*sustainability*

MDPI

*Article*

# Perception and Adoption of Food Safety Standards: A Case of VietGAP Sheep Farmers in the Ninh Thuan Province of Vietnam

**Van Loi Bui [1,2], Xuan Ba Nguyen [2], Gia Hung Hoang [3], Thi Mui Nguyen [2], Ngoc Phong Van [2], Ngoc Long Tran [2], Mau Dung Ngo [2] and Huu Van Nguyen [2,*]**

[1] Hue University, 03 Le Loi Street, Hue City 49000, Vietnam; bvloi@hueuni.edu.vn
[2] Faculty of Animal Sciences and Veterinary Medicine, University of Agriculture and Forestry, Hue University, 102 Phung Hung Street, Hue City 53000, Vietnam; nguyenxuanba@huaf.edu.vn (X.B.N.); nguyenthimui@huaf.edu.vn (T.M.N.); vanngocphong@huaf.edu.vn (N.P.V.); tranngoclong@huaf.edu.vn (N.L.T.); ngomaudung@huaf.edu.vn (M.D.N.)
[3] Faculty of Rural Development, University of Agriculture and Forestry, Hue University, 102 Phung Hung Street, Hue City 53000, Vietnam; hghung@hueuni.edu.vn
* Correspondence: nguyenhuuvan@huaf.edu.vn or nhuuvan@hueuni.edu.vn

**Abstract:** To facilitate the adoption of a food safety standard by producers, it is essential to understand their perception of it. However, few empirical studies have examined how livestock farmers perceive food safety standards in Vietnam. This research examines sheep farmers' attitudes towards Vietnamese Good Agricultural Practices (VietGAP), a type of a food safety standard in Vietnam. A sample size of 109 farmers was selected for interviews and a structured questionnaire was generated to collect data. Descriptive and bivariate analyses were employed. The study results show that sheep farmers were well aware of most VietGAP requirements. They perceived that adopting VietGAP requires practical changes in sheep farming systems, including: selecting breeding stock from clear sources to ensure sheep product traceability, collecting and treating wastes daily to protect the environment, and frequent sterilization of sheep cages. The farmers were changing several practices to comply with VietGAP. Key changed practices identified included: bought breeding stock from clear and reliable sources, frequent collecting and treating of sheep wastes, and used veterinary medicine according to instructions of veterinary medicine producers. Statistically significant relationships existing between the sheep farmers' perceptions and their education level (Pearson = 0.229, $p = 0.017$), farm size (Pearson = −0.193; $p = 0.049$), gender (Eta = 0.173, $p = 0.060$), practice of using labours (Eta = 0.202, $p = 0.028$), training participation (Eta = 0.211, $p = 0.022$), credit participation (Eta = 0.177, $p = 0.050$), community-based organisations (Eta = 0.153, $p = 0.087$), and veterinary/extension contacts (Eta = 0.217, $p = 0.019$) were found. This means that a male sheep farmer who had a higher education level, possessed a smaller farm, practiced hired labours, participated in training/credit programs, was a member of community-based organisation, and had contacts with veterinary/extension workers likely perceived VietGAP better than their counterparts. Based on the findings of this study, it is recommended that the promotion of VietGAP for livestock farmers should be developed and carried out as joint attempts along the value chain actors. New food marketing practices and legal framework and policy for using safe food certifications are required to address to promote farmers' adoption of VietGAP and facilitate transition towards a sustainable agri-food system in Vietnam. This study provides significant insights into safety food standard adoption by livestock farmers and highlights aspects that require to be considered when developing policies to improve the adoption of safety food standards in developing countries.

check for updates

Academic Editor: Alessandro Bonadonna

Received: 21 April 2025
Revised: 17 May 2025
Accepted: 21 May 2025
Published: 1 June 2025

**Citation:** Bui, V.L.; Nguyen, X.B.; Hoang, G.H.; Nguyen, T.M.; Van, N.P.; Tran, N.L.; Ngo, M.D.; Nguyen, H.V. Perception and Adoption of Food Safety Standards: A Case of VietGAP Sheep Farmers in the Ninh Thuan Province of Vietnam. *Sustainability* **2025**, *17*, 5071. https://doi.org/10.3390/su17115071

**Keywords:** food safety standards; sheep farmers; adoption; perception; livestock farming; Vietnam

## 1. Introduction

Livestock farming is one of the most important components of the agricultural sector and it plays a significant role in economic development in many developing nations. It contributes to income generation and livelihood development for a large proportion of rural farmers internationally [1,2]. However, small-scale livestock producers and other value chain actors including farmers in developing countries such as Vietnam are struggling to take part in both domestic and international markets because of the introduction of food safety schemes/standards such as Good Agricultural Practices (GAP). Initially, GAP was developed and introduced to producers and other value chain actors by a group of European retailers to manage food quality and safety issues [3–5], and to react to food safety and quality concerns of consumers [6]. The scheme was first labeled EurepGAP (See www.globalgap.org for the history of EurepGAP and GlobalGAP) and it has officially been used as the normal standard of food retail for many markets in EU countries [3,5]. This standard was then re-labeled GlobalGAP in 2007 to meet its development and utilization by many nations beyond the European continent. GlobalGAP is now commonly recognized as an international private safety and quality food standard [7–9]. The scope of GAP standards includes (1) food safety: GAP standards prioritize minimizing risks of food contamination throughout the production process, from on-farm activities to post-harvest handling; (2) environmental sustainability: GAP promotes practices that reduce environmental impact, including minimizing water and soil pollution, conserving resources, and protecting biodiversity; (3) worker health and safety: GAP standards ensure safe working conditions and protect the health of farm workers; (4) production practices: GAP covers a range of farming methods, including integrated pest management, fertilizer management, conservation agriculture, and sustainable land management; and (5) certification: GAP standards can be used as a basis for voluntary certification programs, verifying that farms adhere to specific guidelines.

Apart from the GlobalGAP standard, several developing nations' governments have also established and introduced their own GAPs that are developed based on GlobalGAP. This type of GAPs is called a public GAP standard. Some typical examples of public GAP standard are Q-GAP standard in Thailand [10], PhilGAP standard in the Philippines [11], MyGAP standard in Malaysia [12], IndoGAP standard in Indonesia [13], and VietGAP standard in Vietnam [14]. Although public GAP standards were developed based on GlobalGAP, their scopes may vary between countries depending on the characteristics of their agri-food systems.

