



Research Paper

Food Safety Standards Requirement Setting and GAP Audit Program Acceptance Decision-making by U.S. Buyers



Jelili Adegboyega Adebiyi ^{1,†,*}, Leslie D. Bourquin ^{2,*}

¹ Department of Earth, Environment, and Geographical Sciences, Northern Michigan University, Marquette, MI 49855, USA

² Department of Food Science and Human Nutrition, and the Institute for Integrative Toxicology, 469 Wilson Road, Michigan State University, East Lansing, MI 48824, USA

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ABSTRACT

The US Department of Agriculture Agricultural Marketing Service (USDA AMS) developed suites of voluntary fee-for-service Good Agricultural Practices (GAPs) audit verification programs, which, for reasons not well understood, are underwhelmingly accepted by produce buyers. To explore this low acceptance, this study conceptualized that buyers set food quality and safety requirements that their suppliers must meet to access their markets. These requirements likely influence which audit programs buyers deem acceptable. To date, no study has examined how buyers set these requirements or how such decisions shape their acceptance of GAP audit schemes. Therefore, this study surveyed and interviewed buyers to understand their food safety requirements for various types of produce, suppliers, and operations, as well as how these factors influence their selection of audit programs. The resulting information was used to understand the implications of buyers' food safety requirements for the low acceptance of USDA GAP audit schemes. The findings revealed that buyers' decisions regarding food safety requirements and audit acceptance are complex, shaped by numerous contextual factors, including regulatory demands, supplier and their operation types, operation scale and location, brand types, retailer reputation, produce risk profiles, and the type, scope, and stringency of audit schemes. The primary factors were the buyers' customers' requirements. Beyond fostering food safety, the requirements were set to strengthen buyers' reputation and competitiveness, enhance quality assurance, and help them capture a share of the produce market. The study concludes by discussing the implications of these findings for expanding acceptance of USDA GAP audit schemes.

Produce retailers considerably influence the development and implementation of private and public food safety audit programs. Alongside business coalitions and industry organizations, retailers are key stakeholders behind major private standards such as Brand Reputation through Compliance (BRCGS, formerly British Retail Consortium (BRC)), GLOBALG.A.P., Safe Quality Food (SQF), and PrimusGFS (Fulponi, 2006; Havinga, 2013; Humphrey, 2012). Major buyers often require their suppliers to comply with specific food safety standards and to certify their produce and facilities against designated audit schemes. As a result, voluntary private standards are practically required for suppliers aiming to access large retail markets. Retailers, therefore, wield significant influence on the GAP audit schemes that growers adopt (Fagotto, 2014; Havinga, 2013; Henson & Northen, 1998; Minor et al., 2019). Buyers may impose stringent food safety requirements to protect and strengthen their brand reputation (Kotsanopoulos & Arvanitoyannis, 2017; Manning, 2007; Marks,

2016; Zheng & Bar, 2021) and to uphold the trust and loyalty of consumers (Fagotto, 2014; Fulponi, 2006). Retailers may also require private-label suppliers to meet specific food quality standards (Fagotto, 2014). These dynamics have implications for the GAP audit programs and standards that get accepted by retailers and widely adopted by suppliers.

Despite retailers' substantial influence on produce safety audit programs and standards, most studies focus on suppliers, examining barriers to GAP standards adoption (Marine et al., 2016; Mohammad et al., 2019), certification costs (Becot et al., 2012; Hardesty & Kusunose, 2009; Karp et al., 2015; Ribera et al., 2012), and the impact of training on GAP implementation (Tobin et al., 2013). In contrast, little is known about how buyers establish their food safety requirements or what drives their decisions regarding acceptable GAP audit programs. To date, no study has directly explored these buyer-side dynamics. The closest work involved nine semi-structured interviews

* Corresponding authors.

E-mail addresses: jadebiyi@nmu.edu (J.A. Adegboyega), bourqui1@msu.edu (L.D. Bourquin).

† Department of Food Science and Human Nutrition, 469 Wilson Road Michigan State University, East Lansing, MI 48824, USA.

examining retailers' roles in food safety standards, with only limited attention to their requirements and how these might evolve under the Produce Safety Rule of the Food Safety Modernization Act (FSMA). The FSMA is a federal government regulation enacted in 2011 to help prevent food safety issues (Minor et al., 2019).

This mixed-methods study aimed to address this gap in the literature by examining buyers' food safety requirements for various types of produce, suppliers, and operations, and how those requirements shape the audit standards they require their suppliers to comply with. It also examined the decision-making power, factors, and processes that influence retailers' acceptance of GAP audit programs from their suppliers. Finally, the study examined the implications of these retailer-driven decisions for the broader adoption of USDA GAP standards by food retailers.

The USDA Agricultural Marketing Service (AMS) provides voluntary, fee-for-service GAP audit programs to help growers and shippers demonstrate to consumers and retailers that they are taking steps to minimize microbial contamination of fruits and vegetables throughout the supply chain. These include the USDA Good Agricultural Practices (GAP) and Good Handling Practices (GHP) audit program (USDA GAP&GHP), launched in 2002; USDA Harmonized GAP (HGAP), launched in 2011; USDA GroupGAP, launched in 2016; and USDA Harmonized GAP Plus+ (HGAP Plus+), introduced in 2018. Each program varies in complexity and scope to accommodate different market needs, operational types, and farm sizes, resulting from collaborative efforts involving retailers and other stakeholders (Minor et al., 2019; Raymond et al., 2018; USDA, 2009). To varying degrees, all four USDA GAP standards align with FDA food safety rules as well as industry- and buyer-specific requirements, intending to foster broader acceptance among retailers.

Contrary to the agency's expectations, USDA GAP audit schemes have not gained widespread acceptance among produce retailers. One possible reason is that these standards may not fully align with retailers' food safety requirements for different types of produce, suppliers, and operations. In a market dominated by private produce safety standards, retailers often require suppliers to certify under programs that meet or exceed their specific criteria. Third-party private standards such as BRC (now BRCGS), PrimusGFS, and Safe Quality Food (SQF) are also likely perceived as more rigorous or comprehensive than USDA GAP standards (Bar & Zheng, 2019; Fagotto, 2014; Fulponi, 2006). To meet consumer expectations for food safety and quality assurance, retailers may prioritize certification to Global Food Safety Initiative (GFSI) schemes, such as BRC and SQF, over non-GFSI programs (Kotsanopoulos & Arvanitoyannis, 2017). These dynamics shaped this study's focus on how such factors influence buyers' food safety requirement-setting, audit scheme acceptance, and the broader adoption of USDA GAP audit programs.

To achieve its underlying objectives, this study accounted for the possibility that retailers' food safety requirements and acceptable standards may vary depending on whether produce is categorized as low- or high-risk. The study also considered that retailers' reputation may influence their choices of audit standards and food safety requirements, as well as whether a scheme is widely accepted in the industry (Crandall et al., 2012; Havinga, 2013; Kotsanopoulos & Arvanitoyannis, 2017; Sansawat & Mulyil, 2011). Additionally, it was theorized that retailers might weigh how their food safety requirements and audit standard choices could impact their reputation and competitive positioning. This study further rationalized that branding produce as private or national commodities could shape retailers' audit expectations and, in turn, affect their food safety requirements and acceptable standards (Lyton & McAllister, 2014; Manning, 2007). The perceived impact of these standards on food safety and quality assurance may also influence their decision-making (Crandall et al., 2012; Fulponi, 2006). These considerations informed both the study's design and data collection.

