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ORIGINAL ARTICLE



The Consumption of Pink Slime Journalism: Who, What, When, Where, and Why?

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ABSTRACT

Pink slime journalism refers to organizations masquerading as local news, often serving special interests. Past research and reporting have illuminated pink slime journalism production (e.g., identifying outlets and documenting practices) but have not systematically analyzed consumption. We combine web browsing behavior of a national sample of American adults during the 2020 election ($N=1,238$; 21 M website visits) with a database of pink slime outlets (1,627 outlets, 132,237 distinct articles) to illuminate the who, what, when, where, and why of pink slime consumption. Our analysis reveals 3.7% of American adults (~9.5 M people) visited pink slime in the months surrounding the 2020 election. Pink slime consumption differed from both general misinformation and traditional local news consumption. We also find a mismatch between production and consumption, with the topics of produced and promoted pink slime articles differing greatly from the topics of pink slime consumed. Google and Facebook were prominent referers to pink slime. Despite speculation, news desert residents were not more likely to consume pink slime.

KEYWORDS

Pink slime; digital trace data; audience analysis; local news; misinformation; journalism; 2020 election; imagined audiences

Introduction

“Pink slime journalism”¹ is a term coined in 2012 by journalist Ryan Zickgraf to describe organizations that mimic local news outlets but push partisan politics or corporate communications without following journalistic practices (e.g., not disclosing funding sources) (Aljebreen, Meng, and Dragut 2024; Bengani 2021; Lepird et al. 2024; Massoglia 2020; Sullivan 2022). The metaphor references byproduct added to beef without appropriate labels (Zickgraf 2022), as “pink slime journalism wants to quietly smuggle low-quality pastel goo from a machine into your regular media diet.” By adopting traditional local news aesthetics, these networks attempt to exploit trust in local news,

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Americans' most trusted news form (Fioroni 2022; Zickgraf 2022). Existing work indicates these outlets (1) flood local media ecosystems before elections (Pearson 2022); (2) frame contentious issues partisanly (Bengani 2021); and (3) advocate for policies benefiting special-interest groups (Monacelli 2022; Taft 2022). These networks have expanded, with both the political left and right embracing similar tactics (Arvanitis and Sadeghi 2022; Markay and Thomas 2022). NewsGuard estimated in 2022 that there were nearly as many pink slime websites as daily newspapers in the US (Benjamin 2022).

Pink slime journalism isn't a US-only phenomenon. Quickly after Russia invaded Ukraine, websites with "local news" names like kherson-news.ru and news-kharkov.ru (Russian spelling of the Ukrainian city) emerged, pulling stories from Telegram that pushed pro-Kremlin narratives (Secrétariat général de la défense et de la sécurité nationale 2024). In 2024, websites imitating local news operated by an American ex-fugitive in Russia targeted the US, UK, and France (Insikt Group 2024; Linvill and Warren 2023; Myers et al. 2024; Wilmot and Visser 2024).

Pink slime journalism has proliferated amid a struggling local news industry where newsrooms face lower revenues, causing cutbacks and lower quality journalism, making people less likely to pay (Heiselberg and Hopmann 2024). Less than one-fifth of Americans pay for online news and local news faces competition from national outlets (Newman et al. 2022). Pink slime websites are part of a larger ideological ecosystem that includes partisan alternative media, influencers, podcasters, and social media (Haller, Holt, and de La Brosse 2019) and tend to not be transparent about their funders, ideological stances, or partnerships (Bengani 2021, 2022; Ihlebæk et al. 2022).

Pink slime journalism has received coverage in high-profile outlets, including *The Washington Post* (Sullivan 2022; Zickgraf 2022), *New York Times* (Alba and Nicas 2020), *Associated Press* (Hendrickson and Swenson 2023), and *Los Angeles Times* (Fonseca 2023), along with other journalistic investigations (e.g., Bengani 2019, 2020, 2021; Benjamin 2022; David 2022; Kasprak et al. 2019; Massoglia 2020; McDonald 2020). Limited academic studies also exist (e.g., Bandy and Diakopoulos 2023; Burton and Koehorst 2020; Royal & Napoli, 2022). This existing work primarily focuses on production: identifying sites and corporate structures (Alba and Nicas 2020; Bengani 2020), documenting their practices (Bengani 2021; Monacelli 2022), and tracing funding (Bengani 2021, 2022).

Critical questions remain about consumption: How many people are exposed to pink slime online? Who are they? How do they find these articles? How wide is network reach? Where are consumers located? Such questions are important to answer for two reasons. First, answering them can provide essential information about the scale and impact of pink slime networks. Despite speculation (Davies 2023; Graham 2020), little research has examined exposure. Knowledge about who is exposed, which articles they see, and how pink slime consumption compares to other information (e.g., traditional local news, general misinformation) can clarify what pink slime journalism *is* (i.e., should it be thought of as most like local news, misinformation, or something else?). Second, consumption data can indicate new directions for research, thereby validating or challenging existing hypotheses.

We examine consumption of pink slime by using a large-scale dataset of American adults' online behavior. We combine three months of web browsing data collected

from a national sample during the 2020 election ($N=1,238$; ~21 million website visits) with a database of pink slime websites to examine the who, what, when, where, and why of Americans' consumption of pink slime, following other scholarship interrogating audience news consumption *via* web browsing data (for a review, see Lee & Peng, 2023). We find that 3.7% (~1 in 25) of American adults visited pink slime sites during the election. Consumers varied by demographics: they were more likely to identify as Biden supporters, be white, and be non-college educated. Pink slime consumption patterns differed from those of both general misinformation and traditional local news (Choate and Hatfield 2022; David 2022; Lynch 2022; Zickgraf 2022)². The production and consumption of pink slime article topics were highly mismatched, with the most common topics of produced (and promoted) pink slime articles and consumed articles differing significantly. Google and Facebook were the most common referrers. Despite speculation, residing in a news desert (i.e., limited local news availability) did not increase pink slime exposure. Furthermore, people were not geographically farther from pink slime outlets visited than from traditional local news outlets.

Relevant Literature, Research Questions, and Hypotheses

We examine exposure to pink slime during the 2020 US election, focusing on who is exposed, what content they see from pink slime outlets, when they encounter it, and where pink slime outlets purport to be located relative to visitors. During the 2020 election, three networks were active: Metric Media, Star, and Courier – the first two right-leaning, the last left-leaning. Metric Media was the largest network, with over 1,200 sites during the 2020 election (Bengani 2020). Metric Media created hundreds of thousands of stories, many templated, with few human bylines (Royal & Napoli, 2022). Star emerged before the 2018 midterms (Schwartz 2018) across eight states (Fowler 2021). Courier was created before the 2020 election and had state-specific sites in five states (Massoglia 2020). Pink slime journalism receives millions of dollars from mega-donors (Bengani 2022; Scola 2022), and new networks emerged preceding the 2022 midterm elections, notably the Local Report network and the American Independent, both on the ideological left.