VietGAP was developed and introduced to Vietnamese farmers and other value chain actors in 2008. It consists of the rules, orders, and procedures that guide producers to process and market their agricultural products while meeting several requirements [14,15]. These comprise, according to Ministry of Agriculture and Rural Development [16], the requirements associated with agricultural food safety and quality, agricultural product traceability, and methods of environmental protection. VietGAP is one of the main tools used by Vietnamese govrenment to respond to consumers' concern about vegatble and crop safety. In Vietnam, consumer perceptions of food safety are generally high, with a majority expressing significant concerns [16–18]. A large percentage of consumers express worry about the safety of food, particularly vegetables and protein sources [18,19]. This concern is heightened by factors like media coverage of food safety scandals and perceived

risks associated with specific food products [20]. Vietnam's current food safety standards are governed by the Food Safety Law (2010) and its guiding decrees, with the Ministry of Health (MoH) overseeing the regulation of food safety. The Food Safety Law outlines general requirements for food production and business establishments, emphasizing the importance of ensuring food safety throughout the entire process, from raw materials to the finished product [21]. In general, Vietnam's food safety standards are based on a modern regulatory framework, but challenges persist, especially in changing the practices of small producers [22,23].

VietGAP has also been applied to livestock farming (including sheep farming which is facing specific hurdles, including biosecurity, disease control, and the lack of sustainable breeding programs). Nevertheless, livestock farmers' perception of VietGAP standard and its adoption is not well scientifically documented. A number of previous studies [24–26] have mainly focused on farmers' and household socio-economic characteristics to examine farmers' GAP adoption, without paying much attention to the role of farmers' perceptions of GAPs in their adoption decisions. Previous studies [27–31] reported that farmers' awareness and perception of new technologies/innovations affected their adoption decision. For example, Tang, Folmer, and Xue [29] looked at the adoption of farm-based irrigation water-saving techniques by Chinese farmers and found that awareness of water scarcity and financial status increases farmers' adoption of farm-based irrigation water-saving techniques. Zheng et al. [31] examined farmers' perceptions, adoption and impacts of integrated water management technology and found that farmers' integrated water management technology adoption correlates significantly with their perceptions. It can be argued that if we better comprehend farmers' views on GAPs, then it is possible for us to devise suitable interventions, programs, and policy instruments that are aimed at fostering successful adoption of GAP standard by farmers. Although no formal research that looks at associations between producers' perception of GAP and its influence on their adoption of GAP has been conducted in developing countries, some researchers [28,30,32] who investigated farmers' adoption of new technologies/innovations suggest that socio-economic characteristics of farmers/farms can influence farmers' perceptions of new technology and its adoption. Factors associated with livestock producers' perceptions, including sheep farmers' perceptions of GAP standards in developing countries such as Vietnam, are not well understood.

Several prior studies [29,31–33] suggest that in order to enhance farmers' adoption of new technology/innovation, it is crucial for us to comprehend the factors that affect their perceptions of it. For example, Meshesha, Birhanu, and Bezabih Ayele [33] suggest that success of policy instruments for increasing smallholder farmers' adoption of climate smart agricultural innovations in the smallholder agriculture system depends on factors that are associated with smallholder farmers' perceptions. Policy initiatives aimed at increasing the adoption of new technologies, developed with considerations of local situations and producers' perceptions, can bring about positive adoption [34]. Comprehending farmers' perceptions of food safety standard, such as GAP standards and factors that are correlated with their perception of food safety standards is, thus, significant for devising suitable policies that assist in creating suitable strategies for increasing the adoption of food safety standards.

Vietnam is a farming-based developing nation, and livestock production is an important means of livelihood and employment for a large number of rural Vietnamese population [35]. Ninh Thuan province, which is situated in South Central Vietnam, is one of the main small ruminant and livestock farming areas of the country. The key small ruminant raised by most farmers in Ninh Thuan is the Phan Rang sheep [36]. However, sheep farming in Ninh Thuan has been faced with difficulties in accessing markets because

of the introduction of food safety and quality standard such as VietGAP standard. Ninh Thuan sheep farmers have changed their practices in various ways and they have continued to farm sheep farmers conforming with VietGAP over time. The main research questions of this study are (1) what is sheep farmers' understanding about VietGAP? What changes have sheep farmers made when adopting VietGAP? and (2) What factors have affected sheep farmers' decision to adopt VietGAP?

A full comprehension of sheep farmers' ongoing complying with VietGAP and their perceptions of factors that affect their decision to adopt VietGAP could not only enhance the performance of sustainable agricultural development programs, but also improve the sheep farmers' ability to adopt food safety and quality standards. The specific objectives of this study were:

(1) To describe the characteristics of sheep farmers in Ninh Thuan;
(2) To determine the sheep farmers' perception of VietGAP;
(3) To examine the relationships, if any, between farmers' perceptions of factors that affect their decision to adopt VietGAP and their socio-demographic characteristics.

The rest of this paper is structured as follows. The next part presents a brief study region and method. Subsequently, key results of the research are described. In the next part, discussion of the main results of the research is provided. The final part contains conclusions and implications.

## 2. Methodology

### *2.1. Research Site and Description*

This research was carried out in Ninh Thuan province, located in South Central Vietnam. Ninh Thuan province covers 3355.7 $km^2$, and livestock farming is one of the important sectors, which has contributed to a significant part of the gross output of the province in 2021 [37]. A majority of the population of Ninh Thuan live in rural regions and are engaged in farming activities. Facilitating the development of the farming sector is, thus, a key component of the provincial development plans [37]. The provincial farming sector mainly comprises livestock, crop, fishery, and forestry, but livestock, especially sheep, are one of the most important activities for the majority of Ninh Thuan farmers. Within the province, the research focused on four communes (a commune is the lowest administrative level of government in Vietnam): Bac Son, Phuoc Trung, Ninh Hai, and Phuoc Nam. These communes were selected to examine as they represent the dominant sheep farming region of the province, with significant representation of livestock farming systems in the Central Vietnam. Such livestock farming systems are believed to be a varying information source on perceived livestock farmers of VietGAP adoption in Vietnam.

### *2.2. Sample, Instrumentation, Data Collection and Data Analysis*

To assess sheep farmers' perception and their adoption of VietGAP in Ninh Thuan province, a cross-sectional survey research design was utilized [38]. Research into farmers' perception of food quality and safety standards has taken several approaches [24,39–41]. Even though some investigations used a case study approach, most scientists employed a cross-sectional survey approach with structured questionnaires [24,42]. Cross-sectional survey approach allows investigators to examine several characteristics at once and gather information on many variables to understand how variations in these variables (such as level of farmers' education, gender of farmers, and their age) might be associated with the important variable of interest which meets the objective of this study. Given these aspects, the cross-sectional survey approach was selected over other research approaches.

A random sampling method suggested in the literature [38,43] was employed. Sheep farmers were randomly chosen for survey. All sheep farmers in the study area were

randomly listed alphabetically by the office of the four selected communes. A required sample size of 109 sheep farmers was identified based on the 95% confidence level and a margin of error of 5% from 150 total sheep farmers, using the sample defining formula of sampling suggested in the literature [38]. The total population of 150 sheep farmers is determined from the list of households of the Ninh Thuan province (received from four selected communes), which is determined by the office of the four selected Commune People's Committees.

