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Underground Built Heritage and Food Production: From the Theoretical Approach to a Case/Study of Traditional Italian "Cave Cheeses"

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Abstract: Throughout history, the natural perishability of food and its inconstant supply over the year have influenced family diets and local food traditions worldwide. These critical issues have been managed in two very different ways: by preserving raw foodstuffs, or by processing them. Underground spaces have often been used for both purposes. Their use for the preservation or processing of foods is a case of successful adaptation of local skills and technologies to the management of local resources and environmental conflicts. This paper, after proposing a methodological approach for elements included in the function "food" of the new-born Underground Built Heritage (UBH) class, lists the main characteristics of three different types of artefacts falling within this category: iceboxes, cellars, and traditional food production. For each group, several examples from all over the world are presented. After this overview, the paper turns to a case study of Italian production of cheese in caves and the general level of protection guaranteed by the current European and Italian legislation to the connection between given food specialities and the UBH used in their production. After introducing the general context, the article analyses the production of traditional Italian "cave cheeses" in detail, with particular reference to Taleggio, Fossa di Sogliano, Canestrato di Moliteno, Pallone di Gravina, and Grotte del Caglieron cheeses, in order to determine how and whether UBH is included in dedicated marketing strategies such as the choice of a product's logo and the product's branding and storytelling.

Keywords: underground built heritage (UBH); historical food spaces; traditional foods; food cultural values; Italian traditional specialities; Italian cave cheese; food branding; food storytelling; marketing

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1. Introduction

Throughout history, the natural perishability of food and its inconstant supply in the course of the year due to the seasonal character of its production and climatic events have played a major role in shaping daily diets and local food traditions. These issues have stimulated a continuous search for strategies to preserve the fresh products or process them in order to make them more resistant to spoilage. Sometimes, such strategies eventually resulted in the creation of new food products which, just like the fresh ones, have become significant elements in local cultural heritage.

Both the conservation and the transformation of food products often involve using underground spaces. This is sometimes done in rural contexts near the places of production, and sometimes in the villages or towns where the food is traded or consumed. In all these cases, both natural and artificial underground cavities are involved. Using caves in such a way often puts a significant stamp on the entire production process and links it significantly to its local context.

As expressions of local tangible and intangible heritage, caves that were used to produce food today can be included in the new-born class of Underground Built Heritage

(UBH), a class that includes all the elements historically built in the underground to manage eight functions: food, religion, defence, economy, transport, living space, water, and sanitation, as shown in Figure 1 [1].