Pink Slime: Who?

How many people are exposed to pink slime journalism, and who are they? Because pink slime websites adopt traditional local news aesthetics and are often discussed as misinformation (Choate and Hatfield 2022; David 2022; Lynch 2022), we compare the consumption of pink slime websites to both traditional local news and misinformation.

Local News Exposure

Most Americans say they follow local news at least somewhat closely (Pew Research Center 2019), with 89% obtaining local news digitally, 41% obtaining it often, and 37% saying they prefer to get local news online, second only to television at 41%. Demographic patterns exist: residents of higher-share white areas depend more on print newspapers, whereas those in lower-share white areas rely more on digital media

(Pew Research Center 2019). Thus, if consumers perceive pink slime as local news, their consumption patterns may resemble those of local news consumers.

Misinformation Exposure

Some individuals are more likely to be exposed to misinformation than others. Older adults are one such group: Americans over 65 were twice as likely as people 18–29 to consume misinformation online during the 2016 (Grinberg et al. 2019; Guess, Nyhan, and Reifler 2020) and 2020 (Moore, Dahlke, and Hancock 2023) elections. Conservatives and those with high political interest are also more likely to consume misinformation online (Grinberg et al. 2019; Guess, Nyhan, and Reifler 2020; Moore, Dahlke, and Hancock 2023). Pink slime has been labeled as misinformation (Choate and Hatfield 2022; David 2022; Lynch 2022). Misinformation, though, is not monolithic; it varies in objectives and tactics. Actors who rely on news websites to spread misinformation often strive to appear as traditional news media (Grinberg et al. 2019): they have mastheads, ethics policies, bylines, and design resembling traditional local news sites. However, do pink slime and misinformation reach similar audiences?

To examine who is exposed to pink slime journalism online, and to contextualize exposure to pink slime to exposure to traditional local news websites and misinformation, we pose RQ1:

RQ1: Who is exposed to pink slime journalism? How does this compare to exposure to both traditional local news and to misinformation?

Pink Slime: What?

What pink slime are people exposed to? Prior work has illuminated the topics pink slime outlets cover, including local and national news and politics, as well as sports scores and gas prices (Bengani 2022; Royal & Napoli, 2022). Metric Media publishes computer-generated stories reporting highly specific local statistics (e.g., Lancaster Elementary School District had 1,618 seventh-grade students during the 2018–2019 school year) (Royal & Napoli, 2022), possibly to reach audiences or build credibility (Henke, Leissner, and Möhring 2020). The articles generated by pink slime outlets can reveal pink slime's *imagined audience*, or “mental conceptualization of the people with whom [they] are communicating” (Litt 2012). However, it remains unclear how imagined audiences compare to actual audiences (Coddington, Lewis, and Belair-Gagnon 2021; Nelson 2021). To better illuminate what pink slime people are exposed to and how pink slime's imagined audience (represented by the content that pink slime outlets produce) compares to its real audience (represented by the pink slime people actually consume), we ask RQ2:

RQ2: What are the topics of pink slime articles that people visit, and how do they compare to the topics of the pink slime articles published?

Pink Slime: When?

When are people exposed to pink slime during online activities, and how do different platforms facilitate exposure? Some suggest that pink slime outlets create content to

rank higher in search engine results (Zickgraf 2022), suggesting that search engines are the primary drivers of exposure. Bengani (2019) found that some pink slime websites appeared on Google's first page of results but did not track who or how many people clicked. Others emphasize pink slime ads, especially during election campaigns (Arvanitis and Sadeghi 2022). Bandy and Diakopoulos (2023) concluded "Facebook did not increase audience reach for pink slime websites" during the 2020 US election. However, this analysis examined only one platform, excluded advertisements, and did not compare pink slime referrals across platforms or search. Burton and Koehorst (2020) found minimal links to pink slime on Reddit and 4chan, hypothesizing pink slime sites instead target more mainstream platforms. To examine when people are exposed to pink slime online, and specifically to explore the role of social media platforms and search engines, we pose RQ3:

RQ3: What are the roles of social media platforms and search engines in exposing people to pink slime?

Pink Slime: Where?

One suspected predictor of pink slime exposure is local news availability (Askari 2020; David 2022; Rafsky 2022; Taft 2022). Pink slime outlets may target "news deserts" (Abernathy 2020; Qin 2024) as opportunities to win over consumers by masquerading as local news outlets. Indeed, Royal & Napoli (2022) found that Metric Media operates many outlets in news deserts. Prior work has also demonstrated that local news availability is a key predictor of local news exposure (Althaus, Cizmar, and Gimpel 2009), further supporting that pink slime outlets may target people with fewer local news outlets. By artificially increasing the supply of local news and serving unmet demand, pink slime purveyors may exploit an opportunity for greater exposure, thereby influencing consumers and/or generating revenue. Given this evidence, we posit H1:

H1: The fewer local news outlets available to someone, the more likely they are to consume pink slime.

Because pink slime outlets purport to represent geographic areas to inherit local news trustworthiness (Fioroni 2022; Zickgraf 2022), we assess whether they reached people in their purported areas. For comparison, we examine whether traditional local news outlets reached people in their geographic areas. However, as local news outlets increasingly cover national stories (Martin and McCrain 2019), local news may no longer reach people only in their immediate media markets. Thus, we ask RQ4:

RQ4: Where are people exposed to pink slime located relative to where pink slime outlets purport to be located, and how does this compare to the location of people relative to traditional local news outlets?

Data & Measures

Participants

We passively collected web browsing data (i.e., URLs visited) from computers, smart-phones, and tablets via the survey company YouGov with 1,238 participants from

August 24, 2020, to December 7, 2020, totaling 21 million website visits³. Demographics of the participants were as follows: 29% percent ($n=358$) were aged 65+, 48% ($n=599$) were 45–64, 14% ($n=175$) were 30–44, and 9% ($n=106$) were under 30; 44.4% ($n=550$) reported identifying as male and 55% ($n=683$) as female; 80% ($n=989$) reported their race as white, 9% as Black ($n=113$), 5% as Hispanic ($n=65$), and 6% as other ($n=71$); 89% ($n=1,103$) said they follow politics most or some of the time; 30% ($n=373$) were considered highly knowledgeable about politics according to Pew Research Center's (2018) civic knowledge questionnaire; 36% ($n=445$) supported Donald Trump in the 2020 U.S. Presidential Election and 59% ($n=726$) supported Joe Biden. YouGov weighted participants to match a nationally-representative sample, and we use these weights in our analyses. All participants provided informed consent and this research was approved by the Stanford University IRB (protocol #: IRB-53941).