A four-part structured questionnaire was generated to gather data. The first part gathered information on demographic and socio-economic characteristics of sheep farmers and households. The second, third, and final parts consisted of a number of statements/questions on sheep farmers' understanding about VietGAP, information sources, changes farmers made when adopting VietGAP, and farmers' perception of factors that affect their decision to adopt VietGAP-conformed sheep farming. The statements were guided by the following questions: what is sheep farmers' understanding about VietGAP? What changes have sheep farmers made when adopting VietGAP? What factors had affected sheep farmers' decision to adopt VietGAP? The statements on these issues were developed based on the existing literature [24,44,45] and listed in advance. Spaces were also left to be filled by sheep farmers. This ensured that the farmers themselves could write some more statements/questions about VietGAP adoption. The statements were measured on a five-point Likert scale, which ranged from 1 = strongly disagree to 5 = strongly agree. The questionnaire was pre-tested with some sheep farmers and formally evaluated by a group of experts from a university for clarity and validity. Trained enumerators were hired to manage the questionnaires in the study region.

Data collected from this study were analyzed in SPSS version 20. Descriptive statistics (such as mean, standard deviation, and percentage) and inferential statistics of bivariate analyses were employed [43]. A reliability analysis for statements on the farmers' perceptions in relation to VietGAP adoption was used to evaluate the extent to which the statements are associated with each other in order to develop an index of the sheep farmers' perception of factors affecting the adoption of VietGAP-conformed sheep farming. Cronbach's alpha reliability coefficient was employed to scrutinize if the statements were connected with each other. Pearson correlation coefficient and Eta correlation coefficient were used to identify the associations between the sheep farmers' perception of VietGAP adoption and their characteristics.

## 3. Results

### *3.1. Sheep Farmers' Socio-Demographic Characteristics*

Table 1 reports the socio-demographic characteristics of the surveyed sheep farmers. A high proportion of the participants (44.0%) were aged between 45 and 54, followed by ages between 35–44 (27.5%), between 55–64 (16.5%), and between 25–34 (11.9%). Approximately 84% of the farmers who took part in the research were men, and about 16% were women. The sheep farmers' education levels, measured as, 'did not go to school', 'primary school', 'junior high school', 'senior high school', 'certificate', and 'university degree', were 19.3, 23.9, 31.2, 19.3, 2.8, and 3.7%, respectively. The annually average income of a sheep farmer was VND 131.8 million. The average farmland area owned by a sheep farmer was about 8635 $m^2$. Approximately 83% of the sheep farmers were non-poor and the remaining 17% were poor. The proportion of sheep farmers who used 'both family and hired laborers' and 'only family laborers' was 67% and 33% respectively. The proportion of sheep farmers who took part in sheep training course schemes in the study region (53.2%) was more than those who did not take part (46.8%). The proportion of sheep farmers who engaged in rural credit schemes (28.4%) was very much less than those who did not engage (71.6%). In

a similar vein, the percentage of sheep farmers who were members of community-based organizations (CBOs) (21.1%) was very much less than those who did not take part in this type of organization (78.9%). Approximately 41% of sheep farmers had communications with veterinary/extension officers, while about 59% did not have any communications with these people.

**Table 1.** Some main characteristics of sheep farmers.

| **Sheep Farmers' Characteristics** | | **Value (Values in Parenthesis are Percentages and Without Parenthesis are Numbers)** |
|---|---|---|
| Age (years) | 25–34 | 13 (11.9) |
| | 35–44 | 30 (27.5) |
| | 45–54 | 48 (44.0) |
| | 55–64 | 18 (16.5) |
| Gender | Male | 92 (84.4) |
| | Female | 17 (15.6) |
| Education level | Did not go to school | 21 (19.3) |
| | Primary school | 26 (23.9) |
| | Junior high school | 34 (31.2) |
| | Senior high school | 21 (19.3) |
| | Certificate/technical training | 3 (2.8) |
| | University degree | 4 (3.7) |
| Income/year (VND million) | Average income | 131.8 |
| Farm size ($m^2$) | Average farm size | 8635.2 |
| Household types | Poor | 18 (16.5) |
| | Not poor | 91 (83.5) |
| Labour types/practice of using labourers | Both family and hired labour | 73 (67) |
| | Only family labour | 36 (33) |
| Sheep training participation | Yes | 58 (53.2) |
| | No | 51 (46.8) |
| Rural credit participation | Yes | 31 (28.4) |
| | No | 78 (71.6) |
| CBO participation | Yes | 23 (21.1) |
| | No | 86 (78.9) |
| Veterinary/extension contacts | Yes | 44 (40.4) |
| | No | 65 (59.6) |

Note: VND is Vietnamese dong. One USD equals 25 VND. CBO is community-based organization.

### *3.2. Sheep Farmers' Awareness of VietGAP Adopted Sheep Farming*

Table 2 presents farmers' awareness of VietGAP in the study region. Overall, sheep farmers were well aware of most of the VietGAP requirements for VietGAP adopted farming practices. A high percentage of the sheep farmers indicated adopting VietGAP requirements as follows: (1) selecting breeding from clear sources to ensure sheep product traceability (90.6%), followed by (2) collecting and treating wastes daily to protect the environment (89.9%), (3) frequent sterilization of sheep cages (85.3%), (4) utilizing hygiene facilities to ensure food safety (83.5%), (5) putting sheep cages in the right position to protect the environment (82.6%), (6) keeping sheep according to different types (76.1%),

and (7) buying breeding stock from farms with no disease (74.3%). However, to a lesser extent, some requirements of VietGAP including: (1) checking drinking water for sheep for food safety (62.4%), followed by (2) checking forages for sheep to ensure food quality (60.6%), (3) vaccinating sheep complying with veterinary requirements (59.6%), and (4) utilizing the right antibiotics for sheep to ensure food safety (58.7%) were also identified as requirements of VietGAP adoption when farming sheep.

