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Linking Sensory Evaluation to Consumers' Willingness to Pay a Premium Price: A Comparative Experiment on Artisanal and Industrial Goat Cheese

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Abstract

This study examines consumer preferences for goat cheese by jointly analysing sensory evaluations and willingness to pay more (WTPM) for artisanal and industrial products. Using a comparative experimental design conducted in Sicily (Italy) with 105 regular cheese consumers recruited through convenience sampling in a controlled laboratory setting, the study investigates how differences in farming systems and processing methods—from extensive pasture-based systems to intensive industrial production—affect sensory perception and WTPM. Two ordered logit models with increasing price levels were estimated to identify the determinants of WTPM, one for industrial goat cheese and one for artisanal goat cheese, including sensory evaluations and socio-demographic variables as explanatory factors. A paired *t*-test was also performed to assess whether sensory evaluations differed significantly between the two cheeses. The results indicate that sensory quality was the main driver of WTPM for artisanal goat cheese, with aroma emerging as the strongest sensory predictor in the exploratory ordered logit model ($\beta = 3.535$; $p < 0.01$). However, the sensory comparison revealed only modest differences between the two cheeses, with taste showing the clearest differentiation in favour of artisanal cheese. Among extrinsic attributes, only PDO certification positively affected WTPM, whereas the negative association observed for biodegradable packaging should be interpreted cautiously as an exploratory finding requiring further investigation. Origin-based signals such as PDO therefore appeared to enhance value alongside, rather than replace, sensory differentiation, acting as complementary rather than substitutive cues. Overall, the findings contribute to the literature on food systems and consumer behaviour by linking sensory perception with production systems and showing how artisanal dairy products can generate consumer value through the combination of sensory characteristics and extrinsic attributes related to origin and production identity.

Keywords: extensive pasture-based systems; marginal rural areas; sensory experiment; WTPM; goat cheese

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Academic Editor: Irina Georgescu

Received: 17 June 2026
Revised: 10 August 2026
Accepted: 11 August 2026
Published: 20 August 2026

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1. Introduction

In recent decades, consumer interest in artisanal and sustainably produced foods has grown significantly, driven by increasing awareness of environmental issues, animal welfare, and the cultural value of artisanal production systems [1].

At the same time, industrial dairy production continues to play a central role in ensuring product availability, price competitiveness, and standardized quality [2,3]. This duality has shaped contemporary food markets, where consumers increasingly choose between industrial foods and artisanal alternatives, often derived from extensive pasture-based systems. The comparison between these two production approaches is especially relevant in the dairy sector. Extensive pasture-based systems are often associated with higher standards of animal welfare, reduced environmental impacts, and distinctive sensory profiles derived from natural feeding regimes [4,5]. Conversely, industrial systems—characterized by controlled feeding—tend to prioritize efficiency, yield, and product homogeneity [6]. These contrasting approaches may generate differences in sensory characteristics, although the magnitude of these differences depends on the specific products and production contexts considered. They may also influence consumer perceptions, trust, and willingness to pay more [7,8].

Goat cheese was selected to compare consumer preferences between an industrial standardized product and an artisanal, sustainably produced product. Goat cheese is an important component of the agri-food heritage of the Mediterranean region, especially in marginal and mountainous areas [9,10], and Italy in particular is renowned for its long-standing dairy traditions and diverse cheese-making practices [11,12]. Within this context, Sicily represents a relevant case study because goat cheese production is historically linked to rural and marginal areas, where extensive grazing supports traditional practices and biodiversity. However, Sicilian goat cheeses remain underrepresented in consumer research compared with better-known European goat cheese regions, such as France and Spain [8,13,14].

The global goat cheese market was valued at $4.1 billion in 2024 and is projected to reach $6.2 billion by 2034, growing at a CAGR of 4.3% from 2025 to 2034 [15]. Goat-milk cheese production in Europe is concentrated in a limited number of countries. France is the largest producer, followed by Spain and the Netherlands; together with other producing countries, these sources indicate a total European goat-cheese production of approximately 200–230 thousand tonnes per year. Total cheese consumption per capita in the EU is around 20–25 kg per person per year, but goat cheese accounts for only a small share of total cheese consumption in most countries [16]. Consumption of goat cheese and other goat-milk cheeses is highest in France, parts of the Mediterranean region (Spain, Greece, and Cyprus), and in specialty-cheese niches elsewhere [17]. In many EU markets, goat cheese remains a specialty or premium product [18]. Although research on goat cheese consumption has grown, consumer perceptions of traditional goat cheeses from less internationally recognized regions, such as Sicily, remain underexplored.

Despite the growing academic interest in sustainable dairy production and consumer preferences for artisanal foods, empirical evidence comparing consumers' sensory evaluations and willingness to pay more (WTPM) for artisanal versus industrial goat cheese remains limited, particularly in Southern Italy, where traditional dairy systems coexist with increasing pressures toward standardization and industrialization. Understanding how consumers participating in sensory evaluations perceive intrinsic sensory characteristics and how these perceptions translate into WTPM can provide exploratory insights for producers, policymakers, and marketers interested in the valorization of local dairy products.

This study contributes to addressing this gap by comparing two Sicilian goat cheeses that differ in both production systems and degree of artisanal processing: (a) an artisanal goat cheese produced using milk from goats raised in extensive pasture-based systems, and (b) an industrial goat cheese produced using milk sourced from intensive farming systems, where animals are fed formulated feed.

The analysis examines how sensory attributes and extrinsic characteristics shape consumer preferences and evaluates consumers' WTPM for the two cheese types. Specifically, the study compares consumers' WTPM for an artisanal goat cheese produced under an artisanal production system (combining extensive pasture-based farming, raw milk, local breeds and traditional processing) with that for an industrial goat cheese produced under an intensive production system. To identify the main determinants of WTPM, two ordered logit models with 10% price increments were estimated—one for industrial goat cheese and one for artisanal goat cheese—linking sensory evaluations and socio-demographic variables to WTPM. Additionally, a paired *t*-test was conducted to assess whether consumers' sensory evaluations of the two cheeses differed significantly, thereby providing empirical evidence on whether different farming and processing systems are associated with measurable differences in consumers' sensory evaluations.

2. Conceptual Background and Research Questions

2.1. Artisanal vs. Industrial Dairy Systems and Consumer Willingness to Pay

The literature consistently shows that consumers attach symbolic, cultural, and emotional value to artisanal foods, often perceiving them as healthier, more authentic, and more sustainable [19–21]. Within the dairy sector, these perceptions are particularly relevant because production systems influence product characteristics and consumer beliefs regarding quality, animal welfare, and environmental sustainability [22].

Dairy production systems can broadly be categorized into extensive and intensive models. Extensive pasture-based systems rely on natural grazing, low stocking densities, and artisanal cheese-making practices. These systems are associated with environmental sustainability, enhanced animal welfare, and unique sensory characteristics derived from the botanical diversity of pastures, which influences milk composition and flavor development [23–25]. By contrast, intensive systems rely on controlled feeding and standardized processing to ensure consistency and efficiency [26].