Materials and methods

Data collection and analysis. Data were collected through semi-structured interviews and a national survey distributed to produce buyers via the Michigan State University (MSU) Qualtrics platform. Interviews were conducted virtually, both before and after the survey. The postsurvey interviews focused on how buyers decide which GAP audit programs to accept. The interviews employed a breadth-depth approach to capture detailed and diverse perspectives on how buyers establish food safety requirements and assess audit schemes (Ahmed, 2025). Therefore, ten buyers were purposively selected from leading produce retailers of various sizes, and regional, national, or multinational scope for the interviews. Participants included professionals such as an Own Brand Quality Assurance Manager, Produce Quality Manager, Director of Food Safety and Quality Assurance, and Executive Vice President, among others. All interviewees possessed in-depth expertise in food safety requirements and had firsthand knowledge of how decisions are made regarding the acceptance of GAP audit schemes in their current and past retail organizations, as well as across the industry. The interviews were stopped upon reaching saturation, as no new meanings, nuances, or themes emerged related to the issues under exploration (Wutich et al., 2024).

Interviewees were asked how their retail organizations set food safety requirements and what factors influence those decisions. They also discussed the types of GAP audit schemes their organizations accept from suppliers, and whether acceptance depends on factors like audit scope, commodity brand type, produce risk profile, and supplier operation type or scale. Some interviewees also drew on their experience with other retail organizations, including previous employers. Insights from the presurvey interviews helped shape and refine the survey, which was pretested with select stakeholders in the produce industry before its launch.

The refined survey included questions on several key topics: (i) retailers' food safety requirements across supplier types, operations (field and formal packing), and commodities (both high-risk and low-risk produce); (ii) how and why requirements differ among suppliers; (iii) acceptance of Group or multisite food safety certifications; (iv) factors influencing the decision to adopt new food safety standards; (v) criteria for accepting suppliers' food safety programs; and (vi) how confident and satisfied retailers' were with their produce safety assurance programs.

The survey was distributed via targeted and general listservs of produce buyers, as well as through professional societies and trade associations, such as the International Fresh Produce Association (IFPA). Reminders were issued to boost the response rate. Of the 41 buyers who responded, only those who completed three-quarters or more of the survey were included for analysis, totaling 34 participants. Survey data were analyzed in STATA, focusing on descriptive statistics and cross-tabulations to assess univariate associations. Semi-structured interviews were analyzed thematically, identifying patterns and insights that addressed the study's core research questions. Illustrative quotes were cited in-text. However, in line with Lingard's (2019) suggestion, to enhance the readability and clarity of the qualitative findings, selected illustrative quotes were also presented in Tables 6 and 7.

Results

Demographics. The majority of survey respondents were wholesalers (35%), followed by processors and retailers (Table 1). As shown in Figure 1, the buyers ($n = 34$) sourced their fresh produce from a mix of suppliers, with a clear tendency to rely on both large ($n = 24$) and small-scale growers ($n = 22$). Distributors or brokers were also frequently used, along with a notable number sourcing from very small-scale growers. A smaller group reported obtaining produce through food hubs. Among the highest-volume buyers, those

Table 1
Profile of fresh produce buyer respondents

	Frequency	% of Responses
Large store	1	2.5
Small store	1	2.5
Early Childhood Education	1	2.5
K-12 Education	1	2.5
Elder Services	1	2.5
Healthcare	1	2.5
Other food retail	1	2.5
Higher Education	2	5
Other food service	2	5
Food Hub	4	10
Processor	5	12.5
Retail	6	15
Wholesale	14	35
Total	35	100

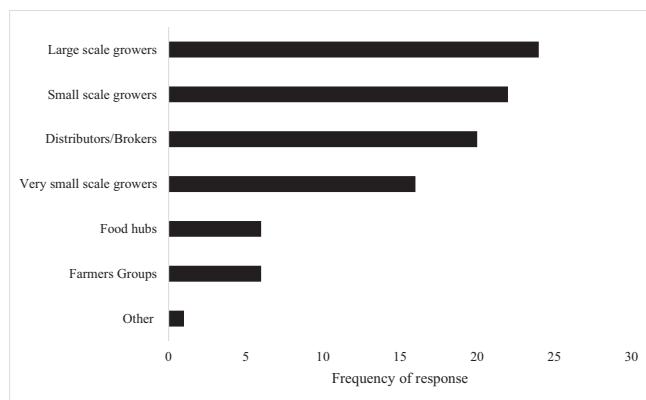


Figure 1. Sources where the buyers purchase fresh produce (n = 34).

transacting over \$40 million annually, there was some indication of vertical integration, with one respondent reporting in-house production through hydroponics and small garden plots. Overall, respondents demonstrated substantial industry experience, averaging 20 years in the fresh produce sector and approximately 17 years working with food safety standards.

Audit requirements setting. Buyers' produce audit requirements varied by supplier type. When asked whether they held all suppliers to the same food safety standards (n = 32), 19% (n = 6) of the buyers responded "no," while 81% (n = 26) responded "yes" (Table 2). The respondents who answered "no" included small retailers and a big wholesale produce buyer. Several factors influenced the decision to apply different standards, including whether the supplier is local, whether the product is typically eaten raw, or if the commodity has been linked to recent foodborne outbreaks. One respondent noted that their decision depends on whether the end-use customer requires a specific standard for a given supplier or product. The survey also asked which suppliers were subject to these differentiated requirements. Most buyers pointed to very small growers, distributors, and brokers, as well as both foreign and local suppliers.

Additionally, buyers' audit requirements varied by both produce type and operation type. Sixty-nine percent (n = 20) of buyers (n = 29) reported requiring the same food safety assurances for all produce, while 31% (n = 9) did not. A common pattern emerged: buyers often required GFSI-benchmarked audits, particularly PrimusGFS, GLOBALG.A.P., and SQF, for produce with a history of foodborne illness outbreaks. Some also accepted USDA HGAP variants, LGMA (Leafy Greens Marketing Agreement), and non-GFSI standards for this category. Regarding operation types, two buyers noted that they applied different standards depending on whether a commodity was packed in the field or a formal facility.

Table 2

Descriptive statistics on whether buyers accept the same standard for all produce, field, or formal packing operations

Items	Frequency	Percentage
<i>Require the same food safety requirements for all suppliers</i>		
Yes	26	81
No	6	19
Total	32	100%
<i>Have the same food safety assurance for all produce</i>		
Yes	20	69
No	9	31
Total	29	100%
<i>Accepts the same standards for produce packed in the field/formal packing operation</i>		
Yes	25	92.6
No	2	7.4
Total	27	100%
<i>Requires suppliers to work with a specific third-party certification body</i>		
Yes	7	26.9
No	19	73.1
Total	26	100%
<i>Requires suppliers to undergo multiple audits to meet multiple buyers' requirements</i>		
Yes	8	30.8
No	18	69.2
Total	26	100%

To meet audit requirements, some buyers require their fresh produce suppliers to work with specific third-party certification organizations or complete multiple audits to address differing expectations.