Identifying Pink Slime, Misinformation, and Local News Websites

To identify visits to pink slime websites in our data, we used the largest and most up-to-date list of pink slime web domains, spanning five networks (Bengani 2022; 1,627 sites). Two networks in this list were created in the run-up to the 2022 midterms, but the other three were active during the 2020 US general election. Visits to traditional local news websites were identified using ratings from NewsGuard, an organization of professional journalists and editors who manually rate the quality of news websites⁴. Specifically, we use websites that NewsGuard labels as covering only local issues. To identify visits to misinformation websites, we use a list of 1,796 misinformation sites compiled by Moore, Dahlke, and Hancock (2023), which combines websites NewsGuard identifies as “repeatedly publishing false content” and websites identified in previous academic research as repeated purveyors of false information.

Topics Covered by the Pink Slime Networks

To identify the topics covered in articles from pink slime outlets, we collected 242,677 Facebook posts via CrowdTangle that included a link to a pink slime domain. After deduplicating the URLs in the posts, collecting the content from the URLs, and removing sparse documents, we were left with 132,237 web pages, each representing an article published by a pink slime outlet. Next, we used structural topic modeling (STM; Roberts, Stewart, and Tingley 2019), an unsupervised approach, to categorize the web pages into 18 topics (for details on selecting the number of topics, see [Supplementary Materials A and Figure S1](#)). These topics and their distribution across the full set of pink slime articles represent the universe of produced pink slime articles. To explore how the produced articles compared with those consumed, we matched the topics of the articles that appeared on Facebook to the topics of pink slime articles that participants visited in their web browsing data. For the consumed pink slime articles that lacked assigned topics, we manually categorized them into one of the 18 categories. To further understand the effects of pink slime outlets' efforts to spur readership of specific articles, we collected tweets from pink slime purveyors. We matched the article URLs in those posts against the topics we assigned the articles. Additionally, we collected all Facebook ads that Metric Media ran during that time period.

Local News Ecosystems

To measure the local news ecosystems of our participants, we used data from “The Expanding News Desert” project⁵, a comprehensive list of local news outlets from every county in the US, including newspapers, public broadcasting, digital news sites, and ethnic media. This list includes 9,269 news organizations in total. Using participant zip codes, we matched the number of local news organizations in each county to the participants’ home counties. The average participant had 15.0 (95% CI = 13.6–16.4) traditional local news organizations in their home county.

Results

Pink Slime: Who?

To answer RQ1 regarding who is exposed to pink slime journalism and how exposure compares to both traditional local news and misinformation, we use our data to estimate Americans’ exposure to pink slime websites, traditional local news sites, and misinformation sites. We use prior research using web browsing data to examine consumption of misinformation websites (Guess, Nyhan, and Reifler 2020; Moore, Dahlke, and Hancock 2023) as a guide for the metrics we calculate to answer RQ1.

We estimate that 3.7% (95% CI = 2.8-5.0%)—about 1 in 25—of American adults were exposed to at least one pink slime website around the 2020 Election (August 24 - December 7, 2020). While this number pales in comparison to the 39.1% (95% CI = 36.4-41.8%) of Americans who were exposed to misinformation websites ($X(1) = 468.0$, $p < .001$) and the 36.4% (95% CI = 33.7-39.1%) exposed to traditional local news websites ($X(1) = 419.4$, $p < .001$) during the same period, it is worth noting that for pink slime networks to be influential, they do not need to have broad reach necessarily. Pink Slime networks’ goals may be to gnaw at the edges of the voting public’s consciousness or to sow distrust in the [online information](#) ecosystem (Bengani 2021). With election victory margins often extremely narrow, a swing of just a handful of votes could make all the difference.

Past research identified sociodemographic patterns in misinformation consumption: supporters of then-presidential candidate Donald Trump, older adults, those with more conservative media diets, and white individuals were more likely to visit misinformation websites (Guess, Nyhan, and Reifler 2020; Moore, Dahlke, and Hancock 2023). We find that none of these patterns in misinformation consumption hold for pink slime consumption. Biden supporters were actually more likely to consume pink slime websites (4.4% exposed; 95% CI = 3.0-6.4%) than Trump supporters (2.1%; 95% CI = 0.8-2.7%) ($\chi^2(1) = 4.2$, $p = .04$). Both these patterns differ from the consumption of local news, where we find similar levels of consumption ($\chi^2(1) = .03$, $p = .86$) between Trump (36.0% exposed, 95% CI = 31.9-40.4%) and Biden supporters (36.7% exposed, 95% CI = 33.2-40.3%).

Biden and Trump supporters also differed in the extent to which they consumed pink slime from pink slime networks on the ideological left (American Independent, Courier, Local Report) and right (Metric Media Network, Star). Specifically, Biden supporters (3.6% exposed, 95% CI = 2.4-5.4%) were more likely ($\chi^2(1) = 11.4$, $p < .001$)

than to have consumed at least one pink slime article from a left-leaning network than Trump supporters (0.5% exposed, 95% CI = 0.1-1.7%). However, Biden (0.9% exposed, 95% CI = 0.4-2.1%) and Trump supporters (1.8%, 95% CI = 0.9-3.5%) did not differ in their likelihood of consuming at least one pink slime article from a right-leaning network ($\chi^2(1) = 1.2$, $p = .28$).

Whereas people 65 years of age and older are most likely to be exposed to misinformation websites (see Figure 1B1), we find no differences across age groups in the likelihood of exposure to pink slime websites (see Figure 1A1). In addition, we find no clear relationship between the ideological slant of people's online media diets and their exposure to pink slime (see Figure 1A2).

Engagement with pink slime websites was relatively low. The average participant exposed to at least one pink slime website visited only 2.6 (95% CI = 1.4–3.8) pink slime sites, significantly fewer than the average number of misinformation ($t = -5.4$, $p < .001$) and traditional local news sites visited ($t = -4.6$, $p < .001$) (see Figure 2A). Among those exposed to misinformation websites, the average individual was exposed to 38.5 misinformation websites (95% CI = 25.2–59.9). For local news, the average number of visits per exposed person was 14.1 (95% CI = 8.1, 20.0). As is shown in Figure 2B, visits to pink slime websites also represented a small percentage of individuals' overall news consumption. Among exposed individuals, visits to pink slime