A substantial body of research demonstrates that consumers are willing to pay a price premium for foods associated with sustainability, artisanal production, environmental stewardship, and animal welfare [27–29]. Studies in the dairy sector specifically highlight consumer interest in sustainable production attributes such as forage-based feeding, prolonged maternal contact, and extensive pasture-based systems [30]. For example, Canavari and Coderoni [31] found that Italian consumers are willing to pay more for dairy products carrying low carbon-footprint labels. Similarly, Infascelli et al. [32] showed that Southern Italian consumers express a higher willingness to pay for milk obtained from pasture-raised animals.

However, willingness to pay is not determined exclusively by ethical or environmental attributes [33]. Consumers ultimately experience food through its sensory properties, suggesting that production-system attributes may influence economic preferences both directly, through consumers' beliefs, and indirectly, through the sensory quality of the final product. This interaction remains relatively underexplored, particularly for artisanal goat cheeses produced under extensive pasture-based systems.

2.2. Sensory Drivers and Stated Preferences in Food Choice

Sensory perception involves both physiological responses to chemosensory stimuli and cognitive processes, including expectations, beliefs, and contextual cues [34]. Consequently, hedonic responses reflect the interaction between bottom-up sensory signals and top-down influences, including labelling, past experiences, and product information.

Sensory drivers of preference are well established in the dairy literature [34,35] and are increasingly integrated with stated-preference methods. Combining sensory evaluation with economic valuation methods provides a more comprehensive understanding of consumer behavior because it captures both the experienced quality of the product and the value consumers assign to it [8,36].

Experimental studies commonly combine blind and informed tasting sessions with willingness-to-pay elicitation exercises [33]. Failure to account for sensory perception may overestimate the contribution of extrinsic product attributes, such as origin labels or sustainability certifications, to consumer valuation [37].

Consumer responses vary across dairy products, market segments, and cultural contexts, highlighting the importance of case-specific analyses.

Artisanal goat cheeses produced under extensive pasture-based systems are often associated with more complex sensory profiles, including differentiated aromatic notes and flavour characteristics. However, the extent to which these differences are perceived by consumers may vary considerably across products and contexts [38–40]. These sensory attributes may enhance consumers' perceptions of authenticity, craftsmanship, and terroir, thereby increasing product appreciation.

Conversely, industrial goat cheeses tend to present more standardized textures, milder aromas, and consistent visual attributes, which may appeal to consumers who prefer predictability and familiarity [35,41,42]. Consequently, sensory preference therefore depends not only on the product itself but also on consumer familiarity and expectations.

To evaluate whether production systems generate perceptible sensory differences, this study first compares consumers' sensory evaluations of the two cheeses using paired *t*-tests. These results provide the basis for investigating whether sensory appreciation translates into differences in willingness to pay.

2.3. Linking Sensory Preferences to WTPM

Understanding how sensory attributes and consumer characteristics jointly influence WTPM is crucial for positioning artisanal goat cheeses. Building on the literature reviewed above, this study assumes that consumers' economic valuation is jointly determined by intrinsic product quality, as experienced through sensory evaluation, and by extrinsic characteristics related to production systems and individual socioeconomic profiles.

Accordingly, the empirical analysis follows a two-stage conceptual framework. First, sensory analysis is used to establish whether objective differences exist between industrial and artisanal goat cheeses in terms of their sensory characteristics. Second, consumers' sensory evaluations are incorporated into the WTP models to examine whether these perceived quality differences translate into a higher willingness to pay and how this relationship is moderated by consumers' socioeconomic characteristics. Thus, sensory quality is conceptualized as the mechanism linking artisanal and industrial production systems, understood as bundles of farming and processing characteristics, to consumers' economic valuation.

To examine these relationships, after identifying sensory differences between the two cheese typologies, two ordered logit models were estimated using WTPM categories expressed as 10% price increments. The models evaluate how sensory evaluations and socioeconomic characteristics influence consumers' WTPM for industrial goat cheese and

for artisanal goat cheese produced under extensive pasture-based systems. This modelling approach appropriately accounts for the ordinal nature of the dependent variable while allowing the identification of the main determinants of consumers' price premiums.

Based on the existing literature, the empirical analysis tests the following hypotheses:

H1. *Sensory quality is positively associated with consumers' willingness to pay more (WTPM) for goat cheese.*

H2. *Sensory attributes may be associated with WTPM through different exploratory patterns in industrial and artisanal goat cheese.*

This integrated approach provides a robust framework for evaluating how sensory perception, consumer characteristics, and production systems influence consumers' WTPM for artisanal versus industrial dairy products. The findings are expected to provide exploratory insights into the valorization of artisanal Sicilian goat cheese among consumers engaged in sensory evaluation contexts.

3. Materials and Methods

3.1. Study Design and Data Collection

The study was conducted in Sicily in 2024 within the framework of the iSAFE GRAZE Project and aimed to investigate how sensory attributes and extrinsic cues influence consumers' WTPM for goat cheese produced under different farming and processing systems. The experimental design comprised two sequential phases: (i) a controlled sensory evaluation and (ii) a stated-preference survey focused on WTPM.

Data were collected at the Sensory Analysis Laboratory of the Department of Veterinary Sciences, University of Messina. A convenience sample of 105 regular cheese consumers was recruited at the Sensory Analysis Laboratory of the Department of Veterinary Sciences, University of Messina (Table 1). The use of a single recruitment site and a laboratory-based convenience sampling strategy may introduce selection bias and limit the external validity of the findings. Participants willing to take part in sensory evaluations may differ from the broader Sicilian consumer population because they may show greater interest in food-related issues, higher engagement with experimental activities, or specific socio-demographic characteristics associated with participation in university-based studies. Therefore, although participants were regular cheese consumers, the sample should not be considered statistically representative of Sicilian consumers of goat cheese.

Given the exploratory nature of the study and the controlled experimental setting, the sample size was considered adequate to investigate the direction and magnitude of the associations between sensory evaluations and willingness to pay more. Although not statistically representative, the sample allowed for exploratory analyses and the detection of medium-to-large effects in responses related to sensory quality and WTPM. However, the estimated relationships should be interpreted as exploratory evidence among Sicilian consumers willing to participate in laboratory-based cheese evaluations rather than as generalizable estimates applicable to the entire population of Sicilian goat cheese consumers.

In fact, since this is an exploratory study, we are primarily interested in the direction and magnitude of the effects rather than in generalizing the values of the coefficients to the entire population [22]. The sample dimension is also consistent with previous studies related to sensory evaluation [43] and WTP estimates [44]. Given that the task of collecting experimental data is very challenging, the sample dimension adopted is also in line with studies combining sensory and stated-preference methods in food research and meets the methodological criteria proposed by Resurreccion [45].

Table 1. Socio-economic characteristics of the sample (n = 105).

Characteristics	%
Gender	
Male	56.19%
Female	43.81%
Education	
Primary and secondary school	10.48%
High school	40.95%
Graduate	11.43%
Post-graduate	37.14%
Income	
Up to €1500	39.05%
Between €1501 and €2499	31.43%
Between €2500 and €4000	18.10%
Over €4000	11.43%
	Mean (SD)
Age	43.53 (17.68)

The sample consisted of 56.19% male and 43.81% female participants, ranging in age from 18 to 80 years, with a mean age of approximately 44 years. Participants were assigned unique anonymized identification codes. Ethical approval was granted by the Research Ethics Committee of the University of Messina, Department of Veterinary Sciences (Protocol No. 2024/05, 23 May 2024). All participants provided informed consent prior to participation.