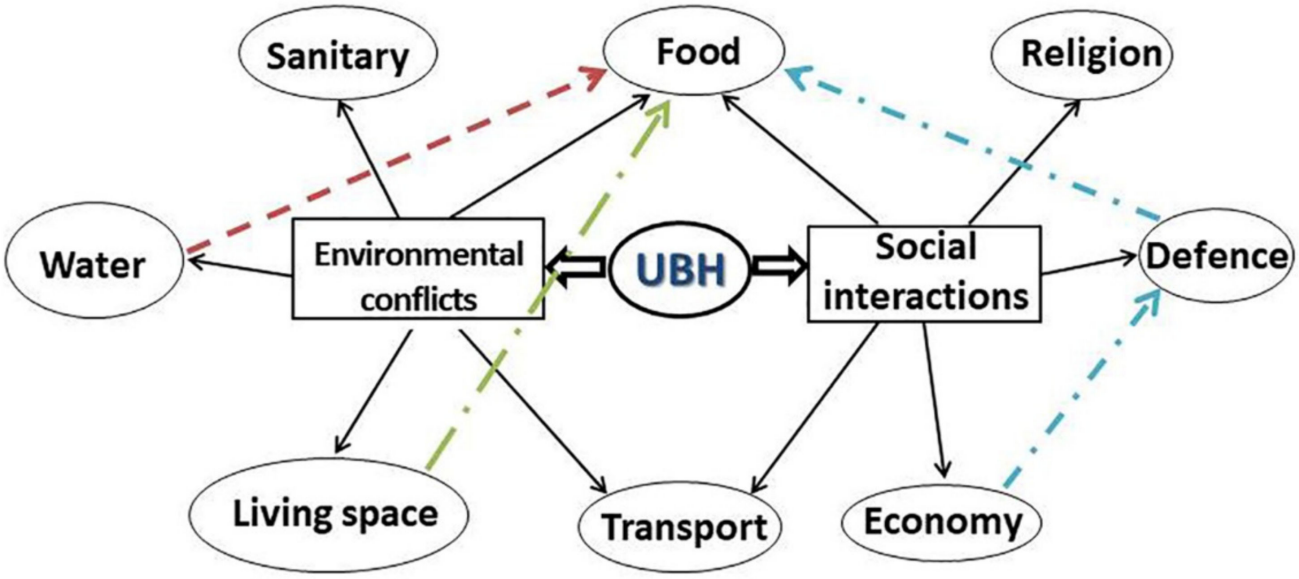

Figure 1. The function "food" in the UBH chart (by R.V.).

Such an inclusion offers great opportunities for the promotion of cave-produced food. To this end, however, further investigation is called for, particularly as regards the following points:

- How can underground constructions used for food storage or production be classified as cultural heritage?
- How can underground cultural heritage be used to characterize specific food specialities?
- To what degree is the quality and authenticity of cave-produced food legally certified?
- What food producers have actually included underground heritage in their marketing strategies and can thus be regarded as role models in this sector?
- What marketing strategies do these role models use?
- What obstacles lie in the way of full exploitation of this sector's potential?

To answer the above questions, with specific reference to the Italian case study examined here, this paper adopts a four-step approach:

1. It defines general criteria for the inclusion of caves used for food management in the new-born UBH class.
2. It proposes a classification of homogeneous UBH groups based on historical uses of caves for food production.
3. It presents an Italian case study and discusses regulations for the protection of food specialities (such as PDO, PGI, TGS, and TAP) that refer to UBH.
4. It provides a general overview of the role played by UBH in the protection and promotion of traditional Italian "cave cheese".

The aim of this paper is to determine if, and to what degree, UBH is exploited to its full potential in marketing strategies such as the creation of the corresponding logo, storytelling, and branding in the production of local food specialities.

Starting from the introduction to the methodological approach to UBH, we focus on the function "food" while providing several examples from worldwide case studies. Then, we introduce the Italian case study with reference to typical productions and summarize the relevant Italian and European legislation. Having selected "cave cheese" as a case study, we examine if and how elements of UBH are currently adopted in branding, storytelling, and marketing strategies.

The choice of "cave cheese" to test this approach is due to the fact that in this specific commodity sector dedicated marketing strategies linked to both local landscapes and historical artefacts have already been successfully experienced at an international level. In Valle de Roncal (Spain), for example, "cheese landscapes are symbol of rural identity and a factor of tourist attraction" [1]; in France, Roquefort Cheese producers have always adopted a "cave based marketing system" as well [2].

The choice of Italy as a case study is thanks to the fact that this country has a special relationship with both its historical heritage and its food productions, the former being an expression of its tangible cultural heritage and the latter representing its intangible heritage.

Despite this focus, the proposed approach is transferable to studies of other nations with reference to other local food specialties; in fact, potential worldwide food producers or consortiums could benefit from the idea of adopting elements of their tangible heritage to promote food specialities embodying local intangible values.

2. Materials and Methods

The class of Underground Built Heritage (UBH) includes all historical artefacts built below ground level or that resulted from substantial transformations of natural caves in order to manage environmental and social interaction issues [3]. Eight subclasses, corresponding to as many functions, have been distinguished: sanitary, water, living space, economy, defence, religion, and food (Figure 1). The function "food" characterizes artefacts adopted to preserve or transform foodstuffs; elements included in this subclass communicate values related to local crops management and to special techniques for the manufacturing of typical local food products.

In certain cases, these artefacts have been excavated especially for this purpose. Sometimes they are adaptations of natural caves or of excavated spaces that, after the ceasing of their original functions, were transformed and equipped for food conservation or processing. In Figure 1, three possible situations have been simulated. The first is that of a water cistern transformed into a cellar (red line in Figure 1), the second of a former cave residence readapted to season cheese (green line in Figure 1), and the third of a stone cave used first as a bunker and eventually to preserve dried fish (blue line in Figure 1).

Whatever the initial function of each artefact, its final inclusion in the subclass "food" reflects its current use for the management of natural resources through the use of special techniques. This UBH thus becomes significant local cultural heritage, and may be the hub of development processes at various levels.