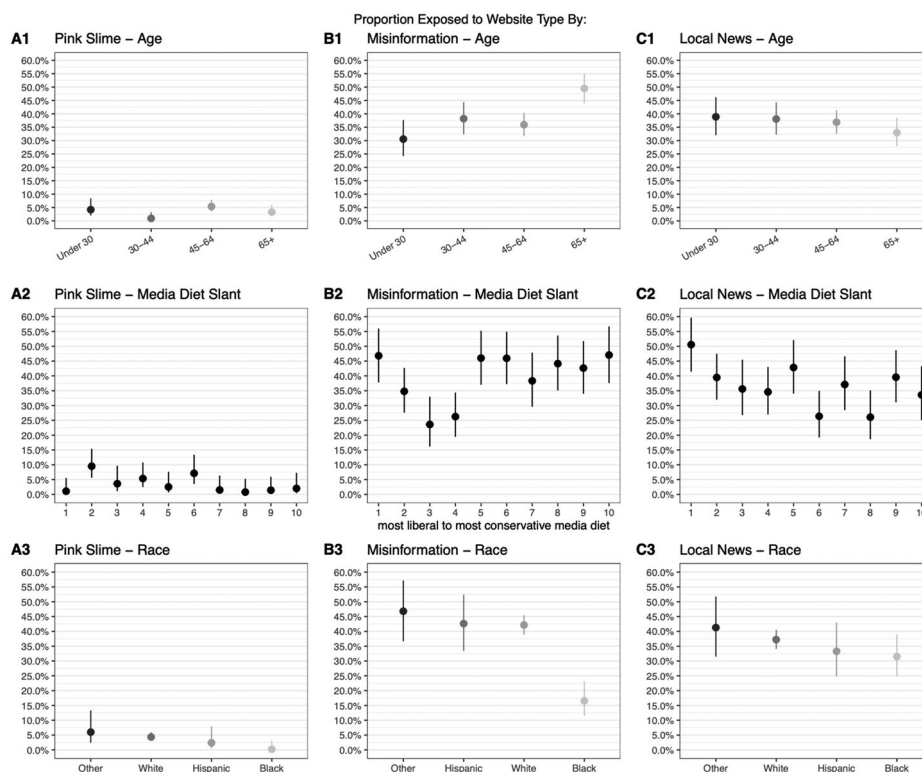


Figure 1. Proportions of Participants Exposed to Pink Slime, Misinformation, and Local News Websites by Age, Media Diet Slant, and Race.

Note: Proportion of people exposed to at least one website of a given type by subgroup.

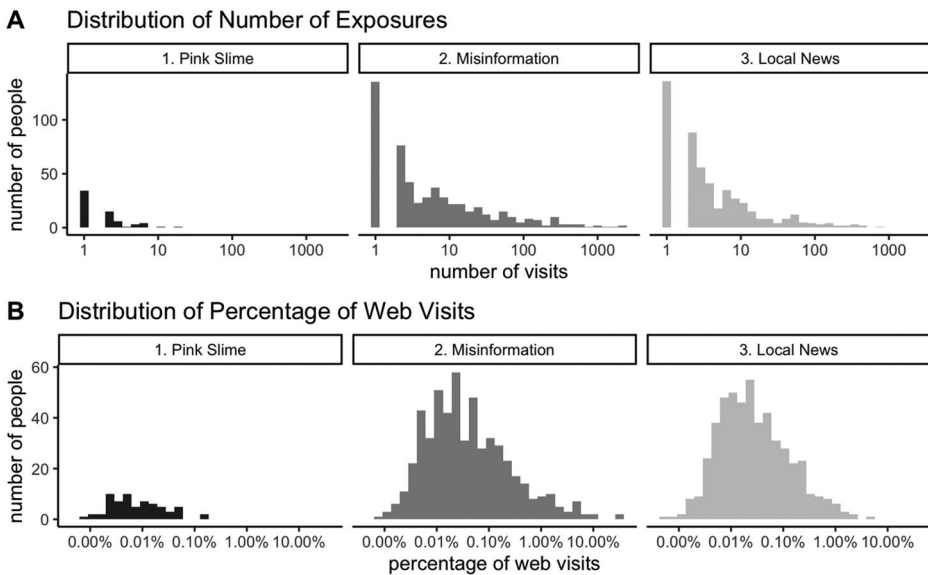


Figure 2. Distributions of Exposure Metrics for Pink Slime, Misinformation, and Local News Websites. Note: Histograms of the distribution of website visits among those exposed at least once. Panel A shows the number of visits to each of the website types. Panel B is the percentage of the news diet that the given website type makes up.

websites represented .34% (95% CI = .04-.65%) of their total news consumption, again well below the percentage made up by misinformation ($t = -4.2$, $p < .001$) and local news site visits ($t = -6.7$, $p < .001$). We find no evidence that pink slime websites are more or less engaging than misinformation or local news websites. The average visit to a pink slime website lasted 54.7 s (95% CI = 40.9–68.4), while the average visit to a misinformation site was 54.3 s (95% CI = 49.6–59.0) ($p = .84$) and 57.4 s (95% CI = 56.6–58.2) ($p = .91$) for local news websites.

Pink Slime: What?

To answer RQ2 regarding what topics from pink slime articles people visited, we compare the distribution of the topics of the articles that pink slime outlets produced to the distribution of topics of the articles visited by our participants using a chi-squared test. For additional points of comparison, we also compare the distributions of topics in pink slime articles produced and consumed by our participants with those promoted by pink slime outlets in Facebook Ads and tweets. Results are presented in Table 1. The distributions of topics in each of these four categories (pink slime articles produced, pink slime articles consumed, Metric Media's Facebook ads, pink slime outlets' tweets) are significantly different from one another ($\chi^2(48) = 30,385$, $p < .001$). The most common topic in the pink slime article produced was gas prices, with nearly 22% of pink slime articles falling into this category. Most of the articles in this category used identical wording throughout the article, except for things like dates and data values (e.g., the price of gas in a city). Thus, we infer that these articles were programmatically created, a practice common among pink slime outlets

Table 1. Topic Model Results.

Topic #	Topic Name	Prog.	Articles %	Consumed %	FB Ads %	Twitter %
1	Apparel Commercial and Economic Data	Yes	4.5%	0.0%	1.0%	0.0%
2	Illinois Public Salary Data & Legal Proceedings	Yes	4.1%	12.7%	0.0%	0.0%
3	Vehicle Commercial and Economic Data	Yes	5.1%	0.0%	0.0%	0.0%
4	Professional Licensing	Yes	12.5%	0.0%	0.0%	0.0%
5	Municipal Government Minutes	Yes	0.0%	0.0%	0.0%	0.0%
6	COVID and Election Conspiracies	No	2.0%	10.8%	10.9%	61.2%
7	Politics	No	1.4%	55.9%	7.9%	0.7%
8	Gas Prices	Yes	21.5%	0.0%	5.0%	0.0%
9	Unemployment Data	Yes	1.5%	0.0%	0.0%	0.1%
10	Technology Commercial and Economic Data	Yes	5.7%	0.0%	1.0%	0.1%
11	Local News	No	4.5%	5.9%	50.5%	33.7%
12	Hobby Commercial and Economic Data	Yes	1.1%	0.0%	0.0%	0.0%
13	Real Estate Data & Listings	Yes	3.6%	10.8%	1.0%	0.3%
14	Iron and Metals Commercial and Economic Data	Yes	18.4%	0.0%	0.0%	0.0%
15	COVID Advisories and Information	Yes	3.1%	3.9%	22.8%	4.0%
16	Public Sector Employment Data	Yes	7.3%	0.0%	0.0%	0.0%
17	Political Fundraising Data	Yes	3.6%	0.0%	0.0%	0.0%
18	Tradespeople Licensing	Yes	0.0%	0.0%	0.0%	0.0%