3.2. Cheese Samples and Production Systems

Two goat cheeses differing in both farming system and processing method were selected for the study. The first cheese was an artisanal product made from the milk of goats raised in extensive pasture-based systems, characterized by prolonged grazing on natural pastures with limited concentrate supplementation during periods of forage scarcity. This system enhances the use of local resources, supports biodiversity conservation, and is commonly associated with native or locally adapted breeds [46,47].

The second cheese represented an industrial product derived from intensive farming systems, in which goats are permanently housed and fed balanced rations based on concentrates, silage, and selected hay. This model prioritizes productivity and standardization, often relying on high-yield cosmopolitan breeds [46].

From a processing perspective, the artisanal goat cheese was produced using traditional cheesemaking practices, relying on local milk and limited technological standardization. Such practices are known to promote greater microbial biodiversity during ripening, contributing to increased aromatic complexity and product differentiation [48]. In contrast, industrial cheesemaking typically employs pasteurized milk, selected commercial starter cultures, and highly controlled processing and ripening conditions, ensuring consistency and food safety while limiting microbial variability and the expression of territorial characteristics [48].

The artisanal goat cheese used in the test was produced from raw milk obtained from Rossa Mediterranea goats and followed an artisanal process that included curd formation, whey cooking at 80 °C for 1.5 h, drying for 2 days, dry salting once per week for four weeks, and ripening for 60 days. At the end of maturation, 1 kg wheels were vacuum-packed, labelled with the project brand, and stored at +4 °C until the sensory sessions. By contrast, the industrial goat cheese was produced using pasteurized milk

from intensively farmed goats and relied on selected commercial starter cultures and standardized ripening conditions aimed at ensuring product consistency, microbiological safety, and sensory uniformity.

3.3. Sensory Evaluation Procedures

The sensory evaluation was conducted under controlled laboratory conditions at the Sensory Analysis Laboratory of the Department of Veterinary Sciences, University of Messina. The laboratory is equipped with individual tasting booths compliant with ISO 8589:2014 standards [49].

Panelists were recruited among regular cheese consumers (consuming cheese at least once per week) who voluntarily participated in a university-based laboratory sensory evaluation. Although the panel consisted of untrained consumers, a brief orientation session was conducted prior to the test to familiarize participants with the evaluation procedure and to provide standardized definitions of the sensory attributes considered (appearance, texture, aroma, and taste).

To minimize potential bias arising from product-related information and brand expectations, both the sensory assessment and the willingness-to-pay-more (WTPM) elicitation were conducted under blind conditions. Cheese samples were removed from their original packaging, equilibrated to room temperature, cut into standardized portions, and labelled with randomly assigned three-digit codes. The samples were presented to participants following a randomized and balanced order to reduce potential order and carry-over effects.

Before completing the sensory evaluation and WTPM assessment, participants were not provided with any information regarding the production method (artisanal or industrial). Consequently, participants' responses reflected their hedonic perception and overall evaluation of the samples, rather than being influenced by prior knowledge of the production process.

Sensory evaluation was performed using a five-point hedonic scale (1 = "dislike extremely"; 5 = "like extremely"), in accordance with established consumer testing methodologies, to assess the overall acceptability of each sensory attribute (appearance, texture, aroma, and taste). The sensory scores reflect hedonic evaluations based exclusively on the intrinsic sensory characteristics of the products, minimizing the influence of expectation or halo effects associated with extrinsic product information. This approach is widely used in consumer-based sensory studies to capture preference and perceived quality of food products [50,51].

Neutral crackers and water were provided between samples to cleanse the palate and reduce sensory fatigue. Each session lasted approximately 30 min, and all evaluations were conducted under identical conditions to ensure consistency and reproducibility of the data.

The sensory protocol adopted in this study follows internationally recognized guidelines for sensory analysis and consumer testing of dairy products.

3.4. Stated WTPM

Following the sensory evaluation, participants completed a structured questionnaire designed to assess their stated WTPM for the cheeses under study. Respondents were asked to indicate which extrinsic attributes influenced their purchase intention, including promotions, brand reputation, biodegradable packaging, organic certification, PDO certification, mountain product certification, animal welfare certification, milk origin, production site, and nutritional information.

Preferences were measured using a five-point Likert scale.

WTPM was elicited by asking participants: "Assuming a base price of €20/kg, how much more would you be willing to pay for each of the following cheeses?"

The base price of €20/kg was selected because it reflects the average retail price range of Sicilian goat cheeses currently available through local and specialized market channels. Therefore, this value was considered a realistic reference price for consumers evaluating potential premiums for differentiated goat cheese products.

Responses were collected using a four-level ordinal scale corresponding to price increases of 10%, 20%, 30%, and 40%. This WTPM range was selected to represent realistic consumer price premiums associated with differentiation between industrial and artisanal goat cheeses, while limiting potential hypothetical bias associated with excessively high price scenarios. Moreover, only a very small proportion of respondents selected the maximum premium level (40%), suggesting that the selected range was sufficient to capture the variation in consumers' willingness to pay. The analysis was conducted using ordinal logistic regression models.

Although the use of fixed percentage increments simplified the valuation task and reduced respondent burden, this elicitation format may also have introduced anchoring effects. Specifically, respondents may have interpreted the proposed price premiums (10%, 20%, 30%, and 40%) as implicit guidance regarding reasonable willingness-to-pay levels rather than expressing their unconstrained valuation. Consequently, the reported WTPM should be interpreted as stated preferences within the predefined response categories rather than as unrestricted measures of consumers' maximum willingness to pay.

3.5. Exploratory Factor Analysis

An Exploratory Factor Analysis (EFA) was conducted separately for each sensory dimension (appearance, aroma, taste, and texture) before computing composite scores (Table 2). Although each dimension was theoretically defined a priori and comprised three items, the EFA was performed to empirically verify the assumption of unidimensionality and to assess whether the items consistently reflected a single underlying construct [52]. This preliminary step was intended to support the aggregation of the items into composite scores by confirming adequate factor loadings and a one-factor solution for each sensory dimension. Therefore, the EFA was used as a validation procedure for the internal structure of the scales rather than as a purely exploratory technique.

Table 2. Sensory characteristics items.

Constructs		Items
Aroma	ARO.1	The cheese emits a pleasant scent.
	ARO.2	The cheese's aroma is appealing and inviting.
	ARO.3	The cheese has a pronounced or distinctive smell.
Appearance	APP.1	The cheese displays an attractive color.
	APP.2	The texture of the cheese is visually appealing.
	APP.3	The cheese is presented in an enticing way.
Taste	TAS.1	The cheese offers a rich and layered flavor.
	TAS.2	The taste of the cheese is well-balanced.
	TAS.3	The cheese leaves a lasting aftertaste.
Texture	TEX.1	The cheese feels smooth and creamy.
	TEX.2	The cheese has a firm and chewy consistency.
	TEX.3	The cheese melts effortlessly in the mouth.