Major food safety programs accepted by buyers. Except for USDA HGAP, the food safety audit programs most commonly accepted by buyers were GFSI-benchmarked (Fig. 2). These included PrimusGFS, GLOBALG.A.P., and SQF. USDA HGAP, however, stood out for its relatively broad acceptance, alongside USDA GAP&GHP, BRC (now BRCGS), CanadaGAP, and the GFSI Global Markets Program (GMaP). LGMA was mentioned at a similar rate as USDA Harmonized GAP Plus+, farm/site visits, Produce GAPs Harmonized, and FSSC 22000.

Several buyers also accepted USDA GroupGAP and various state-level GAP/GHP programs. These included audits from states such as Iowa, Kansas, Maryland, New Jersey, Washington, and Florida, as well as the Commonwealth Quality Program. Some buyers accepted farm food safety plans or manuals as an alternative to a formal audit.

A subset of buyers required compliance with their own company-specific standards (n = 9, 26.5%). Among these were five buyers whose organizations or institutions transacted at least \$10 million per year in produce. Of those, two required certain suppliers to comply with an addendum. One buyer who purchases more than \$40 million worth of produce annually stated that they do not specify the type of GAP certification they require from their suppliers. All they wanted was a GAP audit.

There is mixed evidence on buyers' acceptance of group or multisite certification and produce inspected only by the FDA, without private or USDA GAP certification (Table 3). Most buyers—especially those purchasing at least \$1 million worth of produce annually—said they would not accept produce that is only FDA-inspected. However, some buyers in the same income group did accept it. Over half of the buyers (n = 27) reported accepting group or multisite certification from suppliers. This includes GLOBALG.A.P. Group Certification (Option 2), SQF Multisite Certification, USDA GroupGAP, and CanadaGAP Group Certification (Option B). Most who accepted group or multisite audits were large buyers.

The survey asked buyers (n = 11) who did not accept group or multisite audits to rate 14 factors in their decision-making process. The most commonly cited reasons were that group or multisite audits were not GFSI-benchmarked and did not meet their food safety audit requirements. Some also questioned how group audits were conducted

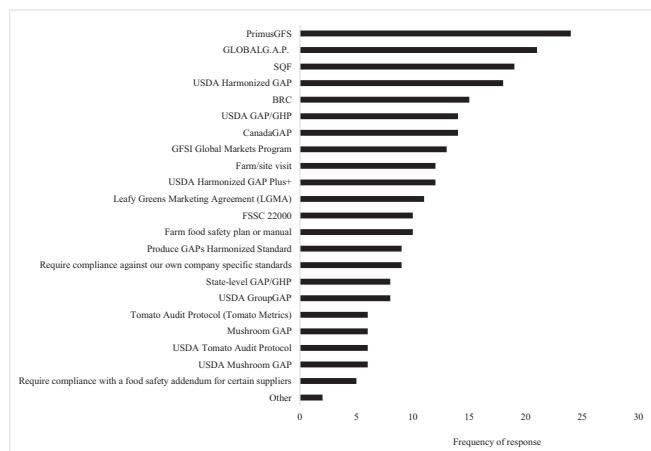


Figure 2. Food safety programs accepted by buyers from their suppliers ($n = 34$).

Table 3
Buyer acceptance of multisite certification and FDA-inspected only produce

Items	Frequency	Percentage
<i>Accepts group or multisite certification</i>		
Yes	16	59.3
No	11	40.7
Total	27	100%
<i>Group (multisite) food safety certification programs accepted by buyers from their fresh produce suppliers</i>		
GLOBALG.A.P. Group Certification	11	30.6
USDA AMS GroupGAP	9	25.0
SQF Multi-site Certification	9	25.0
CanadaGAP Group Certification	7	19.4
Total	15	100%
<i>Accepts produce from a supplier with FDA inspection only</i>		
Yes	12	46.2
No	14	53.8
Total	26	100%

and doubted the effectiveness of Group Quality Management Systems (QMS) (Fig. 3).

Retailer satisfaction and confidence in accepted food safety programs. The survey also asked questions that examined how confident and satisfied buyers were with their food safety assurance programs. Overall, buyers expressed higher levels of confidence and satisfaction with programs such as PrimusGFS, GLOBALG.A.P., BRC (now BRCGS), SQF, USDA HGAP, and USDA HGAP Plus+. However, compared to PrimusGFS and GLOBALG.A.P., a greater proportion of buyers reported being only somewhat confident, neither satisfied nor dissatisfied, with USDA HGAP, USDA GroupGAP, and USDA GAP&GHP (Table 4).

Responding to an open-ended question, buyers pointed to several reasons for their satisfaction and confidence in the standards they accepted. These included the quality of audits associated with the audit schemes, described as "high quality," "a very good program," and providing "... some assurance of safety." Satisfaction was also linked to the scope of fresh produce schemes, which were seen as more rigorous and involved: "It brings a level of confidence as there are certain standards that are requiring more of suppliers than just very basic." For some buyers, satisfaction stemmed from the alignment of the schemes' scope and requirements with specific commodities and their supplier bases, which simplified program administration. As one buyer noted, "Audit schemes are the same among our entire supplier base, allowing more efficient compliance management."

The buyers also ascribed their satisfaction to how well the schemes met the needs of their customer bases and their organization's produce safety requirements, including for low-risk produce: "Ability to meet our requirements for managing audits for our company;" "Some audits take into account too many produce and do not always accurately address our needs;" "Our produce is low risk and rarely consumed raw." Some emphasized that the schemes were tailored to fit the operational size and contexts of their suppliers: "Our suppliers are very small and would need more infrastructure for many of the certifications. They appreciate that the food safety requirements are tailored to the desires of our purchasers while also taking into account slow growth and investment for the farm."

For some, satisfaction stemmed from the broader acceptance of the food safety schemes among industry stakeholders and suppliers: "The standards we use (PrimusGFS) are widely accepted by a large sector of the industry customers and 95% of suppliers use the same standard." Others pointed to the simplicity and clarity of the standards themselves, describing them as having "clean, clear, and precise outline and directive;" "It's simple and easy to understand." Longevity also played a role in satisfaction for some buyers: "We have used it for 10 years, so very comfortable with it."

Buyers' food safety programs' acceptance decision-making. This study found that buyers' decision-making regarding food safety requirements is often top-down. Many indicated that their food safety directors or managers hold the most authority in determining which programs suppliers must follow. Next is the Executive or Head Chef, and then the Quality Assurance Director or Manager (Table 5). Additionally, most buyers consider their suppliers' preferences when deciding whether to accept a particular food safety standard. If suppliers request a specific scheme, buyers may initiate a review, provided certain conditions are met. This includes the request being viewed as worth the investment and effort, typically coming from 5 to 10 suppliers. Some buyers specified that these must be major suppliers who represent a significant portion of their supplier base.

When deciding which food safety audit programs to accept from their suppliers, many buyers cited factors such as commodity-specific food safety risks, whether the program is GFSI-benchmarked, and if it meets their supplier requirements (Fig. 4). In other words, some buyers' food safety requirements and decision-making vary by supplier and type of produce. As expected, the program's integrity and technical equivalence to GFSI were key considerations. Buyers also considered the competency of the certification body and auditor, as well as the program's potential impact on their reputation.

The study also examined which types of information buyers find most useful when deciding whether to accept a produce safety scheme. Topping their list were: evidence of a scheme's effectiveness, regulatory requirements, detailed best practices guidance, an audit verification checklist, and comparison metrics with the FDA Produce Safety Rule and other guidelines. Buyers ranked the following as least important: (1) how to plan food safety audits, (2) tools and guidelines for developing GAPs, and (3) GFSI benchmarking or technical equivalence requirements (Fig. 5).