Note: Topic model results. All pink slime articles shared anywhere on Facebook were categorized into 18 different topics. The “Prog.” column is whether the articles in the category appear to be programmatically created (inferred based on whether the first several words of most articles were identical). “Articles %” is the percentage of total pink slime articles about each topic. “Consumed %” is the percentage of pink slime articles that were consumed by individuals in our browsing data. “FB Ads %” is the percentage of Facebook Ads from Metric Media outlets that shared links in each topic. “Twitter %” is the percentage of tweets from the pink slime purveyors that shared links in each topic. Additional definitions of each topic name are as follows: Apparel Commercial and Economic Data are reports of federal commercial data for this sector. Illinois Public Salary Data & Legal Proceedings includes salary information for public employees in Illinois and details of legal cases involving the state. Vehicle Commercial and Economic Data pertains to statistics about the automotive industry, covering topics like vehicle sales and manufacturing statistics. Professional Licensing relates to the certification and licensing processes for professionals in various fields across the United States. Municipal Government Minutes encompasses the recorded proceedings from municipal government meetings across the United States. COVID and Election Conspiracies, which do not feature programmatically created content, involve articles discussing conspiracy theories related to COVID-19 and elections. Politics, also non-programmatic, focuses on national partisan news (e.g., Biden and Trump). Gas Prices are reports of local gas prices, primarily pulled from the Gas Buddy API. Unemployment Data consists of statistics and discussions about unemployment rates. Technology Commercial and Economic Data covers economic data about the industry. Local News involves articles about events and issues local to specific areas, for example, about local politicians in Nashville, Tennessee. Hobby Commercial and Economic Data contains statistical reports from the hobby industry. Real Estate Data & Listings features data on real estate markets, including property listings and housing market economics. Iron and Metals Commercial and Economic Data deals with the commercial and economic aspects of the industry. COVID Advisories and Information focuses on providing updates, advisories, and important information related to the COVID-19 pandemic, generally containing federal and state government advisories. Public Sector Employment Data includes data on employment rates, job openings, and employment policies in the public sector. Political Fundraising Data details fundraising activities and financial statistics related to political campaigns and parties, primarily Federal Elections Commission data. Tradespeople Licensing concerns licensing requirements, updates, and regulations for tradespeople in various industries in the United States.

$\chi^2(48) = 30,385, p < .001$.

(Royal & Napoli, 2022). By comparison, not a single participant in our data visited a pink slime article about gas prices. Very few pink slime articles addressed politics, yet it was the most common topic among those consumed by our participants. Interestingly, not many of the total articles produced or consumed were about local news. However, local news was among the most commonly promoted topics *via* Facebook Advertisements and tweets generated by pink slime outlets. Overall, these results reflect a mismatch in the content produced and promoted by pink slime purveyors and the pink slime consumed.

Pink Slime: When?

To answer RQ3 regarding when people are exposed to pink slime, we analyze the role of different online platforms in referring people to pink slime websites. A referrer is defined as the website visit immediately prior to a visit to another website, and referral analyses are commonplace in studies of digital trace data to reveal avenues to news consumption (e.g., Bandy and Diakopoulos 2023; Wojcieszak et al. 2021). In our case, we examine referrers to pink slime websites (see Figure 3), including platforms Facebook, Twitter, YouTube, Instagram, and Reddit (Aridor 2022), webmail (Guess, Nyhan, and Reifler 2020; Moore, Dahlke, and Hancock 2023), and search engines Google, Bing, Yahoo, and DuckDuckGo (Wojcieszak et al. 2021). We find that Google was the largest referrer of pink slime, referring 23.4% of visits to these websites. Facebook also referred a substantial number of pink slime websites: 17.7% of visits. Fewer referrals to pink slime websites came from Twitter (3.2%), YouTube (3.2%) Webmail (2.5%), and Bing (1.9%). For comparison, Google, who referred nearly a quarter of pink slime visits, referred 7.1% of misinformation visits and 12.5% of local news visits. Facebook referred 8.5% of visits to misinformation websites and 9.7% of visits to local news sites, nearly half the proportion of pink slime visits it referred.

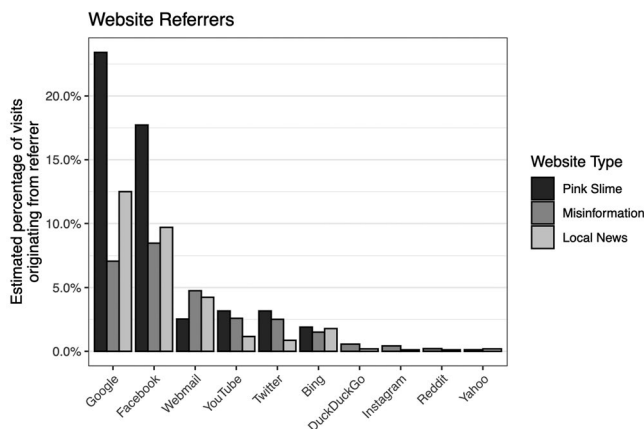


Figure 3. Referrers to Pink Slime, Misinformation, and Local News Websites.

Note: Percentage of total visits to pink slime, misinformation, or local news websites that were referred by each source (Google, Facebook, Webmail [mail.yahoo.com, outlook.live.com, mail.google.com, mail.aol.com], YouTube, Twitter, and Bing). DuckDuckGo, Yahoo, Instagram, and Reddit did not refer to any pink slime visits in our data.

Pink Slime Where?

We first tested the hypothesis that news deserts are associated with pink slime exposure. Specifically, in H1 we predicted that the fewer local news outlets available to someone, the more likely they are to consume pink slime. To test H1, we used a linear probability model⁶ to estimate the predictors of pink slime website exposure. The dependent variable indicates whether a participant visited at least one pink slime website (1) or not (0). Our independent variable of interest is the number of local news outlets in a participant's county. We use this variable to test H1.