Parameter estimation was performed by maximizing the likelihood function under the assumption of multivariate normality, using an iterative algorithm that ensured convergence of the log-likelihood. Factor loadings and uniqueness values were estimated from the correlation matrix using maximum-likelihood extraction, representing, respectively, the proportion of variance shared with the common factor and the specific variance of each variable. This approach made it possible to condense the sensory measurements into unidimensional latent variables that are more coherent and easier to interpret for scientific analysis. The analyses confirmed the adequacy of the measurement structure. All sensory dimensions showed a clear one-factor solution, with eigenvalues ranging from 1.84 to 2.47 and explained variance between 61.53% and 82.30%. Factor loadings were consistently satisfactory, ranging from 0.55 to 0.92 across items. Internal consistency was also acceptable, with Cronbach's alpha values ranging from 0.66 to 0.89, considering the limited number of items per construct (Table 3).

To further assess the reliability and validity of the sensory constructs, Composite Reliability (CR), Average Variance Extracted (AVE), Kaiser-Meyer-Olkin (KMO), and Bartlett's test (χ^2) were calculated for all dimensions (aroma, appearance, taste, and texture) based on the factor loadings obtained from the one-factor solutions. These additional indicators were used to evaluate internal consistency and convergent validity of the measurement model (Table 3).

Discriminant validity was additionally assessed (Tables A1 and A2). The Fornell–Larcker criterion [53] was satisfied, as the square roots of AVE for all sensory constructs exceeded the correlations with the other constructs. These results confirm that aroma, appearance, taste, and texture represent related but distinct sensory dimensions.

3.6. Ordered Logit Model (OLM)

Given the exploratory nature of the study and the relatively small sample size, two ordered logit models were estimated separately to identify the main predictors of WTPM for industrial and artisanal goat cheese. WTPM was measured using 10% price increments. The separate estimation strategy was adopted to identify product-specific determinants of WTPM rather than to formally compare coefficient magnitudes across cheese types. Consequently, differences observed between the two models should be interpreted descriptively.

An ordered logit model (OLM) was used to analyze the relationship between WTPM and explanatory variables [54,55], as WTPM is an ordinal variable and cannot be treated as continuous [56]. Given the exploratory nature of the study and the relatively limited sample size, a backward stepwise procedure was applied as a variable-screening approach to identify potentially relevant predictors among the candidate variables considered. This procedure included both theoretically motivated main effects and interaction terms. However, we acknowledge that stepwise selection approaches may introduce model-selection uncertainty, affect coefficient stability, and lead to less reliable inference. Therefore, the estimates obtained from the final models should be interpreted as exploratory associations rather than definitive causal effects. This iterative method systematically evaluates the predictors, retaining only those that explain the greatest amount of variability in the dependent variable while strictly adhering to the principle of parsimony. Within the ordered logistic regression framework, the selection process is guided by model fit optimization, specifically aimed at identifying the most parsimonious combination of variables that drives the log-likelihood closer to zero. This approach was adopted to obtain a more parsimonious specification; however, the resulting model should be interpreted considering the potential uncertainty associated with data-driven variable selection.

Table 3. Descriptive statistics of sensory attributes for industrial and artisanal goat cheeses.

		Mean	Std. Dev.	Factor Loading	Eigenvalue	Variance Explained (%)	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)	Kaiser-Meyer-Olkin (KMO)	Bartlett's Test (χ^2)
Industrial goat cheese											
Aroma	Aroma1	3.91	1.20	0.88	2.01	66.90%	0.74	0.85	0.66	0.56	111.54 ***
	Aroma2	3.77	1.26	0.92							
	Aroma3	3.15	1.17	0.61							
Appearance	Appearance1	3.81	1.28	0.83	2.17	72.49%	0.80	0.89	0.72	0.71	102.47 ***
	Appearance2	3.99	0.98	0.86							
	Appearance3	3.94	1.13	0.86							
Taste	Taste1	3.61	1.17	0.87	2.08	69.24%	0.77	0.87	0.69	0.64	100.53 ***
	Taste2	3.69	1.10	0.89							
	Taste3	3.37	1.14	0.72							
Texture	Texture1	3.49	1.22	0.83	1.98	65.98%	0.74	0.85	0.66	0.68	69.84 ***
	Texture2	3.86	0.98	0.77							
	Texture3	3.58	1.03	0.84							
Artisanal goat cheese											
Aroma	Aroma1	3.99	1.10	0.87	2.09	69.86%	0.77	0.87	0.70	0.60	116.24 ***
	Aroma2	3.95	1.14	0.92							
	Aroma3	3.65	1.18	0.70							
Appearance	Appearance1	4.09	1.11	0.88	2.47	82.30%	0.89	0.93	0.82	0.73	184.90 ***
	Appearance2	4.02	1.03	0.92							
	Appearance3	4.04	1.02	0.92							
Taste	Taste1	3.95	1.06	0.89	1.88	62.60%	0.66	0.83	0.62	0.56	81.13 ***
	Taste2	3.92	1.08	0.88							
	Taste3	3.61	1.26	0.55							
Texture	Texture1	3.67	1.11	0.72	1.84	61.53%	0.68	0.83	0.61	0.64	53.29 ***
	Texture2	3.92	1.00	0.78							
	Texture3	3.74	1.02	0.84							

Note: *** $p < 0.01$.

The model includes both categorical and continuous variables and estimates the probability of paying more based on socioeconomic and sensory factors [36].

The dependent variable represents four ordered categories corresponding to percentage price increments. The response variable WTPMi, referring to each individual respondent *i*, is ordinal with four categories ($j = 0, \ldots, 3$), coded as follows: 0 for a 10% increase, 1 for 20%, 2 for 30%, and 3 for 40%. The relationship between WTPM and respondent characteristics xi is modeled through a linear function with a random error term εi, as follows:

$$\text{WTPMi} = \beta' \text{xi} + \varepsilon \text{i} \quad (1)$$

where β is a K × 1 vector of parameters to be estimated. The model also estimates a series of threshold parameters $\alpha 1 < \alpha 2 < \ldots < \alpha J$ that define category boundaries in the ordinal outcome.

For the ordered logit models, factor scores derived from the EFAs were used for each identified sensory dimension. The use of factor scores allowed the information contained in the items of each construct to be summarized while accounting for the underlying factor structure, providing composite indicators and avoiding the potential redundancy associated with the simultaneous inclusion of individual items in the models.

For both types of cheese, the dependent variable WTPMi was associated with 15 independent variables (age, gender, education, income, recyclable packaging, nutritional information, organic certification, PDO certification, animal welfare certification, milk origin, production site, aroma, appearance, taste, and texture) and 12 interaction terms (aroma × gender, aroma × education, aroma × income, appearance × gender, appearance × education, appearance × income, taste × gender, taste × education, taste × income, texture × gender, texture × education, and texture × income).

To assess the potential presence of multicollinearity among the explanatory variables, a Variance Inflation Factor (VIF) analysis was conducted for all predictors included in the ordered logit model specifications. All VIF values were below the conservative threshold of 3, indicating that the estimated models are not affected by problematic multicollinearity. Therefore, the included extrinsic-attribute predictors do not show excessive linear relationships that could compromise the interpretation and reliability of the estimated coefficients.