**Table 2.** Farmers' awareness of VietGAP adopted sheep farming.

| No. | Statements on VietGAP Adopted Sheep Farming | Percentage (%) |
|---|---|---|
| 1 | Selecting breeding stock from clear sources to ensure product traceability | 90.8 |
| 2 | Collecting and treating wastes daily to protect the environment | 89.9 |
| 3 | Using frequent sterilization of sheep cages | 85.3 |
| 4 | Utilizing hygiene facilities to ensure food safety | 83.5 |
| 5 | Putting sheep cages in the right position to protect the environment | 82.6 |
| 6 | Keeping sheep according to differing types (breed sheep, baby sheep) | 76.1 |
| 7 | Buying breeding stock from farms with no disease | 74.3 |
| 8 | Checking drinking water for sheep for food safety | 62.4 |
| 9 | Checking forages for sheep to ensure food quality | 60.6 |
| 10 | Vaccinating sheep complying with veterinary requirements | 59.6 |
| 11 | Utilizing right antibiotics for sheep to ensure food safety | 58.7 |
| 12 | Record keeping to ensure sheep product traceability | 42.2 |
| 13 | Having required laboring tools (clothes, booths, mask, . . .) | 41.7 |
| 14 | Obtaining certifications when buying breeding sheep | 41.3 |
| 15 | Having book records for types of foods for sheep | 26.6 |

### *3.3. Farmers' Sources of VietGAP Learning Information*

Table 3 reveals sources of VietGAP learning information. It is clear that sheep farmers received information on VietGAP from several sources. In particular, a high proportion of sheep farmers (72.5%) learned about VietGAP from friends and neighbors who also farm sheep, followed by personal experiences from agricultural activities and extension services (28.4%). A number of sheep farmers (11.9%) also added that they learned about VietGAP from sheep collectors, community-based organizations (8.3%), and local governments (4.6%). In contrast, only about 2% of sheep farmers learned about VietGAP from mass media such as television, radio, and magazines.

**Table 3.** Farmers' sources of VietGAP learning information.

| No. | Sources of Information | Responses | | Percent of Cases (Percentage of How Individuals in our Sample Selected a Type of Source as One of Their Information Sources, Out of the 109 Participants in Our Sample) |
|---|---|---|---|---|
| | | N (Number of Individuals Who Provided Data for the Corresponding Variable) | Percent (Percentage of Responses in Which the Corresponding Variable Was Selected) | |
| 1 | Friends and neighbors | 79 | 37.8 | 72.5 |
| 2 | Personal experiences from agriculture activities | 69 | 33.0 | 63.3 |
| 3 | Extension services | 31 | 14.8 | 28.4 |
| 4 | Sheep collectors | 13 | 6.2 | 11.9 |

**Table 3.** *Cont.*

| No. | Sources of Information | Responses | | Percent of Cases (Percentage of How Individuals in our Sample Selected a Type of Source as One of Their Information Sources, Out of the 109 Participants in Our Sample) |
|---|---|---|---|---|
| | | N (Number of Individuals Who Provided Data for the Corresponding Variable) | Percent (Percentage of Responses in Which the Corresponding Variable Was Selected) | |
| 5 | Community-based organizations (CBOs) | 9 | 4.3 | 8.3 |
| 6 | Local governments | 5 | 2.4 | 4.6 |
| 7 | Mass media | 2 | 1.0 | 1.8 |
| 8 | Others | 1 | 0.5 | 0.9 |

### *3.4. Changes of Sheep Farming Practices When Adopting VietGAP as Perceived by Farmers*

The respondents were asked to rate the extent of practical changes in sheep farming on a 5-point Likert scale, ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. Table 4 describes practical changes in sheep farming that have occurred when adopting VietGAP as perceived by farmers. In general, sheep farmers perceived that there were a number of changes that had occurred in their sheep farming practices when adopting VietGAP. The sheep farmers "strongly agreed" and "agree" with changes that had occurred including: (1) bought breeding stock from clear and reliable sources (M = 4.27, SD = 0.70); (2) frequent collection and treatment of sheep wastes (M = 4.22, SD = 0.69), and (3) used veterinary medicine according to instruction of veterinary medicine producers (M = 4.00, SD = 0.69). The sheep farmers tended to agree with the several statements including: (1) sheep cages were put in the right position (M = 3.93, SD = 0.80); (2) used vaccinates for sheep according to instruction of veterinary officers' (M = 3.76, SD = 0.84); (3) applied right farming process for each type of sheep (M = 3.59, SD = 0.74); and (4) strengthened water checking for sheep (M = 3.57, SD = 0.76). In contrast, they tended to disagree with the statement: new breeding stock must isolate from the present herd ($M \leq 2.46$, $SD \leq 1.02$).

**Table 4.** Changes occurred when adopting VietGAP as perceived by farmers.

| No. | Statements | N | Mean | Std. Dev. |
|---|---|---|---|---|
| 1 | Bought breeding stock from clear and reliable sources | 109 | 4.27 | 0.70 |
| 2 | Frequent collection and treatment of sheep wastes | 109 | 4.22 | 0.69 |
| 3 | Used veterinary medicine according to instruction of veterinary medicine producers | 109 | 4.00 | 0.69 |
| 4 | Sheep cages were put in the right position | 109 | 3.93 | 0.80 |
| 5 | Used vaccinates for sheep according to instruction of veterinary officers | 109 | 3.76 | 0.84 |
| 6 | Applied right farming process for each type of sheep | 109 | 3.59 | 0.74 |
| 7 | Strengthened water checking for sheep | 109 | 3.57 | 0.76 |
| 8 | Applied pairing-breeding process | 109 | 2.56 | 0.68 |
| 9 | Used required laboring tools when working in sheep farming | 109 | 3.53 | 0.97 |
| 10 | Applied different food rations for different types of sheep | 109 | 3.34 | 0.86 |
| 11 | Strengthened food control for sheep | 109 | 3.24 | 0.82 |

**Table 4.** *Cont.*

| No. | Statements | N | Mean | Std. Dev. |
|---|---|---|---|---|
| 12 | Used right eating process for sheep | 109 | 3.20 | 0.99 |
| 13 | Used record keeping during sheep farming | 109 | 3.16 | 1.03 |
| 14 | Used record keeping for sheep food and veterinary medicine | 109 | 3.10 | 1.00 |
| 15 | New breeding stock must isolate from the present herd | 109 | 2.46 | 1.02 |

### *3.5. Farmers' Perception of Factors Affecting Their Decision to Adopt VietGAP*

The respondents were asked to rate factors that affect their decision to adopt VietGAP on a 5-point Likert scale, ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. Table 5 describes sheep farmers' perception of factors that affect their decision to adopt VietGAP. In general, sheep farmers had a positive attitude toward all statements (M > 3). For example, the sheep farmers "strongly agreed" with many statements including: (1) adopting VietGAP made less risks and diseases for sheep (M = 4.11, SD = 0.72); (2) adopting VietGAP improved profits when farming sheep (M = 4.08, SD = 0.51), (3) adopting VietGAP received technical government's support when having risks (M = 4.06, SD = 0.59), (4) adopting VietGAP made sheep farming more effective than other livestock farming (M = 4.05, SD = 0.52), (5) adopting VietGAP reduced inputs' costs when farming sheep (M = 4.05, SD = 0.62). The sheep farmers tended to agree with the several statements including: (1) adopting VietGAP received input government's support (M = 3.94, SD = 0.57); (2) adopting VietGAP received financial government's support (M = 3.92, SD = 0.53); (3) adopting VietGAP decreased risks and instable price (M = 3.88, SD = 0.96); and (4) adopting VietGAP decreased labors when farming sheep (M = 3.85, SD = 0.57).