Although it has been speculated (Askari 2020; David 2022; Rafsky 2022; Taft 2022), we find no evidence that living in a news desert is a significant predictor of pink slime website exposure, as the number of local media outlets in one's county is not a significant predictor of their exposure to pink slime (see Table 2). In contrast, we find that the more local news outlets in one's county, the more likely they are to consume *traditional* local news sites. We obtain the same results when controlling for a series of sociodemographic covariates used in other URL-based exposure analyses (Table 2, Guess, Nyhan, and Reifler 2020; Moore, Dahlke, and Hancock 2023). While we replicate the relationship between local news outlet availability and the consumption of local news online identified by Althaus, Cizmar, and Gimpel (2009), we take

Table 2. Predicting Exposure to Pink Slime and Local News Websites.

	Exposure to at least one website			
	Pink Slime	Local News	Pink Slime	Local News
News Outlets in County	−0.0001(0.0002)	0.002**(0.001)	−0.0000(0.0002)	0.002**(0.001)
Trump supporter			−0.05*** (0.01)	0.02(0.03)
Political knowledge			0.002(0.01)	0.06*** (0.01)
Political interest			0.01(0.01)	0.04*(0.02)
College			−0.04** (0.01)	0.10** (0.03)
Female			−0.02*(0.01)	−0.05(0.03)
Non-white			−0.04*** (0.01)	−0.03(0.03)
Age 30–44 years			−0.01(0.02)	0.04(0.05)
Age 45–64 years			0.03(0.02)	−0.02(0.05)
Age 65+			0.003(0.02)	−0.08(0.05)
Constant	0.04*** (0.01)	0.35*** (0.02)	0.04(0.03)	0.12(0.07)
Observations	1,056	1,056	1,056	1,056
R ²	0.0002	0.01	0.04	0.07
Adjusted R ²	−0.001	0.01	0.03	0.06
Residual Std. Error	0.18 (df = 1054)	0.49 (df = 1054)	0.18 (df = 1045)	0.47 (df = 1045)
F Statistic	0.18 (df = 1; 1054)	8.65** (df = 1; 1054)	4.78*** (df = 10; 1045)	7.53*** (df = 10; 1045)

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Note: OLS regression coefficients are shown with standard errors in parentheses (models estimated using survey weights). The dependent variable is a binary variable indicating whether an individual was exposed to at least one of the given website type (Pink Slime or Local News) website during the data collection period (1) or not (0). "Trump supporter" variable: intending to vote for Trump in 2020 election = 1; not intending to vote for Trump in 2020 election = 0. "Political knowledge" variable: variable ranging from 0–4 representing the number of questions in Pew Research Center's civic knowledge questionnaire answered correctly out of 4. "Political interest" variable: variable ranging from 1–4 where 4 = people who say they pay attention to what's going on in government and politics "most of the time" and 1 = those who pay attention "hardly at all". "College" variable: 1 = college graduate; 0 = not a college graduate. "Female" variable: 1 = indicated identifying as a female, 0 = did not indicate identifying as a female. "Non-white" variable: 1 = indicated identifying as a race other than white; 0 = indicated identifying as white. "News Outlets in County" variable = number of news outlets in respondent's county. p -values are two-sided.

Table 3. Distance Between Participants and Visited Pink Slime and Local News Websites.

	Distance to news consumption		
	Pink Slime Distance	Local News Distance	Difference
Pink Slime			89.149(94.454)
Constant	506.043***(111.012)	598.091***(33.226)	590.892***(32.787)
Observations	32	6,073	6,105
Log Likelihood	-210.497	-46,154.150	-46,403.350
Akaike Inf. Crit.	426.995	92,314.300	92,814.700
Bayesian Inf. Crit.	431.392	92,334.430	92,841.570

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Note: Multi-level regression coefficients are shown with standard errors in parentheses. Coefficients are clustered on individuals. The dependent variable is the distance in miles between a person's self-reported zip code and the purported location of the pink slime or local news outlet. Model 1 ("Pink Slime Distance") is examining only pink slime visits. Model 2 ("Local News Distance") is only local news. In Model 3 ("Difference"), the Pink Slime variable is a binary variable 0 (not pink slime) or 1 (pink slime). Thus, the pink slime coefficient represents the difference between pink slime and local news outlets.

the non-significant relationship between local news outlet availability and the likelihood of consuming pink slime as evidence rejecting H1.

Finally, we explored RQ4, which asked where people are geographically located in relation to the locations of pink slime outlets and the local news outlets they visit, by analyzing differences in the geo-digital distance between pink slime and traditional local news exposure. Geo-digital distance is the distance between a person's actual geographic location and the purported location of an information source, in this case, local news and pink slime websites. If pink slime outlets' goals are to leverage the guise of local relevance and trust in local news to generate interest and perceived credibility among users (Bengani 2021; Massoglia 2020; Zickgraf 2022), the outlets should actually reach users in the localities they purport to represent.

To start, we estimated the approximate latitude and longitude of the participants who were exposed to pink slime websites⁷. Then, we approximated the latitude and longitude of the locality that each visited pink slime website claimed to be from by taking the centroid—the geographic center—of the pink slime outlet's purported locality. For example, the Madison-St. Claire Record purports to be located in Madison, Illinois. We coded this entry as having a latitude and longitude of (38.8114, -89.9532), the central geolocation of Madison, Illinois. Next, we calculated the distance in miles between a person's location and the pink slime or local news outlet they consumed. Finally, we estimate a series of multilevel models, clustered on individuals, to estimate the average distance between individuals and the pink slime and local news that they consumed, as well as the difference in the average distance between pink slime and local news.

On average, the distance between one's self-reported location and the purported distance of visited pink slime websites is 506.0 miles (95% CI = 288.4–723.6). For local news, this distance is 598.1 miles (95% CI = 532.9–664.1). These distances are not significantly different (see Table 3). In other words, the distribution of distances between people's physical location and the "location" of the pink slime outlets they consume is similar to that of the local news outlets they consume, although both average distances are over 500 miles away (see Figure 4 for a visualization of the distributions of distances).