Interaction terms between sensory attributes and socio-demographic variables were included to explore potential heterogeneity in valuation strategies rather than to test confirmatory hypotheses. Given the number of interaction terms examined (12 interactions across sensory attributes and socio-demographic characteristics), the risk of inflated Type I error cannot be excluded. Therefore, interaction effects retained by the stepwise procedure should be interpreted as exploratory and hypothesis-generating findings rather than as confirmatory evidence. Their purpose is to identify potential patterns of consumer heterogeneity that warrant further investigation using larger samples and theoretically pre-specified models.

The adequacy of the ordered logit models was evaluated by reporting standard goodness-of-fit statistics, including McFadden's pseudo-R^2, log-likelihood, Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and the likelihood ratio test (LRχ^2) against the null model. These indicators complemented the regression coefficients and odds ratios by providing an overall assessment of model performance.

To investigate potential differences in sensory characteristics between the two types of cheese, the means of the four sensory attributes were compared using a paired *t*-test to assess the significance of variations associated with product type, since the same panelists evaluated both cheeses. All statistical analyses were conducted using Stata 19.5 (StataCorp LP, College Station, TX, USA).

4. Results and Discussion

4.1. WTPM for Industrial and Artisanal Goat Cheese

To assess H1, separate regression models were estimated for industrial and artisanal goat cheese (Tables 4 and 5) to identify product-specific determinants of WTPM.

Table 4. Ordered logit estimates for WTPM for industrial goat cheese.

Industrial Goat Cheese	Coefficient (Stepwise 0.10)	Std. Err.	Odds Ratio	Std. Err.
Aroma × Income	0.206 *	0.115	1.228	0.142
Gender	−0.994 **	0.403	0.370	0.149
Nutritional information	0.520 **	0.252	1.681	0.424
Texture	0.650 **	0.251	1.915	0.480
Animal welfare certification	−0.776 **	0.255	0.460	0.117
/cut1	−1.692	0.817	−1.692	0.817
/cut2	−0.238	0.806	−0.238	0.806
/cut3	1.251	0.814	1.251	0.814
McFadden pseudo-R^2	0.119			
Log-likelihood	−113.7879			
Akaike Information Criterion (AIC)	243.5758			
Bayesian Information Criterion (BIC)	264.8075			
Likelihood ratio test (LRχ^2)	30.6734 ***			

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Ordered logit estimates for WTPM for artisanal goat cheese.

Artisanal Goat Cheese	Coefficient (Stepwise 0.10)	Std. Err.	Odds Ratio	Std. Err.
Appearance × Gender	−1.147 *	0.596	0.318	0.189
Taste × Gender	−1.010 *	0.528	0.364	0.192
Appearance × Education	0.276 *	0.157	1.317	0.207
Aroma × Education	−0.551 *	0.285	0.576	0.164
Biodegradable packaging	−0.592 **	0.224	0.553	0.124
Aroma	3.535 ***	0.897	34.297	30.756
PDO certification	0.606 **	0.244	1.833	0.448
/cut1	−0.020	0.950	−0.020	0.950
/cut2	1.520	0.953	1.520	0.953
/cut3	2.856	0.972	2.856	0.972
McFadden pseudo-R^2	0.221			
Log-likelihood	−105.7425			
Akaike Information Criterion (AIC)	231.485			
Bayesian Information Criterion (BIC)	258.0246			
Likelihood ratio test (LRχ^2)	59.8916 ***			

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Because the models were estimated independently, comparisons between coefficients across models are descriptive and should not be interpreted as formal statistical tests of differences between cheese types.

The estimation results for industrial goat cheese (Table 4) indicate that consumers' WTPM beyond the baseline price of €20/kg is mainly driven by intrinsic sensory attributes related to product performance and functional information, rather than by ethical or sustainability-related cues.

This pattern is consistent with previous research [57], showing that industrial food products are primarily evaluated through a utilitarian lens, where perceived quality, reliability, and informational reassurance play a dominant role.

The positive interaction between aroma and income exhibits a positive and significant effect ($\beta = 0.206$; $p < 0.10$), suggesting that higher-income consumers attribute greater economic value to olfactory quality even in an industrial context, as observed by Celik Ates and Ceylan [58]. Aroma therefore appears to function as a quality cue for consumers with greater purchasing power, who may associate refined aromatic characteristics with superior processing standards or higher product control.

Texture also exerts a positive and statistically significant effect on WTPM ($\beta = 0.650$; $p < 0.05$), confirming its central role in shaping perceived cheese quality. In the context of industrial production, texture is often associated with freshness, standardization, and technological precision, all of which contribute to consumer confidence in the product.

Similarly, nutritional information positively affects WTPM ($\beta = 0.520$; $p < 0.05$), emphasizing the importance of health-related and functional cues. Clear nutritional communication can compensate for the limited symbolic or territorial differentiation of industrial products by acting as a credibility-enhancing signal that reinforces trust and perceived quality [59–62].

By contrast, ethical attributes do not contribute positively to WTPM for industrial goat cheese. A plausible interpretation is that animal welfare, as a credence attribute that consumers have limited ability to evaluate, may generate confusion or skepticism rather than increasing perceived value in contexts characterized by multiple quality cues [63–65]. This interpretation is consistent with studies showing that skepticism toward sustainability claims reduces the persuasiveness of ethical labelling [66] and that beliefs about animal welfare can be negatively associated with beliefs about certification systems [67].

Gender differences were observed in the stated WTPM for industrial goat cheese, with female consumers showing a lower propensity to report higher price premiums ($\beta = –0.994$; $p < 0.05$). This result may reflect differences in the way consumers evaluate product attributes, including potentially different perceptions of industrial production systems and quality cues. However, it should also be interpreted cautiously because gender differences in stated willingness-to-pay responses may arise from different response behaviours, hypothetical bias, or valuation strategies, which do not necessarily imply equivalent differences in actual purchasing behaviour. Therefore, the observed coefficient should be considered as a difference in stated economic valuation rather than direct evidence of gender-specific market behaviour. Previous studies have documented gender heterogeneity in sustainable food preferences and ethical food choices [68,69], although the extent to which these stated differences translate into real purchasing behaviour remains context-dependent.

A different and more complex pattern emerges for artisanal goat cheese produced under extensive pasture-based systems (Table 5); within the analysed sample, consumers' WTPM reflects a multidimensional evaluation process combining sensory quality, origin-related attributes, and socio-demographic characteristics.

Aroma emerged as the sensory attribute most strongly associated with WTPM in the selected exploratory model, showing a positive and statistically significant coefficient ($\beta = 3.535$; $p < 0.01$). However, considering the stepwise selection procedure and the limited sample size, this estimate should be interpreted as an indication of the relative importance of aroma rather than as a precise quantitative measure of its effect on WTPM. Consistent with the literature on pasture-based dairy systems, more complex aromatic profiles are often associated with natural feeding regimes, microbial diversity, and artisanal processing, which may enhance sensory experience [70,71].