Interview results. Process of creating buyers' food safety requirements. Depending on factors such as organizational structure and size, the process of creating buyers' food safety requirements may be either top-down or bottom-up. For large retailers, it is more often a bottom-up process, as produce may be just one of many items they handle. As a result, "the leadership may not have a strong point of view" about produce safety requirements or which schemes to accept (Food Safety and Compliance Manager). Instead, the leadership in large organizations relies on their teams to do the groundwork (Table 6, Q1). Some noted this may reflect a lack of deep expertise at the top, pushing decisions several layers down and encouraging a grassroots approach to standards development. However, the process can also be top-down in specific ways, such as when leadership seeks

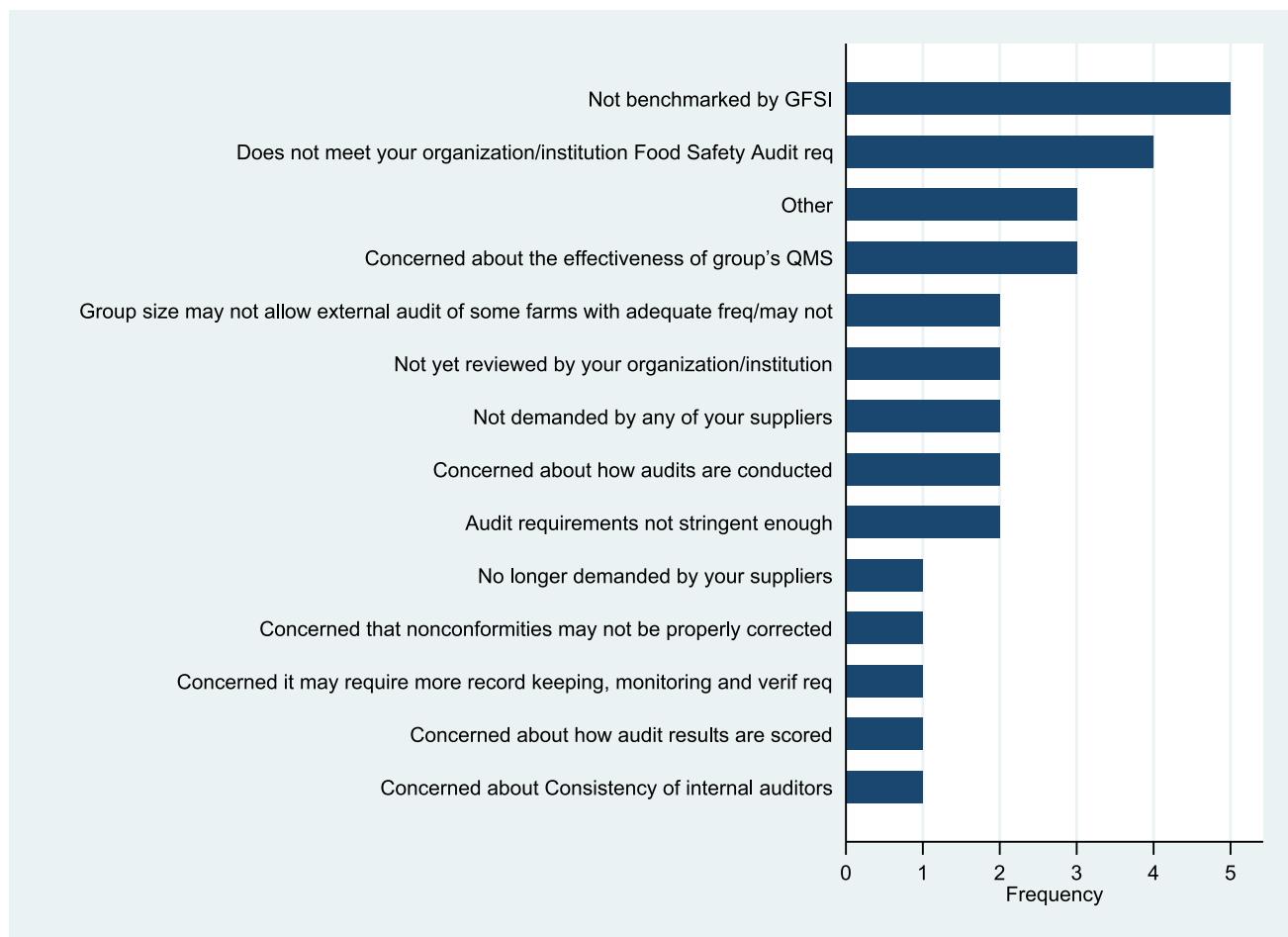


Figure 3. Reasons buyers do not accept group (multisite) food safety certification programs (n = 11).

Table 4
Confidence and satisfaction of buyers in their accepted food safety assurance programs

Items	Frequency	Percentage
<i>Buyers' confidence in the produce safety assurance programs they were using?</i>		
Extremely confident	14	56
Moderately confident	6	24
Somewhat confident	4	16
Slightly confident	0	0
Not at all confident	1	4
Total	25	100%
<i>Buyers' satisfaction with the produce safety assurance programs they were currently using?</i>		
Very Satisfied	13	52
Somewhat satisfied	8	32
Neither satisfied nor dissatisfied	3	12
Somewhat dissatisfied	0	0
Very dissatisfied	1	4
Total	25	100%

to "challenge the team to think about different things depending on how well-versed they are" (Food Safety and Compliance Manager).

The process involves conducting a gap analysis, particularly of existing industry standards that are widely accepted. This includes assessing the scope of the standards to determine how they align with GFSI, FSMA, and other regulatory requirements. The gap analysis also "involves looking at all the different elements that go into the standard and seeing if a standard would actually meet what we consider our

Table 5
Decision power within a buyer organization/institution, and whether they consider supplier preferences in their produce safety decision-making

Items	Frequency	Percentage
<i>Who holds the most decision-making power in determining the food safety programs required for fresh produce suppliers by buyers?</i>		
Safety Director/Manager	17	56.7
Quality Assurance Director/Manager	2	6.7
Regional Manager	1	3.3
Compliance Department	1	3.3
Food Service/Nutrition Services Director	0	0.0
Executive/Head Chef	3	10.0
Other	6	28.0
Total	30	100%
<i>Whether a buyer's organization/institution considers the preferences of suppliers when deciding whether to start accepting a particular food safety standard</i>		
Yes	20	76.9
No	6	23.1
Total	26	100%
<i>Considering suppliers' preferences, conditions to be met before buyers would decide to start accepting a particular food safety standard</i>		
At least 5-10 suppliers to make the request	4	16.67
Suppliers making the request must be large suppliers	4	16.67
Suppliers making requests to represent a significant portion of the buyer's suppliers	3	12.50
Requests by suppliers must be worth the organization's investment in time and effort	7	29.17
Other	6	25.00
Total	24	100%

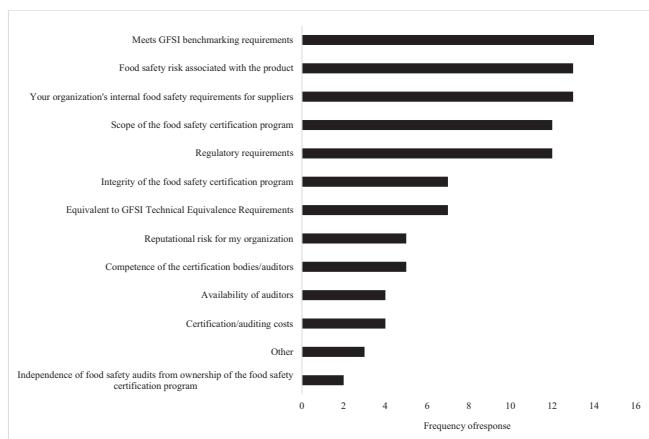


Figure 4. Factors buyers consider when deciding on the food safety programs to accept from suppliers.

requirements for food safety" (Manager – Food Safety Vendor Audits). It may also include surveying potential suppliers and other customers to assess: (1) their current produce safety practices; (2) the audit schemes that they would certify their produce or operations against; and (3) whether they would need to comply with additional requirements. Buyers also use the survey to understand what their suppliers are willing or able to implement and to inform decisions about adjusting their (buyer's) own standards (Table 6, Q2).