**Table 5.** Farmers' perception of factors affecting their decision to adopt VietGAP.

| No. | Statements | Mean | Std. Dev. |
|---|---|---|---|
| 1 | Adopting VietGAP made less risks and diseases for sheep | 4.11 | 0.72 |
| 2 | Adopting VietGAP improved profits when farming sheep | 4.08 | 0.51 |
| 3 | Adopting VietGAP received government's support when having risks | 4.06 | 0.59 |
| 4 | Adopting VietGAP made sheep farming more effective than other livestock farming | 4.05 | 0.52 |
| 5 | Adopting VietGAP reduced inputs' costs when farming sheep | 4.05 | 0.62 |
| 6 | Adopting VietGAP had stable price | 4.01 | 0.65 |
| 7 | Inputs for VietGAP sheep farming are available in locality | 4.01 | 0.35 |
| 8 | Adopting VietGAP received input government's support | 3.94 | 0.57 |
| 9 | Adopting VietGAP received financial government's support | 3.92 | 0.53 |
| 10 | Adopting VietGAP decreased risks and instable price | 3.88 | 0.69 |
| 11 | Adopting VietGAP decreased labors when farming sheep | 3.85 | 0.57 |
| 12 | Adopting VietGAP enhanced understanding of sheep farming | 3.81 | 0.41 |
| 13 | Market demand for sheep products stabilized/increased | 3.80 | 0.48 |
| 14 | Adopting VietGAP received techniques/training support | 3.70 | 0.47 |
| 15 | Adopting VietGAP improved effectiveness of sheep farming | 3.62 | 0.50 |

**Table 5.** *Cont.*

| No. | Statements | Mean | Std. Dev. |
|---|---|---|---|
| 16 | Adopting VietGAP gained chances for exporting sheep | 3.62 | 0.55 |
| 17 | Adopting VietGAP gained participation in clubs, cooperatives | 3.58 | 0.51 |
| 18 | Adopting VietGAP improved sheep cages | 3.48 | 0.64 |
| 19 | Adopting VietGAP reduced negative impacts on environment | 3.43 | 0.51 |
| 20 | Adopting VietGAP improved health for consumers | 3.33 | 0.47 |

### *3.6. Relationships Between Farmers' Perceptions of Factors Affecting VietGAP Adoption and Their Characteristics*

To determine a relationship between sheep farmers' perceptions of factors affecting VietGAP adoption and their characteristics, a reliability analysis for 20 statements on the sheep farmers' perceptions of factors affecting VietGAP adoption (in Table 5) was first applied in order to evaluate the extent to which these statements are related to each other in order to construct an overall index of the sheep farmers' perception of factors affecting VietGAP adoption. Analysing results of the first assessment showed that two statements had a low item–total correlation (statements number 4 and 20 in Table 5). These items were then removed completely from the list in order to improve the scale's homogeneity and reliability. In the second analysis, it was found that the value of Cronbach's alpha reliability coefficient equalled 0.756, showing that the 18 remaining statements are closely associated with each other and represented good enough their perceptions. An overall index of the sheep farmers' perceptions of factors affecting VietGAP adoption was then generated and constructed. This index is used as a dependent variable. Finally, a bivariate analysis was employed to evaluate relationships between the sheep farmers' perceptions of factors affecting VietGAP adoption and their characteristics (independent variables). Pearson correlation coefficient for continuous variables and Eta correlation coefficient for nominal variables were utilised to identify the relationships. Table 6 presents the relationships between characteristics of the sheep farmers and their perceptions of factors affecting VietGAP adoption. It can be seen that sheep farmers' perceptions of factors affecting VietGAP adoption were statistically associated with sheep farmers' education, farm size, type of using labors/practice of using labors, sheep training participation, credit participation, veterinary/extension contacts ($p \leq 0.05$), gender, and CBO participation ($p \leq 0.1$).

**Table 6.** Relationships between farmers' characteristics and their perceptions of factors affecting VietGAP adoption.

| Variable 1 | Variable 2 | Correlation Coefficient | Coefficients | *p*-Value |
|---|---|---|---|---|
| Age | Farmers' perceptions | Pearson | −0.079 $^{NS}$ | 0.416 |
| Education | Farmers' perceptions | Pearson | 0.229 ** | 0.017 |
| Income | Farmers' perceptions | Pearson | 0.012 $^{NS}$ | 0.900 |
| Farm size | Farmers' perceptions | Pearson | −0.193 ** | 0.049 |
| Household size | Farmers' perceptions | Pearson | 0.029 $^{NS}$ | 0.763 |
| Gender | Farmers' perceptions | Eta | 0.173 * | 0.060 |
| Household type | Farmers' perceptions | Eta | 0.004 $^{NS}$ | 0.585 |
| Type of using labors | Farmers' perceptions | Eta | 0.202 ** | 0.028 |

**Table 6.** *Cont.*

| Variable 1 | Variable 2 | Correlation Coefficient | Coefficients | *p*-Value |
|---|---|---|---|---|
| Training participation | Farmers' perceptions | Eta | 0.211 ** | 0.022 |
| Credit participation | Farmers' perceptions | Eta | 0.177 ** | 0.050 |
| CBO participation | Farmers' perceptions | Eta | 0.153 * | 0.087 |
| Veterinary/extension contacts | Farmers' perceptions | Eta | 0.217 ** | 0.019 |

Note: * and ** indicate significant at 0.1 and 0.05 levels. $^{NS}$ indicates non-significant.

## 4. Discussion

A distinctive feature of this research is that it examines sheep farmers' perception of factors that affect their decision to adopt VietGAP. The main outcome of this study is thus important for developing successfully VietGAP adoption strategies and hence the uptake of food safety standards. The research found that the sheep farmers' perception of factors affecting VietGAP adoption was positively and statistically correlated with the practice of using labors and this finding has not been reported in any previous work. The possible reason for this is that using more labors is needed when adopting VietGAP and it is an important factor that affects VietGAP adopted sheep farming activity. The sheep farmers who use both family and hired labors may have more labor resources to comply with the requirements of VietGAP. Therefore, they are more likely to adopt VietGAP than those who used family labor only, which is fundamentally limited and depended on number of people within a household. Findings from this study suggest that the practice of using labors by farmers/households should be mindfully considered when promoting farmers' adoption of food safety standards and when carrying out transition programs toward food safety and security.

The present research found that the sheep farmers' perception of factors affecting VietGAP adoption was positively and statistically related to their veterinary and extension contacts. In the mainstream GAP adoption literature [24,26,45,46], the importance of communication with veterinary/extension officers and its effect on sheep farmers' adoption of public GAP has rarely been discussed. The government of Vietnam should improve local veterinary systems and strengthen rural agricultural extension services for livestock farmers in order to foster VietGAP adoption by sheep farmers. Extension contact should be included into the extension services for targeting livestock farmers.