PDO certification showed a positive association with WTPM (β = 0.606; $p < 0.05$). Since the cheeses were evaluated under blind conditions and neither sample was presented as PDO-certified, this coefficient should be interpreted as consumers' stated preference for PDO certification as an additional quality and authenticity signal rather than as the effect of an existing certification on the tasted product. Thus, PDO appears to represent a potential complementary cue that may reinforce perceived value when combined with sensory differentiation.

Origin certifications reinforce perceptions of authenticity, reliability, and connection to place, complementing rather than substituting sensory quality. This result is consistent with previous research showing that consumers value artisanal cheeses most when sensory pleasure is embedded within a coherent narrative of origin, tradition, and certified production practices [72,73].

In contrast, biodegradable packaging showed a negative association with WTPM (β = –0.592; $p < 0.05$). This unexpected result should be interpreted cautiously and not as evidence that sustainable packaging reduces consumers' valuation of artisanal cheese. Rather, within the exploratory framework of the present study, this finding should be considered as a hypothesis-generating result requiring further investigation.

Two alternative mechanisms may explain this pattern. First, when consumers evaluate products primarily through sensory experience, sustainability-related packaging cues may receive lower priority compared with attributes directly connected to taste, aroma, and perceived eating quality. Previous studies have shown that environmentally friendly packaging does not necessarily increase consumer valuation when quality, authenticity, or product experience represent the dominant consumption drivers [74,75]. Second, biodegradable packaging may activate unintended negative product inferences related to functional performance, such as concerns about protection, durability, freshness preservation, or product quality perceptions [75].

However, the present experimental design did not include direct measures of packaging perceptions, perceived functionality, environmental attitudes, or quality inferences. Therefore, it is not possible to determine whether the observed negative association reflects a lower relative importance attributed to sustainability cues or the activation of negative expectations toward biodegradable packaging. Future research should explicitly investigate these mechanisms through dedicated measures of consumer perceptions, cognitive associations, and expectations regarding sustainable packaging.

The interaction terms retained by the exploratory stepwise procedure suggest potential heterogeneity in the way consumers integrate sensory attributes into their WTPM decisions. However, these effects should be interpreted cautiously because multiple interaction terms were examined and the variable-selection procedure may increase the probability of chance findings. Therefore, the following interaction effects are discussed as exploratory patterns requiring validation in future studies rather than as confirmatory evidence.

The negative interactions between gender and both appearance (β = –1.147; $p < 0.10$) and taste (β = –1.010; $p < 0.10$) were retained in the exploratory model. These associations may indicate heterogeneity in how sensory attributes are incorporated into stated WTPM decisions; however, they should not be interpreted exclusively as differences in the intrinsic importance assigned to these attributes. Gender-related differences in stated willingness-to-pay may also reflect variations in response styles, hypothetical valuation behaviour, or the way consumers express economic preferences in experimental settings. Consequently, these interaction effects should be interpreted as differences in stated valuation patterns rather than as direct evidence that male and female consumers assign different sensory importance to appearance or taste.

Previous studies have suggested that gender may influence preferences for sustainable food attributes and health-related cues [76,77]. However, whether these stated differences correspond to differences in actual purchasing behaviour requires further investigation.

Education-related interactions provide additional exploratory indications of possible differences in attribute weighting among consumers with different educational backgrounds. The positive association between appearance and education and the negative association between aroma and education may reflect different evaluation strategies, but these interpretations remain tentative because the interaction terms were identified through a data-driven selection procedure and require confirmation in future studies.

The positive interaction between appearance and education ($\beta = 0.276$; $p < 0.10$) suggests that more educated consumers may interpret visual presentation as a signal of care, craftsmanship, and alignment with sustainability principles. In contrast, the negative interaction between aroma and education ($\beta = -0.551$; $p < 0.10$) points to a lower reliance on sensory pleasure alone among more educated consumers and may reflect a more multidimensional evaluation of product quality that integrates extrinsic information such as certifications, production methods, and transparency.

Overall, these findings corroborate H1, confirming that sensory quality is positively associated with consumers' willingness to pay more (WTPM) for both industrial and artisanal goat cheese. Although the specific drivers differ between production systems, sensory attributes consistently play a central role in product valuation.

The interaction effects identified in the artisanal model should not be considered as evidence of confirmed moderation mechanisms, but rather as exploratory signals of possible consumer heterogeneity that require validation through confirmatory analyses.

Taken together, the two exploratory models suggest different descriptive patterns in the factors associated with WTPM for industrial and artisanal goat cheese. However, because the models were estimated separately, these patterns should not be interpreted as formal evidence that the effects of sensory attributes differ significantly across cheese types.

4.2. Sensory Differences Between Industrial and Artisanal Goat Cheese

The evaluation of differences in sensory perceptions, assessed through *t*-tests (Table 6), provides additional insights into the mechanisms underlying variations in WTPM. Because the same panelists evaluated both cheese samples, the sensory comparisons were treated as a within-subjects design. Accordingly, paired *t*-tests were conducted to compare the sensory attributes of artisanal and industrial goat cheese, accounting for the dependence between repeated measurements and controlling for individual variability among participants.

The results of Levene's tests indicate that the assumption of homogeneity of variances was not fully satisfied for all sensory attributes. A significant difference in variance was observed for aroma (Levene's $p = 0.001$), indicating heterogeneous variances between the two cheese samples for this attribute. Conversely, no significant differences in variance were detected for appearance ($p = 0.416$), taste ($p = 0.301$), and texture ($p = 0.988$), confirming homogeneity of variances for these dimensions.

The analysis of effect sizes based on Cohen's d revealed small differences between artisanal and industrial cheeses across all sensory attributes, with values ranging from -0.14 to -0.30. The largest effect was observed for taste (Cohen's d = -0.30; 95% CI: -0.57 to -0.02), indicating a small but statistically meaningful difference, with higher sensory evaluations attributed to artisanal cheese. Aroma showed a small effect size (d = -0.26; 95% CI: -0.53 to 0.01), although the confidence interval included zero, suggesting limited practical relevance. Smaller effects were found for texture (d = -0.16; 95% CI: -0.43 to 0.11) and appearance (d = -0.14; 95% CI: -0.41 to 0.13), indicating minimal differences in consumers' perceptions of these attributes.

Table 6. Comparison of sensory attributes between industrial and artisanal goat cheeses: paired *t*-test.

Variable	Mean Difference	Std. Error Difference	95% CI Lower	95% CI Upper	*t*-Statistic	Degrees of Freedom (df)	*p*-Value	Leven *p*	Cohen's d (95% CI)
Aroma	−0.251	0.114	−0.477	−0.024	−2.196	104	0.030 **	0.001	−0.26 (−0.53, 0.01)
Appearance	−0.136	0.100	−0.335	0.062	−1.365	104	0.175	0.416	−0.14 (−0.41, 0.13)
Taste	−0.270	0.102	−0.472	−0.067	−2.641	104	0.009 **	0.301	−0.30 (−0.57, −0.02)
Texture	−0.133	0.080	−0.291	0.024	−1.674	104	0.097 *	0.988	−0.16 (−0.43, 0.11)

Note: * $p < 0.10$, ** $p < 0.05$.

