein concentrate, zinc oxide, niacinamide, ferrous sulfate, copper gluconate, vitamin a palmitate, calcium pantothenate, thiamine mononitrate (b1), pyridoxine hydrochloride (b6), riboflavin (b2), and cyanocobalamin (b12)], salt, less than 2% of: spices, dextrose, lactic acid starter culture, oleoresin of paprika, flavoring, sodium nitrite. * Ingredient not in regular pepperoni).

Sauce: Tomatoes (water, tomato paste [not less than 28% soluble solids]), modified food starch, sugar, contains 2% or less of: dextrose, sea salt, dried onion, spice, dehydrated romano cheese (sheep's and cow's milk, cheese cultures, salt, enzymes), paprika, dried garlic, citric acid.

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Sodium nitrite (IARC Group 2A – IARC's designation for probable carcinogen)
- Red meat (IARC Group 2A – IARC's designation for probable carcinogen)
- Sodium phosphate
- Sodium (510 mg)
- Saturated fat (3.5 g)
- Added sugar (2 g)

Potential Undisclosed Contaminants*

- Heavy metals (pepperoni, cheese, wheat)
- Pesticide residues, including glyphosate (pepperoni, cheese, wheat)
- Antibiotic and other veterinary drug residues (pepperoni, cheese)
- Beta-agonist residues, including ractopamine (pepperoni)
- Synthetic hormone residues (pepperoni)
- Naturally occurring hormones, including insulin-like growth factor 1 (IGF-1) (cheese)
- Dioxins (pepperoni, cheese)
- PFAS (pepperoni, cheese)

**Note: This report did not test this product for potential undisclosed contaminants. This list is intended to illustrate potential exposure concerns associated with industrial beef, pork and dairy production systems.*

#8: Diced Chicken Chunks

Vendor: Pilgrim's Pride (a JBS subsidiary)

Product name: [Fully Cooked Diced ½" White and Dark Chicken Meat] (Product 1230)

Nutrition Facts	
Serving Size 2.36oz (67g)	
Calories per serving	**90**
	Amount Per Serving
Total Fat	2.5 g
Saturated Fat	0.5 g
Trans Fat	0 g
Cholesterol	60 mg
Sodium	280 mg
Total Carbohydrate	0 g
Dietary Fiber	0 g
Total Sugars	0 g
Added Sugars	0 g
Protein	17 g
Vitamin D	0 mcg
Calcium	10 mg
Iron	0.4 mg
Potassium	230 mg

Ingredients

White and dark chicken meat, water, modified food starch, salt, sodium phosphates.

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Sodium phosphates
- Sodium (280 mg)

Potential Undisclosed Contaminants*

- Heavy metals
- Pesticide residues
- Antibiotic residues
- Veterinary drug residues, including nicarbazine
- Dioxins
- PFAS

Vendor's Documented Contamination and Other Concerns

- Foreign matter contamination
  - 2020: In this Class II recall, nearly 60,000 pounds of fully cooked chicken breast nuggets shipped for retail use were recalled due to rubber contamination.[323]
  - 2019: In this Class I recall, 58,020 pounds of breaded chicken products shipped to Publix supermarkets in Florida were recalled due to rubber contamination.[324]
  - 2018: In this Class I recall, 101,310 pounds of ready-to-eat breaded chicken patties distributed to schools in November 2017 through the USDA commodity program were recalled due to rubber contamination as a result of equipment failure at a production facility.[325]
  - 2016: In a series of four recalls between April and May 2016—ultimately classified as a Class I recall—Pilgrim's Pride recalled a combined 5,550,904 pounds of fully cooked chicken products contaminated with plastic, wood, rubber, and metal. These products were shipped nationwide for institutional use, including schools.[326]
- Food safety concerns
  - 2017: JBS was implicated in "Operation Weak Flesh," a Brazilian police investigation that reportedly found evidence of JBS allegedly bribing meat inspectors to overlook unsanitary practices, including processing rotten meat and exporting products contaminated with salmonella.[327]

**This report did not test this product for undisclosed contaminants. This list is intended to illustrate potential contaminant concerns associated with industrial chicken production systems*

#9: Pasta with Meat Sauce

Vendor: JTM

Product name: [Rotini w/ Italian Meat Sauce (WGR)](#) (Product 5591CE)

Nutrition Facts	
Serving Size 1 Plate (210.90g)	
Calories per serving	**336**
	Amount Per Serving
Total Fat	16 g
Saturated Fat	6.1 g
Trans Fat	1.0 g
Cholesterol	54 mg
Sodium	452 mg
Carbohydrates	27 g
Dietary Fiber	3 g
Total Sugar	6 g
Added Sugar	1 g
Protein	19 g
Vitamin D	0 mcg
Calcium	49 mg
Iron	3 mg
Potassium	1011 mg

Ingredients

Water, ground beef (no more than 20% fat), rotini (whole durum wheat flour, semolina, egg white, glycerol monostearate, niacin, ferrous sulfate, thiamine mononitrate, riboflavin, folic acid), tomato paste, contains less than 2% of onions, sugar, seasoning (potassium chloride, flavor [contains maltodextrin]), seasoning (sugar, onion, spice, garlic), salt, spices, sodium phosphates, dehydrated garlic, soybean oil, citric acid, dehydrated parsley.