This research found that the sheep farmers' perception of factors affecting VietGAP adoption was positively and statistically connected with their education level, which means that sheep farmers who has a higher education level is likely to realize the importance of following VietGAP requirements than those who has a lower education level. Results of some previous studies [47,48] suggested that farmers' perception of food safety standards was associated with their education level, which is collaborated by the finding of this research. Interestingly, a positive significant correlation was found to exist between the sheep farmers' perception of factors affecting VietGAP adoption and their participation in credit and training schemes, and this finding has not been reported in any previous literature. It is recommended that providing technical training and credit services for sheep farmers could be a suitable method to foster food safety standard adoption by sheep farmers. Developing education and training on VietGAP is necessary to enhance VietGAP adoption. Strengthening the technical capacity of sheep and livestock farmers may be a cost-effective way to promote VietGAP adoption in the future.

The present research found that the key changes that had occurred when adopting VietGAP in the research region were: (1) bought breeding stock from clear and reliable sources; (2) frequent collection and treatment of sheep wastes; (3) used veterinary medicine

according to instruction of veterinary medicine producers; (4) put sheep cages in the right position; and (5) used vaccines for sheep according to the instruction of veterinary officers. This suggests that many sheep farmers in the study region have tried to adopt VietGAP in their sheep farming production systems by adopting several practices conforming to VietGAP. Although some studies [44,46] have investigated farmers' adoption of VietGAP, little has been written about the practical changes that had occurred when adopting VietGAP, as shown in this research.

It was found that sheep farmers in the study region received information on VietGAP from several sources (including from friends and neighbors, personal experiences from agricultural activities, and extension services), which may be complementary to each other. This suggests that any single source of VietGAP information may not meet all information needs of the sheep farmer for adopting VietGAP. It was also found that sheep farmers were well aware of most of the VietGAP requirements, including: selecting breeding stock from clear sources to ensure sheep product traceability, collecting and treating wastes daily to protect the environment, using frequent sterilization of sheep cages, utilizing hygiene facilities to ensure food safety, putting sheep cages in the right position to protect the environment, keeping sheep according to different types, and buying breeding stock from farms with no disease. This means that most sheep farmers recognized the importance of adoption VietGAP and they know how to comply with VietGAP in sheep farming.

## 5. Conclusions and Implications

Overall, Vietnamese sheep farmers are aware of most VietGAP requirements in the study area. They perceived that adopting VietGAP requires several practical changes, including but not limited to: (1) selecting breeding from clear sources to ensure sheep product traceability, (2) collecting and treating wastes daily to protect the environment, and (3) frequent sterilization of sheep cages. Sheep farmers also perceived that there were a number of changes that have occurred in their VietGAP adapted sheep farming including: (1) bought breeding stock from clear and reliable sources, (2) frequent collection and treatment of sheep wastes, and (3) used veterinary medicine according to instruction of veterinary medicine producers. For any extension programs that intend to encourage sheep farmers' adoption of VietGAP, the sheep farmers' characteristics, including education, farm size, gender, type of using labors, training participation, credit participation, CBO participation, and veterinary/extension contacts, should be considered.

Taking from the findings of this study, there are some areas the Vietnamese Government could concentrate on to enhance the livestock farmers' adoption of VietGAP standard. First, several factors that are associated with livestock value chain actors have affected livestock farmers' decision to adopt VietGAP. Therefore, in order to encourage the adoption of VietGAP, it is important to not only target livestock farmers, but also several actors associated with value chains for livestock. The promotion of VietGAP for livestock farmers should be developed and carried out as joint attempts along the value chain actors. Second, facilitating a change at the traditional agri-food system towards sustainability is required. New food marketing practices and legal framework and policy for using safe food certifications are some of the areas that are required to address to promote farmers' adoption of VietGAP and facilitate transition towards a sustainable agri-food system in Vietnam.

Findings of this research should be distributed to veterinary officers, agricultural extension workers, development practitioners, and agricultural policy-makers to devise the most suitable programs for fostering VietGAP adoption to Vietnamese sheep farmers. The findings from this study are significant resources for policy makers, extension practitioners, and agricultural educators to develop strategies that aim to facilitate farmers' adoption of GAP standards. The findings from this study can help veterinary officers, extension

practitioners, and policy makers internationally to comprehend, conduct, and facilitate livestock development initiatives in their respective nations.

It is acknowledged that this research has limitations. The research has provided an important understanding of perception and adoption of VietGAP by sheep farmers. However, the data of this research was concentrated only on sheep farming. There is a need for more research in order to generalize these findings. Extending this study beyond the Bac Son, Phuoc Trung, Ninh Hai, and Phuoc Nam communes and other types of livestock farming would be very interesting. In addition, the research design employed in this study was cross-sectional. It only measured farmers' perceptions at a single point in time. Clearly, farmer's perceptions change over time as the farmers obtain practical experience. For anyone interested in predicting VietGAP adoption by farmers over time, this change has implications. Thus, more effort to assess validity of the findings from this research is required. The present research concentrates on sheep farming. Further study could be conducted to evaluate farmers' perception and adoption with other types of farming. Different contexts could help to capture full insights into farmers' VietGAP adoption.

**Author Contributions:** V.L.B.: Conceptualization, design, methodology, investigation, data collection and data analysis, writing—original draft preparation, writing—reviewing and editing. X.B.N.: Conceptualization, design, methodology, investigation, data collection and data analysis, writing—original draft preparation, writing—reviewing and editing. G.H.H.: Conceptualization, design, methodology, investigation, data collection and data analysis, writing—original draft preparation, writing—reviewing and editing. T.M.N.: Investigation, data collection and data analysis, writing- reviewing and editing. N.P.V.: Investigation, data collection, writing—reviewing and editing. N.L.T.: Investigation, data collection, writing—reviewing and editing. M.D.N.: Investigation, data collection, writing—reviewing and editing. H.V.N.: Conceptualization, design, methodology, investigation, data collection and data analysis, writing—original draft preparation, writing—reviewing and editing. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Vietnamese Ministry of Education and Training through the project CT-2021-01-DHH-03 'Research on current status and propose solutions for improving production of Phan Rang sheep'.

**Institutional Review Board Statement:** This study is waived for ethical review as the research concentrates on non-sensitive data regarding the farmers' understanding of sheep farming, the adoption of VietGAP in sheep farming and the factors that affect their perceptions of VietGAP. This includes collecting information about their understanding and viewpoints of VietGAP, without investigating personal or sensitive issues, ensuring that the data collected remains within ethical boundaries by the Education and Research Council of Hue University of Agriculture and Forestry.