The sensory evaluation revealed modest differences between the two cheeses (H2), particularly for taste. These results provide descriptive evidence that the products differed in some sensory characteristics, but they do not constitute formal evidence that the effects of sensory attributes on WTPM differ between cheese types.

However, the magnitude of these differences is generally limited, suggesting that while artisanal cheese benefits from a modest sensory advantage—particularly regarding taste—the relationship between sensory quality and WTPM remains relatively consistent across the two production contexts.

These findings are consistent with previous research showing that sensory attributes, particularly aroma and flavor intensity, are key determinants of consumers' WTPM for food products, as they reflect quality perceptions based on hedonic experience rather than visual cues alone [33]. Experimental evidence from other Italian food products further indicates that when consumers can taste a product and simultaneously receive information about its origin, sensory experience tends to play a stronger role than origin cues in shaping willingness to pay [78].

Taken together, the sensory and economic results suggest that participants in the sensory evaluation were able to perceive differences in flavor-related attributes and translate them into higher WTPM when these differences are considered authentic and meaningful. Evidence from dairy and livestock markets also shows that consumers are more willing to pay a premium for products with superior sensory characteristics when these are combined with sustainability-related attributes, such as environmental mitigation practices and animal welfare standards [79–81]. Therefore, artisanal production may generate value not only through ethical or symbolic associations but also through specific sensory characteristics that, although limited in magnitude, contribute to consumers' gastronomic experience and product differentiation [38].

However, because the two cheeses differed simultaneously in processing method and milk production system—the artisanal cheese being produced from raw milk of pasture-raised Rossa Mediterranea goats and the industrial cheese from pasteurized milk of intensively farmed animals—the observed sensory differences reflect the combined effect of these factors. Consequently, the results should be interpreted as reflecting the combined effect of the artisanal production system rather than the isolated influence of pasture-based farming, processing method, milk origin, or breed.

5. Conclusions

This exploratory study provides insights into how valuation of goat cheese among consumers participating in a controlled sensory experiment is associated with sensory experience, production systems, and product narratives. Moreover, socio-demographic effects identified in the models, including gender-related patterns, should be interpreted as differences in stated valuation processes rather than definitive evidence of differences

in actual consumer behaviour. Industrial goat cheese was assessed primarily through functional and utilitarian criteria, such as texture and nutritional information, whereas artisanal goat cheese from extensive pasture-based systems was evaluated through a more experiential framework.

Within the analysed sample, the results indicate that sensory quality, rather than sustainability cues considered individually, represents the main factor associated with a higher willingness to pay more (WTPM) for artisanal goat cheese. Among the sensory attributes, aroma was the dominant determinant of WTPM within the exploratory ordered logit model estimated for artisanal goat cheese. However, this finding refers only to the exploratory model estimated for artisanal goat cheese. Because separate models were estimated for the two products, no formal inference can be made regarding whether the influence of aroma differs significantly between artisanal and industrial cheese. The sensory comparison between the two cheeses showed that the clearest differences concerned taste, while differences in aroma and other attributes were smaller and associated with limited effect sizes. These findings refine previous assumptions that artisanal production necessarily produces substantial sensory advantages. Rather, they suggest that artisanal value may derive from the accumulation of small sensory differentiators combined with symbolic and territorial attributes that reinforce perceived authenticity.

Among the extrinsic attributes considered, PDO certification—anchored to territorial origin—contributed positively to WTPM, whereas biodegradable packaging was negatively associated with WTPM in the exploratory model. This latter finding should not be interpreted as evidence that sustainable packaging decreases consumer value, but rather as an unexpected association that highlights the need to better understand how consumers interpret sustainability-related packaging cues in premium food contexts.

Taken together, these findings suggest that, in this context, an origin-based signal such as PDO added value alongside, rather than in place of, a differentiated sensory profile, operating as a complementary rather than a substitutive cue. Whether sustainability attributes more broadly play such a complementary role, and whether they do so by reinforcing the effect of sensory quality, cannot be established from the present design and represents a question for future research.

By linking production systems, sensory perception, and WTPM within an exploratory experimental design, this research contributes to the growing literature that conceptualizes food value as an experience-based construct. Nevertheless, the estimated willingness-to-pay premiums should be interpreted in light of the categorical elicitation format adopted, which may have influenced respondents through anchoring effects associated with the predefined percentage increments. For artisanal dairy products, perceived value appeared to be rooted not only in ethical meanings or certifications, but also in the tangible sensory outcomes of farming practices, milk characteristics, and artisanal processing. From this perspective, artisanal production systems, which combine extensive pasture-based farming with traditional processing practices, may represent a meaningful pathway for preserving gastronomic identity and enhancing the perceived value of local foods, particularly in rural and marginal areas.

6. Implications

6.1. Managerial and Policy Implications

The findings highlight the strategic importance for artisanal goat cheese producers of investing in sensory quality, especially in maintaining distinctive flavour and aroma characteristics that contribute to product differentiation. However, the results indicate that sensory differentiation alone may not be sufficient to justify premium positioning.

Instead, modest sensory advantages may become economically relevant when combined with territorial identity, certification schemes, and authentic production narratives.

Artisanal production systems, combining extensive pasture-based farming with traditional cheesemaking techniques, may generate higher consumer valuation and potential price premiums by strengthening sensory experiences, although further research is needed to confirm these relationships across broader consumer samples. Territorial certifications such as PDO should be used to reinforce, rather than replace, sensory differentiation, embedding product quality within a coherent narrative of place and tradition.

For industrial producers, the results suggest that value creation is more effectively pursued through improvements in texture, consistency, and transparent nutritional communication, rather than through ethical certifications that may appear misaligned with industrial production. Aligning communicated values with product identity is essential to avoid credibility losses and consumer skepticism. Finally, for marketers and food communicators, the results underline the importance of segmented and experience-oriented communication strategies.

From a policy perspective, the study supports initiatives aimed at preserving and promoting extensive pasture-based systems and artisanal food production. These systems generate not only environmental and animal welfare benefits but also distinctive sensory qualities that are recognized and rewarded by consumers. Policies that support PDO schemes, local branding, and sensory valorization strategies can enhance the resilience and competitiveness of artisanal food systems, particularly in marginal rural areas.

6.2. Consumer and Food Value Implications

Beyond its empirical findings, this study carries broader implications for how food value is understood and communicated. Because consumers appear to ground perceived quality primarily in sensory experience rather than in symbolic or ethical claims alone, communication strategies for artisanal dairy products are likely to be more effective when they are anchored in authenticity and lived food experience rather than in sustainability messaging detached from it. This suggests a role for production narratives that explicitly connect farming systems to their sensory outcomes: linking pasture-based practices to the aromatic and gustatory qualities they generate may strengthen consumer engagement and support premium positioning more convincingly than certifications or ethical claims used in isolation. Such an approach is particularly relevant for local food systems and sustainable consumption, where the way food is experienced contributes directly to how its value is recognized.