The results of the gap analysis may lead buyers to develop their own standards, addendums, or manuals detailing their food safety requirements (Table 6, Q3).

Buyers' food safety program acceptance decision-making and requirement setting. The interviews revealed that buyers' decisions regarding standard requirements and acceptance of produce safety audit schemes were shaped by complex, highly contextual factors. These included operation type and scale, brand type, produce risk

profile, audit type, scheme scope and coverage, and location. Most medium- to large-scale fresh produce buyers require third-party and GFSI audits from their suppliers, though some flexibility is extended to local and small-scale growers. We discuss these factors in more detail below.

Buyer and customer requirements. Buyers' and customers' requirements primarily underpin the setting of buyers' produce safety scheme requirements and the decision-making process for accepting the audit program. Most large and mid-sized buyers have key customers or end-users, such as restaurants, schools, hotels, hospitals, and industrial clients, with clear preferences for commodities certified under specific GFSI and non-GFSI benchmarked schemes (Table 6, Q4); "We would certainly use SQF or the others if one of our customers required it. ... I mean, we are doing business with McDonald's, Burger King, Subway, and big national QSR chains, and GFSI benchmarked is what they want" (Executive Vice-President). These requirements may include "addendums even for the GFSI benchmarked item" (Executive Vice-President). Such addendums are incorporated into buyers' produce safety requirements and help determine which audit schemes they accept and require from suppliers.

Market access. By meeting their customers' requirements, buyers aim to achieve two interconnected goals: promoting food safety and ensuring sustained market access. As one buyer explained, "If we do not meet up to our customers' requirements, then we are not accomplishing one of our tasks, which is to keep up our market access open... So, the way we look at our task is twofold. The obvious one, of course, is to minimize risks. But the other one is to maintain market access to our marketing team" (Vice President of Food Safety). For a related reason, the buyer noted they do not accept USDA GAP&GHP "by itself for high-risk crops" because "it impedes market access or the ability of our marketing team." The buyer further stated, "let's face it if we are contracting, especially family farms, our real job is to convert their crop to cash. And by having only the GAP&GHP audit, it impedes market access and our ability to do an adequate job of marketing" (Vice President of Food Safety).

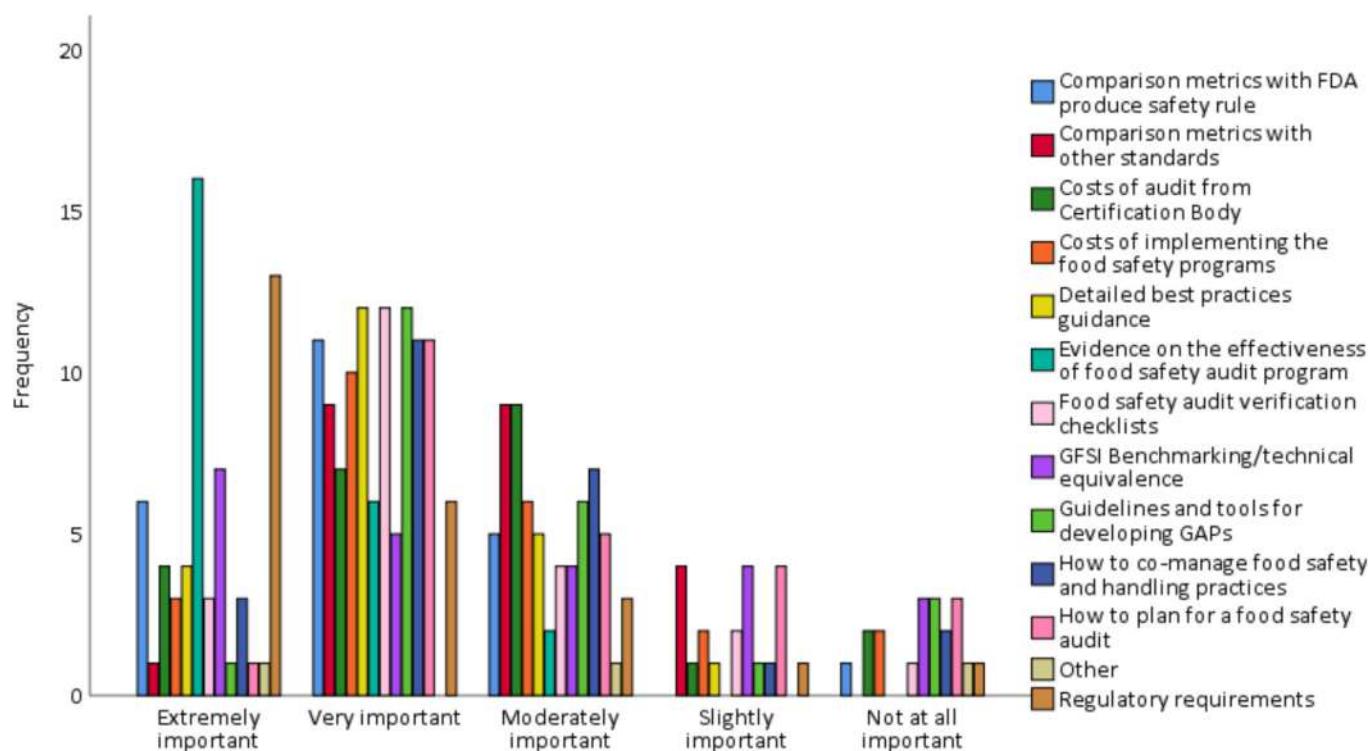


Figure 5. Usefulness of some information to buyers' food safety program acceptance decision-making.