**Informed Consent Statement:** Informed consent for participation was obtained from all subjects involved in the study.

**Data Availability Statement:** The dataset for this study can be provided by the corresponding author upon a suitable request.

**Acknowledgments:** The authors would like to thank Hue University and the Vietnamese Ministry of Education and Training for their supports in conducting this research.

**Conflicts of Interest:** The authors of this research declare no conflicts of interest.

## References

1. Sarkar, A. Role of Livestock Farming in Meeting Livelihood Challenges of SC Cultivators in India. *Indian J. Hum. Dev.* **2020**, *14*, 23–41. [CrossRef]
2. Ashley, K.; Harrison, H.; Chan, P.H.; Sothoeun, S.; Young, J.R.; Windsor, P.A.; Bush, R.D. Livestock and livelihoods of smallholder cattle-owning households in Cambodia: The contribution of on-farm and off-farm activities to income and food security. *Trop. Anim. Health Prod.* **2018**, *50*, 1747–1761. [CrossRef]

3. Asfaw, S.; Mithöfer, D.; Waibel, H. What Impact Are EU Supermarket Standards Having on Developing Countries' Export of High-Value Horticultural Products? Evidence From Kenya. *J. Int. Food Agribus. Mark.* **2010**, *22*, 252–276. [CrossRef]
4. Hobbs, J.E. Public and private standards for food safety and quality: International trade implications. *Estey Cent. J. Int. Law Trade Policy* **2010**, *11*, 136–152.
5. Bayramoglu, Z.; Gundogmus, E.; Tatlidil, F.F. The impact of EurepGAP requirements on farm income from greenhouse tomatoes in Turkey. *Afr. J. Agric. Res.* **2010**, *5*, 348–355.
6. Tallontire, A.; Opondo, M.; Nelson, V. Contingent spaces for smallholder participation in GlobalGAP: Insights from Kenyan horticulture value chains. *Geogr. J.* **2014**, *180*, 353–364. [CrossRef]
7. Annor, B.P.; Mensah-Bonsu, A.; Jatoe, J.B.D. Compliance with GLOBALGAP standards among smallholder pineapple farmers in Akuapem-South, Ghana. *J. Agribus. Dev. Emerg. Econ.* **2016**, *6*, 21–38. [CrossRef]
8. Herzfeld, T.; Drescher, L.S.; Grebitus, C. Cross-national adoption of private food quality standards. *Food Policy* **2011**, *36*, 401–411. [CrossRef]
9. Annor, P.B.; Kaitibie, S.; Lyne, M.C. Heterogeneous impacts of GlobalGAP adoption on net income in small-scale pineapple farming in Ghana: Does farm size matter? *Agribusiness* **2023**, *39*, 1199–1216. [CrossRef]
10. Amekawa, Y.; Hongsibsong, S.; Sawarng, N.; Yadoung, S.; Gebre, G.G. Producers' perceptions of public good agricultural practices standard and their pesticide use: The case of Q-GAP for cabbage farming in Chiang Mai Province, Thailand. *Sustainability* **2021**, *13*, 6333. [CrossRef]
11. Anastacio, N.J.; Lusanta, D.; Cabardo, J.J.; Bongat, H.; Tan, G.N.; Gamotin, G. Agritourism Farms as Conduit of the Adoption of Good Agricultural Practices (GAP) in Eastern Visayas, Philippines. In Proceedings of the Mindanao Symposium on the Future of Agrifood Systems, Davao del Sur, Philippines, 16 November 2023.
12. Amekawa, Y.; Ng, C.C.; Lumayag, L.A.; Tan, G.H.; Wong, C.S.; Abdulrauf, B.; Tan, H.B.; Tai, W.X.; Tan, S.M.; Liu, C.H. Producers' perceptions of public good agricultural practices and their pesticide use: The case of MyGAP for durian farming in Pahang, Malaysia. *Asian J. Agric. Rural Dev.* **2017**, *7*, 1–16. [CrossRef]
13. Yulisti, M. Impact of Food Safety Standards on the Welfare of Smallholder Producers: The Case for the Shrimp Value Chain in Indonesia. Ph.D. Thesis, UWA School of Agriculture and Environment, Perth, Australia, 2020.
14. Kim, D.-C.; Duong, T.T.; Nguyen, Q. Does an agricultural products' certification system reorganize vegetable farmers? A case of the VietGAP program in Lam Dong Province, Vietnam. In *Rural Transformations*; Routledge: Milton Park, UK, 2022; pp. 200–216.
15. Nicetic, O.; van de Fliert, E.; Van Chien, H.; Mai, V.; Cuong, L. Good Agricultural Practice (GAP) as a vehicle for transformation to sustainable citrus production in the Mekong Delta of Vietnam. In Proceedings of the Building Sustainable Rural Futures: The Added Value of Systems Approaches in Times of Change and Uncertainty—9th European IFSA Symposium, Vienna, Austria, 4–7 July 2010; pp. 1893–1901.
16. Ha, T.M.; Shakur, S.; Pham Do, K.H. Consumer concern about food safety in Hanoi, Vietnam. *Food Control* **2019**, *98*, 238–244. [CrossRef]
17. Luu, H.P.; Tran, T.T.H.; Truong, T.X. Factors affecting consumers' food safety behavior in Vietnam. *Food Control* **2023**, *143*, 109294. [CrossRef]
18. Ngo, H.H.T.; Dang-Xuan, S.; Målqvist, M.; Pham-Duc, P.; Nguyen-Hong, P.; Le-Thi, H.; Nguyen-Viet, H.; Le, T.T.H.; Grace, D.; Lindahl, J.F.; et al. Impact of perception and assessment of consumers on willingness to pay for upgraded fresh pork: An experimental study in Vietnam. *Front. Sustain. Food Syst.* **2023**, *7*, 1055877. [CrossRef]
19. Ha, T.M.; Shakur, S.; Pham Do, K.H. Risk perception and its impact on vegetable consumption: A case study from Hanoi, Vietnam. *J. Clean. Prod.* **2020**, *271*, 122793. [CrossRef]
20. Vuong, H.T.V. Food safety in Vietnam: Perceptions, Behaviours, Economics and Policy. Ph.D. Thesis, UWA School of Agriculture and Environment, Perth, Australia, 2021.
21. Dinh, T.B.L.; Tran, C.T. Food Safety Policy Review. Food and Fertiliser Technology. Available online: https://ap.fftc.org.tw/article/841 (accessed on 25 January 2019).
22. Pham, H.V.; Dinh, T.L. The Vietnam's food control system: Achievements and remaining issues. *Food Control* **2020**, *108*, 106862. [CrossRef]
23. Stark-Ewing, S. *Food Safety Governance in Vietnam: Obstacles and Opportunities*; Connecticut College: New London, CO, USA, 2018.
24. Kersting, S.; Wollni, M. New institutional arrangements and standard adoption: Evidence from small-scale fruit and vegetable farmers in Thailand. *Food Policy* **2012**, *37*, 452–462. [CrossRef]
25. Nupueng, S.; Oosterveer, P.; Mol, A.P.J. Global and local sustainable certification systems: Factors influencing RSPO and Thai-GAP adoption by oil palm smallholder farmers in Thailand. *Environ. Dev. Sustain.* **2023**, *25*, 6337–6362. [CrossRef]
26. Srisopaporn, S.; Jourdain, D.; Perret, S.R.; Shivakoti, G. Adoption and continued participation in a public Good Agricultural Practices program: The case of rice farmers in the Central Plains of Thailand. *Technol. Forecast. Soc. Change* **2015**, *96*, 242–253. [CrossRef]