6.3. Limitations and Further Research

This study has some limitations that should be considered when interpreting the findings. First, the analysis is based on a convenience sample recruited at a single university-based sensory laboratory. Although participants were regular cheese consumers, the recruitment strategy may have favoured individuals with greater interest in food products, sensory evaluation activities, or university research participation. Consequently, the sample composition may differ from that of the broader Sicilian consumer population in terms of socio-demographic characteristics, food involvement, and attitudes toward artisanal products. Therefore, the findings should be interpreted as reflecting the preferences of Sicilian consumers willing to participate in laboratory-based cheese evaluations rather than those of Sicilian goat cheese consumers in general. Future studies should employ larger and more heterogeneous samples recruited through probabilistic or market-based approaches to improve external validity and assess whether these patterns extend to the broader consumer population.

Second, the relatively small sample size limits statistical power, particularly for detecting interaction effects, and increases uncertainty around estimates involving consumer heterogeneity. In addition, the simultaneous exploration of multiple interaction terms increases the possibility of Type I errors. Although these interactions were included to identify potential patterns rather than to test confirmatory hypotheses, the retained effects should be considered exploratory and hypothesis-generating. Future research should validate these relationships using larger samples, pre-specified hypotheses, and appropriate multiple-testing control procedures.

An additional methodological limitation concerns the use of backward stepwise variable selection in the ordered logit models. Although this approach was adopted for exploratory purposes to identify potentially relevant predictors among a relatively large set of candidate variables, stepwise procedures may increase model uncertainty and affect the stability of coefficient estimates and significance levels. Therefore, the regression results should be interpreted as exploratory evidence rather than definitive estimates. Future studies with larger samples should assess the robustness of these relationships using theoretically pre-specified models, cross-validation procedures, or regularization approaches such as Lasso or Elastic Net.

A further limitation of the present study is that the comparison between artisanal and industrial goat cheeses involves production systems that differ simultaneously across several dimensions, including farming practices, milk treatment, processing methods, and the use of local versus commercial breeds. As a result, the observed differences in sensory perception and consumers' willingness to pay cannot be attributed to any single production factor. Instead, our findings should be interpreted as reflecting consumers' responses to the overall artisanal production bundle, rather than to extensive pasture-based farming alone. Future research should adopt factorial experimental designs that independently manipulate farming systems and processing methods, allowing the relative contribution of each factor to sensory quality and consumer preferences to be more clearly identified.

An additional limitation concerns the absence of a formal discrimination test assessing whether participants could reliably distinguish the two cheese samples beyond chance level. Although the consumer-based sensory evaluation design was appropriate for measuring hedonic responses and willingness to pay more, it did not allow us to determine whether the observed differences in sensory ratings corresponded to a statistically confirmed ability to discriminate between the products. Therefore, the sensory differences identified in the present study should be interpreted as differences in perceived liking and evaluation rather than as evidence of objectively verified discrimination ability. Future studies should integrate consumer acceptance measures with discrimination tests, such as triangle or duo-trio tests, to better assess the extent to which differences in production systems generate perceptible sensory distinctions.

A further limitation concerns the use of separate ordered logit models for the two cheeses. Although this approach allowed the identification of product-specific determinants of WTPM, it does not permit formal statistical comparisons of coefficient magnitudes across cheese types. Consequently, differences observed between the two exploratory models should be interpreted descriptively rather than as evidence that the effects of sensory attributes differ significantly between artisanal and industrial goat cheese. Future research should estimate joint panel-data models, such as mixed ordered logit specifications including consumer random effects and interactions between cheese type and sensory attributes, to formally test whether the influence of sensory characteristics differs across artisanal and industrial products.

Another limitation concerns the absence of direct measures capturing consumers' perceptions of biodegradable packaging. Although the negative association between biodegradable packaging and WTPM represents an interesting exploratory result, the current design does not allow identification of the psychological mechanisms underlying this relationship. Specifically, it is not possible to determine whether consumers simply assigned lower importance to sustainability-related packaging cues compared with sensory attributes, or whether biodegradable packaging activated negative expectations regarding product protection, freshness, or quality. Future studies should incorporate dedicated measures of packaging perceptions, perceived functionality, sustainability beliefs, and product-quality inferences to clarify the mechanisms through which sustainable packaging influences consumer valuation.

Finally, WTPM was elicited using stated preference methods, which may be subject to hypothetical bias. Future research should complement these measures with incentive-compatible approaches, such as Becker–DeGroot–Marschak (BDM) auctions or real purchase experiments, to validate the relationship between sensory experience and economic valuation under conditions that more closely resemble actual market behaviour. More broadly, integrating sensory evaluation with real purchasing contexts and informational cues would provide a deeper understanding of how production systems shape consumers' gastronomic experiences and willingness to pay.

A further consideration concerns the interpretation of socio-demographic differences in stated WTPM, particularly gender-related effects. Although the models identify associations between gender and stated economic valuation, these differences should not be interpreted as direct evidence of differences in actual purchasing behaviour. Previous research on stated-preference methods suggests that demographic groups may differ in how they express hypothetical economic preferences, potentially due to differences in response strategies, uncertainty, or the interpretation of valuation tasks. Therefore, the gender effects identified in the present study should be understood as differences in stated valuation patterns rather than confirmed differences in market behaviour. Future studies should combine stated-preference approaches with revealed-preference methods, such as experimental purchasing tasks, incentive-compatible auctions, or scanner-based market data, to verify whether observed gender differences persist in real purchasing contexts.

Another methodological limitation concerns the use of fixed WTPM categories expressed as 10%, 20%, 30%, and 40% price premiums. While this categorical format facilitated respondents' evaluations and supported the use of ordered logit models, it may also have generated anchoring effects, whereby respondents interpreted the proposed percentages as reference points for reasonable premiums rather than reporting their unconstrained willingness to pay. Consequently, the estimated WTPM levels should be interpreted with caution. Future research could compare the present approach with open-ended elicitation methods or incentive-compatible valuation techniques to assess the robustness of consumers' stated willingness to pay across alternative elicitation formats.

Author Contributions: Conceptualization, G.D.V. and D.S.; methodology, G.D.V., D.S., M.H. and R.Z.; software, R.Z. and M.H.; validation, G.D.V. and L.L.; formal analysis, R.Z. and M.H.; investigation, L.L., M.L. and V.L.; data curation, L.L., V.L. and M.L.; writing—original draft preparation, G.D.V., D.S. and M.H.; writing—review and editing, G.D.V., D.S., M.H. and R.Z.; supervision, G.D.V. and L.L.; project administration, G.D.V. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Committee of the University of Messina, Department of Veterinary Sciences (Protocol No. 2024/05, 23 May 2024).

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

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the corresponding author on request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Discriminant validity for industrial goat cheese based on Fornell–Larcker criterion.

	Aroma	Appearance	Taste	Texture
Aroma	1.0000			
Appearance	0.5823	1.0000		
Taste	0.5416	0.5744	1.0000	
Texture	0.5990	0.6388	0.6830	1.0000

Table A2. Discriminant validity for artisanal goat cheese based on Fornell–Larcker criterion.

	Aroma	Appearance	Taste	Texture
Aroma	1.0000			
Appearance	0.7156	1.0000		
Taste	0.7580	0.7242	1.0000	
Texture	0.6552	0.6190	0.6896	1.0000

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