Table 6

Illustrative quotes on the process of creating buyers' food safety requirements and the role of regulation, risk, and customer pressure in buyers' food safety requirement setting, and GAP scheme acceptance

Quotations in the text	Illustrative Quote
Process of creating buyers' food safety requirements	
Q1	"They do not get into the weeds not until they have to make a decision, and after all the legwork has been done by individual teams" (Food Safety and Compliance Manager)
Q2	"We will make an assessment, especially if we are making any changes to our own standards, to see what people are implementing out there. This helps us get a feel for how many would be in compliance already with our requirements if we introduce new requirements, as opposed to how many would be trying to comply with our requirements" (Own Brand Quality Assurance-Manager)
Q3	"We have our own manual that we document. But it is a composition of various sources that we draw from to come up with our final standards. But it's a little different from many other buying groups, where, for one reason or another, they often feel compelled to kind of have their own additional requirements or standards" (Director of Food Safety).
Buyer and customer requirements	
Q4	"We accept all the GFSI because that is what most of our customers are demanding anywhere" (Vice President of Food Safety)
Regulatory requirements	
Q5	"We do not just accept the regulatory point-blank. We want third-party assurance. And this goes with any of the programs. If they say it was inspected by the FDA or USDA, I will say that is the baseline compliance, the regulatory compliance that I expect them to comply with. I want above and beyond that" (Food Safety and Compliance Manager)
Q6	"We are trying to outcompete everybody with the buyers saying that you know, our produce, ours will lead to safer produce ... Everyone is trying to outcompete everybody with these standards" (Vice President of Food Safety)
Risk mitigation	
Q7	"What we would accept internally would be any food safety program that we feel mitigates, effectively, food safety risks. I used the term risks and not a hazards because most of the food safety programs, including GFSIs, are hazard-based" (Vice President of Food Safety).

Regulatory requirements. Regulatory requirements served as a baseline in the buyers' criteria for food safety audit programs they implemented and accepted from suppliers. The buyers did not accept commodities solely inspected by the FDA or State Departments of Health (Table 6, Q5).

Buyers sought standards beyond regulatory compliance to protect against food safety and reputational risks, as well as to remain competitive. Regulatory requirements were seen as minimums, often insufficient to prevent food safety hazards (Table 6, Q6).

Internal expertise influence. The experiences, understanding, and preferences of team members who draft the produce safety requirements for an organization can influence both the requirements themselves and the audit schemes suppliers must use for certification. One interviewee revealed that technical staff within their organization pushed for suppliers of leafy greens nationwide to implement and certify against LGMA. The buyer interviewee added that the experiences of such individuals and "how they view certain things have a very strong ability to influence and shape the standards that get accepted and new requirements" (Food Safety and Compliance Manager).

Risk mitigation. The perceived superiority of a food safety scheme and its perceived effectiveness in mitigating risks informed some buyers' food safety requirement setting (Table 6, Q7).

Supplier operational size. Some buyers considered the operational size of potential suppliers when setting food safety requirements, aiming to ensure the standards could be implemented across a broad supplier base (Table 7, Q1). From a size perspective, the ease

of implementing audit schemes feeds into buyers' decision-making (Table 7, Q2).

Operation types, scales, and location. Buyers tailored their produce safety requirements and the audit standards they accepted from suppliers based on operation type, scale, and location. One buyer whose organization does not accept USDA HGAP or HGAP Plus+ indicated that they accept GLOBALG.A.P., Primus Standard GAP, SQF, and CanadaGAP, with an addendum for field pack facilities. They also accept PrimusGFS for field pack facilities without an addendum, and CanadaGAP (Options B and C), GLOBALG.A.P., SQF, BRC (now BRCGS), and PrimusGFS for processing facilities. The buyer imposes additional requirements for processors, except those certified under PrimusGFS. They consider these standards sufficient for food safety in field pack, harvest crews, and facilities (Table 7, Q3).

Another buyer respondent stated their requirement for suppliers without facilities is "to have good agricultural practices in place" (Director of Food Safety). For those with facilities, they added, "We would require them to adhere to the GMP regulations, and depending on who they are, they have to have food safety plans to comply with the various FSMA regulations" (Director of Food Safety).

Beyond individual practices, a broader pattern emerged in how buyers expect local suppliers to meet differentiated requirements and produce safety standards. The buyers do so to support local suppliers, typically small-scale growers, while reducing compliance costs. Buyers use various strategies to help these suppliers meet differentiated requirements. One buyer, for instance, treats local suppliers as part of their own brand. As a result, these suppliers must comply with the buyer's own brand requirements but not the national brand requirements (more on this later).

Another buyer uses the scale of local suppliers' operations to determine their eligibility for certification under differentiated standards and to identify which requirements would be most beneficial to them. The buyer considers two aspects of scale: the operation's geographic spread and the number of commodities involved. To assess this, the buyer engages new local suppliers in conversation and later visits their farms: "We talk to growers, especially when we get new growers, and then when we visit, we talk about what standards might be most advantageous for each operation. ...So, if we get to a small farm. If it has one location, and one crop, that's a lot different than a small operation that might have seven or eight different locations, orchards that are spread out" (Vice President of Food Safety). For such small-scale growers, the buyer may "recommend a GLOBALG.A.P because one audit would cover the entire operation in one set of books because it's the same people with the same hazards, the same crops, or were similar crops." However, if the operation is in a single location, the buyer added, "We might recommend, for practical sense, a GLOBALG.A.P audit, or have them use another standard, based strictly on costs, in this case, if it was a low enough, low enough risk commodity" (Vice President of Food Safety).

Another buyer required their local suppliers to follow "the same basic practices" as their national suppliers, and "those practices must be in compliance with the Produce Safety Rule." These local suppliers were typically smaller and seasonal farms with "limited distribution capabilities and within seven hours' driving range of one of their distributors" (Director of Food Safety). Local suppliers had to have "a basic plan stipulating how they control food safety in their operations." While the buyer accepted USDA GAP audits for local suppliers, they preferred USDA HGAP and USDA HGAP Plus+, which were seen as more demanding and more widely accepted by customers (Table 7, Q4).

Concerning location, some buyers applied differentiated standards based on where the produce was grown. One buyer respondent noted they require LGMA for leafy green suppliers in California and Arizona, and a similar standard for suppliers outside those states (Table 7, Q5).

Brand-based food safety expectations. Buyers established differentiated audit and compliance requirements for suppliers based on the

Table 7

Illustrative quotes on the role of supplier operation size, operation types, scales, and location, produce risk profile and standard types and scope or stringency in buyers' food safety requirement setting, and GAP scheme acceptance

Quotations in the text	Illustrative Quote
Supplier operational size	
Q1	"We have very small businesses, and we have these larger corporations also. So, we tried to find something that is a medium, what would be acceptable from both sides of the screen, because you want to be able to have those produce available from a local standpoint, but then also, you know, the offerings of those larger companies" (Manager Quality Assurance)
Q2	"And certainly, the ease of execution, all things being equal, ease of execution would be the next highest item on the decision-making tree." (Executive Vice-President)
Operation types, scales, and location	
Q3	"What we are looking at is how closely the standards align with what we really expect for certain things, for like, a facility standard, what we are really going to accept and expect an audit standard to cover. So that would be the differentiation" (Manager, Food Safety Vendor Audits)
Q4	"We still accept USDA GAP audits for local farms. But we encourage them through various means to actually go to the USDA harmonized standards for their auditing, which is a little bit more demanding. It also has more acceptance on the end-user side, as people would accept it as a good audit or a good certification" (Director of Food Safety)
Q5	"For leafy greens, we are requiring GFSI, or else they are applying LGMA. If they are in California or Arizona, we require the LGMA. If they are not, we are reviewing them for that survey. What their requirements would be ... would mirror the LGMA" (Own Brand Quality Assurance-Manager). Another buyer stated that, "for US crops, we are using GLOBALG.A.P and Primus. For our South American crops, we are using a GLOBALG.A.P and BRC" (Vice President of Food Safety).
Produce risk profile	
Q6	"We go by risk in terms of what standards we are requiring" (Own Brand Quality Assurance-Manager). Buyers categorized fresh produce as either high-risk or low-risk, a terminology that, as one noted, they "don't really like to use that much" (Director of Food Safety).
Standard types and scope/stringency	
Q7	"We do have a lot of family farms that we will take a standard that is not GFSI-benchmarked... I know that even companies like Walmart will accept a non-GFSI benchmarked for small growers for a year, as they are moving in or using the local GAP" (Vice President of Food Safety)