Location of individuals and their local news/ pink slime consumption

dot = individual location, arrow tip = pink slime location

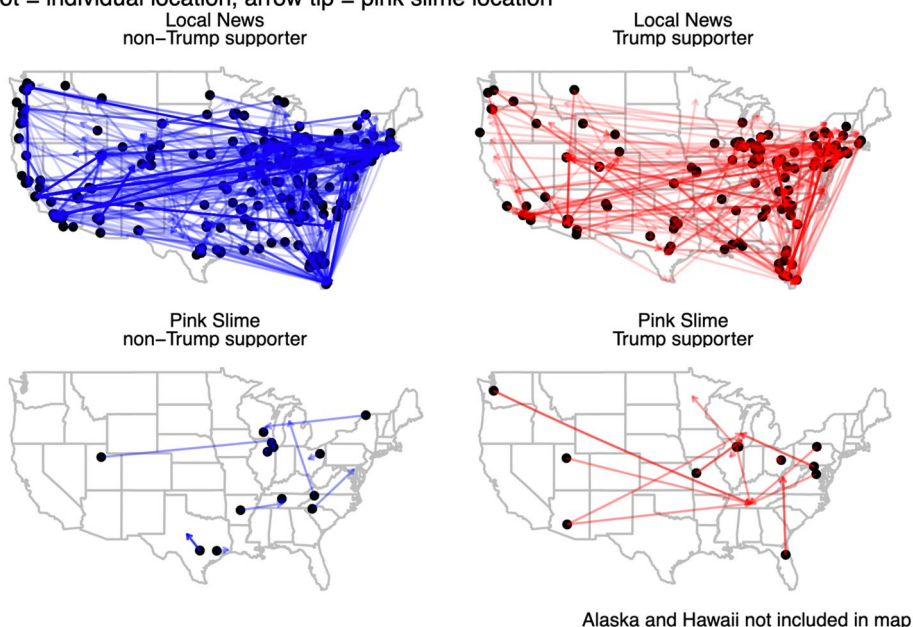


Figure 4. Locations of Participants Relative to Visited Local News and Pink Slime Websites.

Note: Map showing the reported locations of individuals (dots) connected to the purported location of the pink slime website they were exposed to (where the arrow is pointing). Local news visits are in the top row. Pink slime visits are in the bottom row. Non-Trump supporters are in the left column. Trump supporters are in the right column.

Discussion

Summary of Findings

Overall, we found that 3.7% of Americans visited at least one pink slime website during the 2020 US election. Pink slime consumers made few total visits to pink slime sites. The consumption patterns of pink slime differed considerably from those of misinformation and local news, two categories of information that pink slime is often discussed alongside. Specifically, exposure to pink slime was less concentrated than exposure to misinformation. Also, those most likely to consume misinformation (older adults and conservatives) were not more likely to visit pink slime. Those who did visit pink slime websites were more likely to be supporters of then-presidential candidate Joe Biden, to have less than a college education, to identify as a gender other than female, and to identify as white. Levels of exposure to pink slime were considerably lower than those to traditional local news, a pattern consistent with disparities in exposure to traditional and political alternative media identified in other work (Andersen et al. 2022). The topics of the pink slime websites people visited differed greatly from those of the pink slime articles produced, as well as from those pink slime outlets promoted *via* Facebook and Twitter. The most common referrers to pink slime were, in order, Google, Facebook, YouTube, and Twitter, all of which referred a higher percentage of

pink slime visits than misinformation or traditional local news website visits. Although hypothesized in prior reporting on pink slime (Askari 2020; David 2022; Rafsky 2022; Taft 2022), we did not find that living in a news desert increased people's likelihood of consuming pink slime. This result aligns with other work showing that those living in news deserts are not more likely to consume low-quality news overall (Greene et al. 2024). We also found that individuals were located similarly far away in geographic distance from the purported locations of the pink slime outlets whose content they consumed as the locations of the traditional local news websites they visited, in both cases being on average over 500 miles away, suggesting a potentially similar discrepancy in the intended and actual audiences of both pink slime *and* local news sites.

Contributions

We make two core contributions. First, we present a comprehensive view of pink slime readership *via* web browsing behaviors. Our findings indicate disconnects between production and consumption. While existing work emphasizes network growth (Arvanitis and Sadeghi 2022; Bengani 2020, 2022), we provide evidence that pink slime outlets reach relatively few people and play minor roles in online media diets. Many prominent topics produced (and promoted *via* Facebook and Twitter) hardly register among articles consumed. These findings stimulate important new questions for research on pink slime journalism specifically and local news in general, which we discuss in detail in the next section.

Second, we advance imagined audiences research. We use the imagined audiences framework to compare production (topics and purported geographic locations) to consumption. Produced pink slime reveals imagined audiences, while consumed pink slime reveals “real” audiences. Most research doesn't compare imagined to real audiences; instead, it focuses on who journalists imagine as their audience and how that shapes reporting (Nelson 2021). Our findings indicate that complementing information about outlets' imagined audiences with data on real audiences can reveal insights about readers' preferences and the broader information ecosystem. Did our participants not consume much of the pink slime that was produced because they preferred a more narrow subset of the topics of pink slime outlets' content, or did features of the information environment (e.g., search engine and social media algorithms) systematically direct them to some pink slime content over others? Journalists often hesitate to be reflexive of their imagined audience because they believe they can never truly know who is consuming their articles (Nelson 2021). Through our approach, we show that imagined-audience research, more broadly, *can* actually study who is consuming their content – and thus can possibly move towards the what, where, when, and why of consumption.

Future Research//Pink Slime: Why?

We highlight three future research directions. First, our findings call for a deeper investigation into the mechanisms underlying the pink slime consumption dynamics we observe, which can provide insights into the “Why's” of pink slime production and consumption. For instance, do we observe relatively low levels of pink slime

consumption because people simply do not encounter much pink slime *via* search engines or social media, because they recognize and purposefully avoid pink slime, because these websites are still relatively new and unknown, because these websites do not have a notable presence in a state or city in terms of relevant stories, or because other types of content successfully outcompete pink slime for readers' attention, perhaps because much of pink slime's content is seen as irrelevant or disreputable? Even though much of the pink slime produced is automatically or programmatically generated (Royal & Napoli, 2022; see also Table 1), we found that many of the stories consumed were not programmatically generated. Was this because people avoided stories they perceived as auto-generated, because algorithms down-ranked or refrained from showing them to users, or because the operators themselves didn't push templated stories? These open mechanistic questions are inspired by our empirical findings. Focused research on them can not only better help scholars better understand the role and reception of pink slime journalism in the digital news environment but also other types of content that individuals encounter alongside or instead of pink slime, and features of the [online information](#) ecosystem itself (e.g., the roles of algorithms, location-based recommendations).

Second, future work should continue to conceptualize pink slime. Though often discussed as misinformation (Choate and Hatfield 2022; David 2022; Lynch 2022), consumption of the two types of content is quite different. While Trump supporters were more likely to visit misinformation, Biden supporters were more likely to visit pink slime. Moreover, pink slime consumption patterns differ from those of local news, too. Pink slime has not matched the prominence of local news in media diets, even in news deserts. Emphasizing pink slime's prevalence may thus erode trust in local news. Altogether, our results suggest that pink slime should be conceptualized as a unique phenomenon.

Third, we identify the distribution of local news exposure (concentrated, with few consuming most), referrer patterns (Google dominates), and consumer demographics. Participants averaged ~600 miles from local news outlets. Since pink slime reached people at a similar distance to local news, either local news is not reaching "local" readers or pink slime is succeeding "locally." This finding could relate to consolidation and nationalization of coverage in local news (Martin and McCrain 2019), but longitudinal data is needed to assess that explanation.