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Sodium phosphates
- Sodium (452 mg)
- Saturated fat (6 g)
- Added sugar (1 g)

Potential Undisclosed Contaminants*

- Heavy metals (beef, wheat)
- Pesticide residues, including glyphosate (beef, wheat)
- Antibiotic residues (beef)
- Beta-agonist residues, including ractopamine (beef)
- Synthetic hormone residues (beef)
- Naturally occurring hormones, including insulin-like growth factor 1 (IGF-1) (beef)
- Dioxins (beef)
- PFAS (beef)

Vendor's Documented Contaminant Concerns

- Foreign Matter Contamination
  - 2023: 22,530 pounds of frozen, ready-to-eat beef chili with beans were recalled after a consumer complaint about semi-rigid white plastic material found in the product. These products had been purchased by USDA Foods for the National School Lunch Program and distributed to school distributors in California, Massachusetts, New York, Pennsylvania, New Jersey, and Wisconsin.[328]
  - 2018: 14,525 pounds of fully cooked pulled barbecued beef products were recalled after consumer complaints of rubber pieces found in the product.[329]

- **Listeria:** In 2018, 960 pounds of cooked ground beef patty crumbles were recalled after routine FSIS inspection identified the product as positive for *Listeria monocytogenes*.[330]

**This report did not test this product for undisclosed contaminants. This list is intended to illustrate potential contaminant concerns associated with industrial beef production systems*

#10: Corn Dog

Vendor: Foster Farms

Product name: Whole Grain Chicken Corn Dogs, 4.0 OZ., IW, CN, Smart Snack Compliant (Product 94124)

Nutrition Facts	
Serving Size 1 corn dog (4oz.) 112g	
Calories per serving	**240**
	Amount Per Serving
Total Fat	9 g
Saturated Fat	2.5 g
Trans Fat	0 g
Cholesterol	40 mg
Sodium	470 mg
Total Carbohydrate	30 g
Dietary Fiber	2 g
Total Sugars	8 g
Added Sugars	7 g
Protein	9 g
Vitamin D	0 mcg
Calcium	100 mg
Iron	1.5 mg
Potassium	240 mg

Ingredients

Batter ingredients: Water, whole wheat flour, whole grain corn, sugar, contains less than 2% of soy flour, leavening (sodium acid pyrophosphate, sodium bicarbonate), soybean oil, salt, ascorbic acid, dried honey, whole egg, natural flavor. Fried in vegetable oil.

Chicken frank ingredients: Mechanically separated chicken, water, corn syrup solids, contains less than 2% of soy protein concentrate, salt, spices, sodium phosphate, potassium chloride, flavorings, sodium erythorbate, sodium nitrite.

Ingredients of Concern

- Processed meat (IARC Group 1 – IARC's designation for known carcinogen)
- Sodium nitrite (IARC Group 2A – IARC's designation for probable carcinogen)
- Sodium phosphate
- Mechanically separated chicken
- Sodium (470 mg)
- Saturated fat (2.5 g)
- Added sugar (7 g)

Potential Undisclosed Contaminants*

- Heavy metals (chicken, wheat)
- Pesticide residues (chicken, wheat)
- Antibiotic residues (chicken)
- Veterinary drug residues, including nicarbazine (chicken)
- Dioxins (chicken)
- PFAS (chicken)

Vendor's Documented Contaminant Concerns

- Salmonella
  - 2013-14: CDC confirmed 634 people in 29 states and Puerto Rico were infected with Salmonella Heidelberg linked to Foster Farms chicken; 38% were hospitalized. The outbreak strains were resistant to several commonly prescribed antibiotics.[331]
  - 2015: Another Salmonella Heidelberg outbreak was linked to Foster Farms facilities, resulting in an estimated 278 illnesses across 18 states. Consumer Reports found the outbreak strain in a Foster Farms sample purchased from a California plant in July 2013 and publicly called for a recall before the company took action.[332]
- Foreign matter contamination
  - 2025: 3.8 million pounds of chicken corn dog products were recalled after complaints of wood embedded in the batter; at least five consumers reported injuries.[333]

- 2023: ~77,000 pounds of Mini Chicken Corn Dogs were recalled due to possible spoilage after consumers reported unusual odor, abnormal appearance, and unpleasant taste.[334] The plant that produced the recalled corn dog products is reportedly the same Foster Farms facility in California that was linked to a 2013-2014 *Salmonella* outbreak in fresh chicken products.[335]
- 2013-2014: USDA noncompliance reports obtained by the Natural Resources Defense Council documented routine sanitation and food safety violations at Foster Farms facilities – including more than 200 from two California plants – including fecal matter contamination, mold growth, cockroach infestations, foreign matter on chicken carcasses, and failure to implement required testing and sampling.[336] The plant that was linked to the 2013–2014 *Salmonella* outbreak was reportedly cited 154 times, including 22 violations for fecal contamination, and was temporarily closed by USDA in January 2014 due to "egregious insanitary conditions" and a live cockroach infestation.

**This report did not test this product for undisclosed contaminants. This list is intended to illustrate potential contaminant concerns associated with industrial chicken production systems*

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Friends of the Earth

CHEF ANN FOUNDATION

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.

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