27. Adesina, A.A.; Baidu-Forson, J. Farmers' perceptions and adoption of new agricultural technology: Evidence from analysis in Burkina Faso and Guinea, West Africa. *Agric. Econ.* **1995**, *13*, 1–9. [CrossRef]
28. Tang, J.; Folmer, H.; Xue, J. Adoption of farm-based irrigation water-saving techniques in the Guanzhong Plain, China. *Agric. Econ.* **2016**, *47*, 445–455. [CrossRef]
29. Mulyono, J.; Suryana, A.; Suryana, E. Perception and innovativeness level of farmers on the integration system of rice and cattle farming. *IOP Conf. Ser. Earth Environ. Sci.* **2021**, *892*, 012026. [CrossRef]
30. Zheng, H.; Ma, W.; Boansi, D.; Owusu, V. Farmers' perceptions, adoption and impacts of integrated water management technology under changing climate. *Int. J. Water Resour. Dev.* **2024**, *40*, 425–447. [CrossRef]
31. Sinja, J.; Karugia, J.T.; Baltenweck, I.; Waithaka, M.M.; Miano, M.; Nyikal, R.A.; Romney, D. Farmer Perception of Technology and its Impact on Technology Uptake: The Case of Fodder Legume in Central Kenya Highlands. In Proceedings of the African Association of Agricultural Economists (AAAE) 2004 Inaugural Symposium, Nairobi, Kenya, 6–8 December 2004.
32. Meshesha, A.T.; Birhanu, B.S.; Bezabih Ayele, M. Effects of perceptions on adoption of climate-smart agriculture innovations: Empirical evidence from the upper Blue Nile Highlands of Ethiopia. *Int. J. Clim. Change Strateg. Manag.* **2022**, *14*, 293–311. [CrossRef]
33. Fu, S.; Huang, Y. Exploring farmers' perceptions of the technological characteristics of traceability systems. *Agric. Syst.* **2024**, *215*, 103871. [CrossRef]
34. Mottaleb, K.A. Perception and adoption of a new agricultural technology: Evidence from a developing country. *Technol. Soc.* **2018**, *55*, 126–135. [CrossRef]
35. CGIAR. *Sustainable Livestock Feeding in Vietnam*; CGIAR: Montpellier, France, 2025.
36. Van, N.; Mui, N.; Dung, D.; Phong, V.; Long, T.; Hoan, L.; Thao, L.; Tam, V.; Dung, N.; Loi, B. Commercial concentrate supplementation in phan rang sheep diets: Effects on digestibility traits, growth and carcass performance. *Adv. Anim. Vet. Sci* **2024**, *12*, 1–8.
37. Ninh Thuan Department of Animal Husbandry and Veterinary (Department of Agriculture and Rural Development, Ninh Thuan province). *Report on Achievements of 2021 and the Plan for Development in 2022*; Department of Agriculture and Rural Development: Ninh Thuan, Vietnam, 2022.
38. De Vaus, D. *Surveys in Social Research*; Allen & Unwin Academic Publisher: Crows Nest, Australia, 2014.
39. Zhu, Z.-k.; Leng, C.-x. Does food safety perception matter to farmers' happiness? Evidence from China. *Heliyon* **2024**, *10*, e23868. [CrossRef]
40. Mosimann, S.; Ouk, K.; Bello, N.M.; Chhoeun, M.; Thompson, L.; Vipham, J.; Hok, L.; Ebner, P. Describing food safety perceptions among growers and vendors in Cambodian informal vegetable markets. *Front. Sustain. Food Syst.* **2023**, *7*, 1111580. [CrossRef]
41. Holzapfel, S.; Hampel-Milagrosa, A. Global and National Food Safety and Quality Standards: Implications and Impacts for Farmers in Thailand and India. In *Sustainability Standards and Global Governance: Experiences of Emerging Economies*; Negi, A., Pérez-Pineda, J.A., Blankenbach, J., Eds.; Springer: Singapore, 2020; pp. 163–186.
42. Chelang'a, N.C.; Kariuki, I.M.; Obare, G.A.; Otieno, D.O. Determinants of adoption of GLOBAL G.A.P. standards: Evidence from smallholder French beans farmers in Murang'a County, Kenya. *Cogent Food Agric.* **2023**, *9*, 2176949. [CrossRef]
43. Agresti, A.; Finlay, B. *Statistical Methods for the Social Sciences*, 4th ed.; Pearson Prentice Hall: Upper Saddle River, NJ, USA, 2009.
44. Hoang, H.G. Exploring farmers' adoption of VietGAP from systemic perspective: Implication for developing agri-food systems. *Br. Food J.* **2020**, *122*, 3641–3661. [CrossRef]
45. Loan, L.; Pabuayon, I.; Catelo, S.; Sumalde, Z. Adoption of good agricultural practice (VietGAP) in the lychee industry in Vietnam. *Asian J. Agric. Ext. Econ. Sociol.* **2016**, *8*, 1–12. [CrossRef] [PubMed]
46. Quyen, N.T.K.; Yen, T.T.B.; Riple, A.K.L. Adoption of Vietnamese Good Agricultural Practices (VietGAP) in aquaculture: Evidence from small-scale shrimp farming. *Asian Fish. Sci.* **2022**, *34*, 12. [CrossRef]
47. Yeboah, I.; Asante, B.O.; Prah, S.; Boansi, D.; Tham-Agyekum, E.K.; Asante, I.S.; Aidoo, R. Perception and adoption of food safety practices (FSP) among beef sellers and consumers: Empirical evidence from Ghana. *Cogent Food Agric.* **2023**, *9*, 2287285. [CrossRef]
48. Nyokabi, N.S.; Korir, L.; Lindahl, J.F.; Phelan, L.; Gemechu, G.; Berg, S.; Mihret, A.; Wood, J.L.N.; Moore, H.L. Exploring the adoption of food safety measures in smallholder dairy systems in Ethiopia: Implications for food safety and public health. *Food Secur.* **2024**, *16*, 423–435. [CrossRef]