Limitations

Our findings must be interpreted in light of our study's limitations. First, our URL-based data only captures visits to websites, not to feed-based platforms where people scroll without clicking URLs. As pink slime outlets advertise more on social media (Alba 2022), future work must capture feed-based exposure. Second, our sample was skewed toward older, whiter participants. While we used weights provided by YouGov, findings may not perfectly reflect Americans' consumption. The YouGov Pulse panel underrepresents non-high school graduates and leans Democratic (Guess, Nyhan, and Reifler 2020).

Third, our data were collected around the 2020 presidential election. Since that time, pink slime networks have grown in the number of outlets and the amount of

funding they have to support their efforts (Bengani 2022). Their use of social media platforms has changed (Alba 2022), as have efforts to moderate pink slime's reach (Arvanitis and Sadeghi 2022). Amidst these changes, the amount of public discourse about pink slime has very likely increased. Additionally, online platforms have evolved since 2020 in how they present news to users, potentially including content from pink slime outlets (e.g., Facebook has adjusted its Feed to reduce the amount of political content presented to some users; Stepanov 2021). For these reasons, the consumption of pink slime today and in the future may differ from what we documented during the 2020 election. It is important to continue work on pink slime consumption so we can update and deepen our understanding of how much, who, and through what channels people consume it.

As additional context for how the pink slime and broader local news landscape have changed since the data for this paper were collected (the 2020 US election), not only have the networks operating pink slime outlets grown, but a new related strategy—partisan actors buying up local journalistic outlets—has emerged further dismantling the local news ecosystem (Coppins 2021; Folkenflik 2024). For example, the largest electric company in Alabama purchased a historic Black newspaper and neglected to cover soaring power bills (Green 2024). One of the key entities that we discuss in this paper, Metric Media, bought an 80-year-old local news outlet in Mount Vernon, Ohio (Green, Smith Richards, and Bengani 2024). A recent investigation found that the newspaper was helping fossil-fuel interests kill a solar endeavor in the town (Green, Smith Richards, and Bengani 2024).

Pink slime's evolution occurs in the context of broader political events and declining trust in media. In 2024, more than sixty countries held elections, and incumbents largely struggled (Wike, Fagan, and Clancy 2024). This widespread defeat of incumbent governments comes at a time when 36% of adults in the U.S. have no trust in mass media, with a further 33% expressing "not very much" confidence (Brenan 2024). In our fragmented information ecosystem, pink slime news outlets continue to grow, possibly fomenting an environment that breeds further divisiveness, which can, in turn, be exploited by motivated actors, both domestic and foreign.

While our analysis focusing on 2020 shows that just under 1 in 25 American adults were exposed to one or more of these pink slime outlets, the number may have risen significantly as these sites adapt their strategies (both advertising and editorial), find new benefactors, buy trusted local news names, and dispatch physical mailers (e.g., Christian and Scanlon 2024; Pearson 2024) thereby widening their reach. And yet—they won't be working in isolation, but within a broader surround-sound ecosystem where different media formats and voices echo the same talking points and amplify each other, adding layers of credibility.

Fourth, in our analysis of RQ2, we treat the content produced and promoted by pink slime outlets as representing the imagined audience of pink slime journalism. While news organizations presumably publish content they think their audiences will want to read, the literature on *news values* suggests that a wide range of factors contribute to what news journalists ultimately choose to cover (Kepplinger 2008). Some of these factors include timeliness, prominence and impact, proximity, novelty, exclusivity, and news organizations' ideological or commercial agendas (Harcup and O'Neill 2017; Reese and Shoemaker 2013). Furthermore, local news outlets likely have

some distinct news values from national media, which influence their production behaviors (Jenkins and Nielsen 2020). In the case of online news in particular, the pressure to obtain clicks and shares influences decisions about which news to cover (Phillips 2012). In other words, while readership is likely an important factor in selecting news stories to cover, it is not the sole factor. For instance, while participants in our data did not visit any of the templated pink slime stories about gas prices (see Table 1), pink slime outlets may have been running those stories as a way to optimize placement of their outlets' content in search engine results or otherwise build credibility in algorithmic systems by publishing relevant, factually accurate information at a large scale (Zickgraf 2022). Thus, while our findings seem to reveal a disconnect between pink slime journalism's imagined and actual audiences, pink slime outlets may choose to run certain stories or types of stories that they do not intend readers to read, but rather serve other purposes. Future work should endeavor to better understand the motives behind pink slime outlets' selection of content to publish and how these differ from traditional local news outlets.

Fifth, while our findings reveal people's exposure to pink slime journalism, they do not speak to the *effects* of those exposures on people's offline attitudes and behaviors (e.g., voting decisions, support for public policies). Existing research on other types of online content, such as misinformation, is mixed regarding direct linkages between exposure to misinformation and behavioral or attitudinal consequences. While some studies indicate that exposure can change people's attitudes or behaviors (e.g., Porter, Velez, and Wood 2022), others indicate that exposure, especially in small amounts, has minimal effects (e.g., Drummond, Siegrist, and Árvai 2020). It will be essential for future work to trace the behavioral consequences of pink slime exposure to fully understand pink slime journalism's effects on society.

Notes

1. The term "journalism" in "pink slime journalism" is not used to make a judgment about the journalistic practices and properties of pink slime outlets and their content. In fact, the Society of Professional Journalists has been publicly critical of pink slime journalism (e.g., https://x.com/spj_tweets/status/1711358350976283071). However, we use the terminology "pink slime journalism", because it is used by reporters and other experts to refer to pink slime journalism (and differentiates it from pink slime in other contexts, such as the byproduct added to ground beef).
2. "General misinformation" refers to news and information websites that repeatedly publish false content, but are not specifically designed to appear as local news outlets in the way pink slime websites are; for the sake of brevity we use the term "misinformation" throughout the rest of the manuscript to refer to "general misinformation".
3. Code and data to reproduce the results in this paper are available at <https://github.com/rossdahlke/pink-slime/tree/main>. Aggregated visit data, as opposed to data at the URL-level, are provided to maintain participant privacy.
4. <https://www.newsguardtech.com/>.
5. <https://www.usnewsdeserts.com/>.
6. Linear probability models are used for this analysis due to their ease of interpretation, computational simplicity, robustness to model misspecifications, and practicality in handling large samples (Angrist and Pischke 2009; Hellevik 2009), while producing results similar to logistic regression (Hellevik 2009). As a robustness check, we also present a logistic regression in (Supplemental Materials B Table S2).

7. To protect participant privacy, we used the centroid of their self-reported zip code as their “location” for participants who provided their zip code.

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