branding of the produce, whether it was a national brand or a private label. For example, one buyer categorized their produce as a national brand and another as their own (private label), each requiring different food safety standards and audit schemes. Own-branded produce carries the organization's logo and label, unlike national-branded commodities. For own-branded produce, the standards were higher, combining food safety and quality, which suppliers were required to meet. Thus, the buyer only accepted GFSI-benchmarked standards that addressed both food safety and quality. The buyer found some GFSI-benchmarked schemes more comprehensive and better aligned with their own-brand requirements. Therefore, for their own brand, the buyer prefers SQF, especially SQF Level 3, and other standards with food quality and safety components. GFSI standards, such as BRC (now BRCGS), were also accepted, but with audits for additional requirements. For national brands, the standards were less stringent. Buyers accepted third-party audits not benchmarked by GFSI, such as the Primus standard. Moreover, if the national brand had not been linked to foodborne outbreaks or illnesses, some buyers required suppliers to complete a survey attesting to compliance with all U.S. regulations, including the FSMA Produce Safety Rules.

While brand distinctions guided general expectations, some buyers took additional steps to enforce stricter oversight, especially for private-label suppliers. One such buyer, for instance, imposed even more prescriptive and stringent requirements for their private label suppliers. In addition to requiring third-party food safety audit standards such as GFSI-benchmarked schemes, suppliers of private-label produce were expected to comply with "supplemental prerequisite programs like environmental monitoring programs" (Food Safety and Compliance Manager). They were also required to have a self-monitored testing process, though the buyer did not independently verify their Certificate of Analysis (COA). However, the buyer conducted on-site visits to perform their own audits. In contrast, for national brand suppliers, the requirements were less stringent. The buyer only verified the audit itself but did "not go too deep down to the prerequisite programs or even any additional programs that the supplier has to demonstrate compliance to" (Food Safety and Compliance Manager).

While most buyers applied stricter standards to private-label produce, there were exceptions. In some cases, buyers enforced higher requirements for national brand suppliers. Accordingly, one buyer required third-party audits not only of both facilities but also of farm operations for their national suppliers, which were mainly large companies distributing across the U.S. and into Canada. The buyer did not accept USDA GAP audits from these suppliers, citing that "... a lot of end users don't accept them as adequate" (Director of Food Safety).

Beyond branding distinctions, buyers could also consider geography and market destination when setting food safety standards, particularly whether the produce is being imported or exported. One buyer explained that when produce is exported to the U.S. under the buyer's private label, the supplier must adhere to the buyer's food safety requirements. Similarly, when own-branded produce is grown and processed in the U.S. and exported to another country, those internal requirements apply: "If it is an own-branded item that they are exporting, it is going to be our requirements because we are purchasing it, and then Mexico is buying it from us. If it is produced here and going there, then it is going to meet our requirements as we are purchasing it." In contrast, for non-own-branded produce prepared abroad and imported into the U.S., local suppliers' requirements might apply, unless the product is labeled under the buyer's own brand: "If they are preparing it in Mexico, they might have their own certain requirements. They do use ours, for our own brand, they use the same standards" (Own Brand Quality Assurance-Manager).

Produce risk profile. The characterization of produce based on risk profiles influenced the requirements and produce safety audit schemes that most buyers expected their suppliers to follow (Table 7, Q6). Buyers explained the criteria they used to determine whether a commodity was high- or low-risk. As one buyer interviewee puts it, "We will usually say a commodity is a 'higher risk' if it has been through a recall that we know has some risk behind it." High-risk produce was also defined based on suppliers' practices and how they are "handling different things," which the buyers "deem as higher risk" (Manager Quality Assurance). In contrast, low-risk produce refers to commodities that are typically not consumed raw and are not linked to foodborne illnesses or outbreaks. To classify a commodity as 'high-risk,' buyers drew on FDA documentation of produce with histories of recalls, contamination, and outbreaks. They also considered guidance from LGMA, which was said to "look at other varieties that may be involved" (Own Brand Quality Assurance-Manager).

The general practice was to impose prescriptive and stringent food safety requirements and standards for auditing high-risk commodities. At a minimum, most buyers require GFSI certification for these commodities, as GFSI schemes were considered "more robust standards" (Produce Quality Manager). Additionally, some buyers required suppliers to complete surveys containing "a lot of food safety questions" to assess how they manage aspects considered high-risk (Produce Quality Manager). Requirements also tended to be more rigorous

when the high-risk commodity was sold under the buyers' own brands. One buyer noted that their organization accepted GFSI Technical Equivalent audits for high-risk produce, such as the USDA Harmonized GAP Plus + . However, the buyer was not accepting group or multisite certification for such commodities.

For low-risk commodities, buyers were generally less prescriptive. Some required suppliers "to have good agricultural practices in place" (Director of Food Safety). There was openness to accepting non-GFSI schemes, such as USDA Harmonized audits and Primus Standard Audits.

Standard types and scope/stringency. A major finding from the interviews is that buyers' acceptance of standards depends on both the scope of the standards and whether they are GFSI-benchmarked. Regarding scope, buyers considered which food safety and quality issues were included or excluded in a standard, as well as how thoroughly these issues were addressed in relation to their requirements for specific commodities and operations. Most buyers also evaluated whether a standard was GFSI-benchmarked or its Technical Equivalence.

As indicated by the buyer interviewees, the dominant practice in the industry, especially among large retailers, is to require third-party audits and adherence to GFSI-benchmarked produce safety standards. However, this study found that buyers did not necessarily treat all GFSI-benchmarked standards equally, as they perceive differences in how these standards cover food safety and quality requirements for various commodities and operational contexts. For example, many buyers prefer PrimusGFS not only because it is fully GFSI-benchmarked, but also because its scope includes both food safety and quality.

The findings further suggest that buyers are more likely to accept non-GFSI-benchmarked standards for "low-risk" commodities or for small-scale growers as transitional audits leading toward GFSI-benchmarked standards (Table 7, Q7).

Discussion

This section broadly discusses the implications of the study's findings, including their potential impact on the increased acceptance of USDA GAPs standards by food retailers. A major implication is that buyers, particularly large fresh produce retailers, view food safety as a mechanism for enhancing and sustaining their reputational status and market access. As a result, buyers set their food safety requirements to match or exceed those that their competitors require their suppliers to comply with. In doing so, large buyers aim to achieve the dual objectives of promoting food safety and maintaining a competitive positioning in the fresh produce market (Fagotto, 2014; Henson & Reardon, 2005). This aligns with the findings by Hao (2014) and Jaffee and Masakure (2005), who reported that large retailers set superior food safety and quality requirements and accept credible audit programs to differentiate their produce and enhance their competitiveness. Thus, the findings suggest that whether large buyers will accept USDA GAP standards may primarily depend on whether doing so enhances their market access and competitive advantages in the fresh produce market (Kotsanopoulos & Arvanitoyannis, 2017). This highlights the need for USDA GAP standards to be differentiated from and strengthened relative to non-GFSI and GFSI-benchmarked private GAP audit schemes such as SQF, BRC (now BRCGS), and PrimusGFS, which are widely accepted by retailers in the US (Bar & Zheng, 2019; Crandall et al., 2012; Havinga, 2014). This can be achieved by evaluating the efficacy of USDA GAP audit standards, particularly HGAP and HGAP Plus +, against the requirements of private food safety schemes widely accepted by major fresh produce retailers. Another approach is to assess and benchmark the scope and requirements of USDA GAP standards against those of the major produce buyers and their large customers. This is because, as the results and existing studies

demonstrate, buyers widely accept specific private audit standards because the requirements of buyers and their large customers are embedded in these standards (Lambert & Frenz, 2021). Another reason is that many retailers consider private standards to be higher and more stringent than the government's food safety standards (Fulponi, 2006; Soon & Baines, 2013).

This study's results reinforced and expanded existing findings about the audit scheme requirements for branded commodities among U.S. retailers. As indicated by this study's findings, branding through food safety and quality assurance is one way that produce retailers differentiate themselves and remain competitive in the marketplace (Fulponi, 2006). For the same reason, retailers differentiate the commodities that they carry as either national or private brands (Hao, 2014). Similar to this study's findings, existing studies have reported that retailers require their branded produce suppliers, particularly those supplying to their private brands (also known as store-brands, own/home brands), to be certified against retailers' own standards, their organization's standards, or third-party audit standards that are sufficiently stringent and rigorous to ensure and protect the integrity, quality, and value of the brand as well as the retailer's reputation (Havinga, 2015; Lytton & McAllister, 2014; Richards et al., 2013; Soon & Baines, 2013).

The findings that most buyers require their suppliers to audit high-risk commodities against GFSI-benchmarked schemes are consistent with those of Minor et al. (2019) and Schoenfuss & Lillemo (2014). As indicated by Edwards et al. (2021) and confirmed by this study, such GFSI schemes include private standards such as PrimusGFS, SQF, and GLOBALG.A.P., which are considered stricter and more rigorous third-party audit schemes. When diligently followed, large retailers judged the private audit standards to be robust enough to help ensure the safety of "high-risk" commodities (Giraud-Héraudet al., 2012). Although such GFSI schemes do not always guarantee that foodborne outbreaks will not occur (Giraud-Héraudet al., 2012; Lytton, 2019; Powell et al., 2013), the prevailing belief is that they help reduce the market and reputational risk retailers face when failing to provide safe commodities (Marks, 2016; Sansawat & Mulyil, 2011). Even suppliers certified under GFSI-benchmarked schemes suggested they help guarantee a safer produce supply (Crandall et al., 2012; Crandall & O'Bryan, 2015; Crandall et al., 2017). Therefore, the findings indicate that large retailers may be less inclined to accept USDA GAP audit schemes for high-risk produce, as doing so could compromise their market access and expose them to reputational risk from foodborne outbreaks, potentially hindering their competitiveness. The findings suggest and reinforce the need for the USDA to strengthen the scope and requirements of the harmonized versions of its standards, specifically USDA HGAP Plus +, in relation to the GFSI schemes commonly demanded by buyers for high-risk commodities. The suggested emphasis on USDA HGAP Plus + is due to its GFSI technical equivalence, a major reason some large retailers, such as Amazon, accept the scheme for high-risk commodities (Amazon, 2022). The findings may also indicate that when it comes to low-risk commodities, retailers that require GFSI-recognized audit schemes for high-risk commodities are more likely to accept USDA GAP standards. Given this, USDA AMS might want to focus on low-risk commodities when marketing its standards to such retailers.

Minor et al. (2019) reported that large and small suppliers of high-risk commodities under a retailer's private label were required to comply with GFSI standards. Unlike this study, Minor et al. (2019) did not offer supporting underlying explanations for their findings. Additionally, Crandall et al. (2012) noted that Walmart required all private brand and some national brand suppliers to certify their produce against GFSI standards. The findings of this study help explain why leading retailers may require their private brand suppliers to certify to any GFSI-benchmarked standards, with or without addendums, or to comply with a required supplemental program. The results also clarified why some retailers only accept GFSI certifications, which require

food safety and quality compliance from their suppliers of privately branded commodities. Retailers require such standards from their private brand suppliers to safeguard against food safety failures that could have costly consequences on the brand and retailer's reputation (Crandall & O'Bryan, 2015; Fagotto, 2014; Kotsanopoulos & Arvanitoyannis, 2017; Richards et al., 2013). Therefore, the findings suggest that retailers may be less likely to accept certification under USDA GAP audit schemes for privately branded commodities, as they do not address food quality and are not GFSI-recognized. The results also suggest that retailers are more likely to accept harmonized versions of USDA GAP standards, particularly USDA HGAP Plus+, for their nationally branded commodities.

The results of this study also have implications for what the USDA AMS can do to enhance confidence and satisfaction of buyers in their GAP audit schemes, thereby fostering greater acceptance by retailers. One option is to improve the quality of USDA GAP audits. This is important because, as indicated by this study's results, buyers attributed their satisfaction with the produce safety they received from their suppliers to the quality of the audits. Enhancing the quality of USDA GAP audits will require further research. However, one approach could involve improving USDA auditors' training, skills, and competence (Kotsanopoulos & Arvanitoyannis, 2017; Lytton, 2019; Powell et al., 2013).

As also indicated by this study, providing evidence of the effectiveness of USDA GAP audit schemes may contribute to their broader acceptance by retailers. This may require asking growers and retailers implementing USDA GAP schemes to provide testimonials about their perceived effectiveness. The USDA AMS may also commission a study to assess the efficacy of its GAP audit programs, identify strengths and weaknesses, and develop strategies to address areas in need of improvement.

Limitations and suggestions for future research

The findings of this study underscore the need to investigate the questionnaires that retailers administer to their suppliers to determine whether suppliers must comply with additional requirements. Studying these questionnaires could provide valuable insights into how buyers establish their food safety requirements. Replicating the study with a larger sample size is also recommended. This is particularly important, given the small sample size in this study. That said, the limited sample does not necessarily imply that the findings cannot be generalized to U.S. buyers. As in Robb and Garber (2020), this study's sample represents a cross-section of produce retailers in the U.S.

Conclusions

This study explored and revealed the food safety requirement setting and GAP acceptance decision-making of U.S. produce retailers to derive insights into what the USDA AMS can do to foster wider adoption of its GAP audit programs among retailers. Buyers set their requirements and accept GAP audit schemes that can help insulate them against food safety risks and reputational damage, while strengthening their competitive positioning and advantages. The requirements and retailers' scheme choices were mediated by a range of complex and nuanced factors, including operational types, scale, and location, as well as whether a product is considered high- or low-risk, or categorized as a private or national brand. Retailers' requirements tended to be stricter and more prescriptive for high-risk and private-branded commodities, as well as those requiring quality assurance. For such products, this study concludes that retailers were less likely to accept USDA GAP standards, given their preference for widely accepted private third-party schemes that are GFSI-benchmarked. However, one exception could be USDA HGAP Plus+, due to its GFSI Technical Equivalence. In contrast, this study also

concludes that USDA GAP standards may be better aligned with retailers' requirements for local suppliers, low-risk produce, and those carrying national brand labels.

Data availability

The data for this study, along with the survey instruments, will be made available upon request.

CRedit authorship contribution statement

Jelili Adegboyega Adebiyi: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Leslie D. Bourquin:** Writing – review & editing, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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