Elements in the "food" subclass can be classified into three different groups: iceboxes, mostly used until the introduction of artificial refrigeration; cellars, created to preserve food at a given humidity and temperature; and places for the processing of local products (orange line in Figure 2). All of these artefacts can be under domestic or entrepreneurial management. When they are used within a productive process, they can be reclassified as belonging to the first sector of the class economy (green line in Figure 2). In this case, they can be exploited for their narrative potential within branding or marketing policies dedicated to local productions and local regeneration plans as well.

2.1. Iceboxes

Cold storage has always played a leading role in food preservation. Until modern technology gave us refrigerators, the subsoil's capability for thermal insulation was exploited to preserve natural ice and pressed snow in all possible ways. Although the practice of collecting snow and ice in ancient China is documented in a number of texts from 1000 BC onward, icebox technology is usually dated back to 400 BC, when Persians built the first yakhchal, considered to be one of the first attempts at sustainable architecture ever [4]. These structures combined the natural cooling properties of the subsoil with ventilation from local underground water channels called qanat, and were designed to store ice used to preserve food supplies [5]. Later on, the ancient Jews, Greeks, and Romans used ice to

cool food. In these cases, however, ice was intended to cool food and drinks to make them more palatable during the warmer months. The ice was kept in dedicated underground rooms. All these iceboxes served the purpose of producing local luxury food specialities [6], often at the domestic level [7].

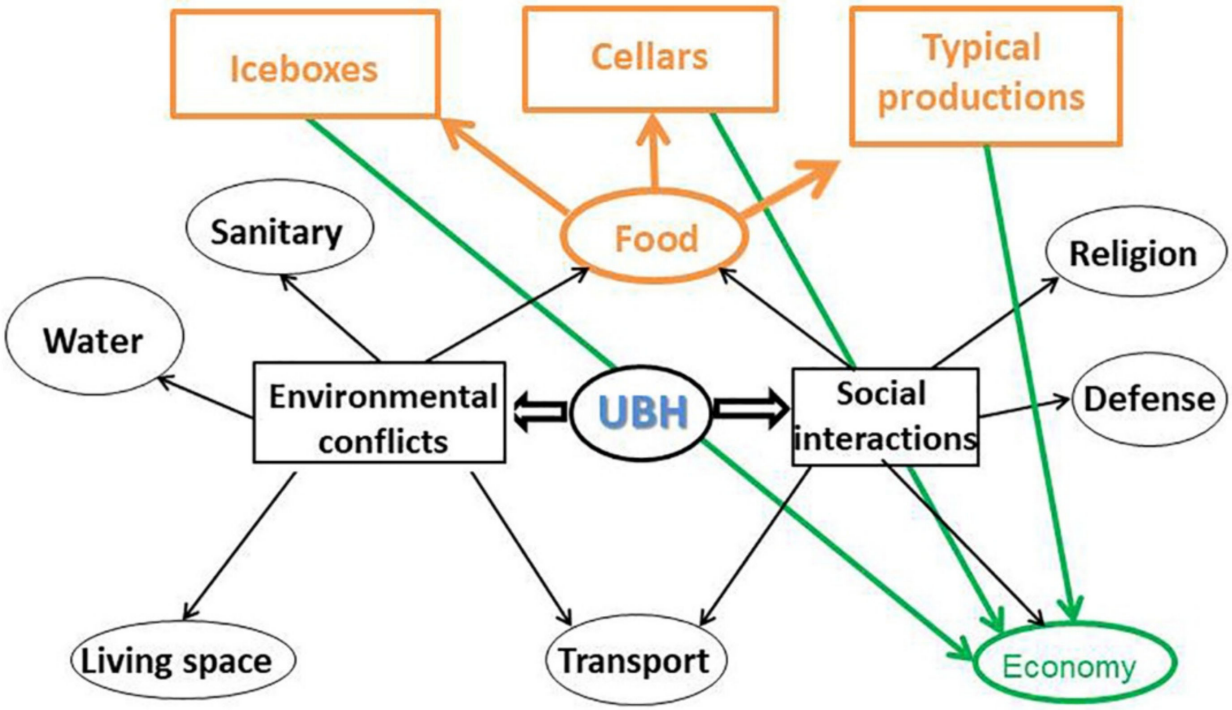

Figure 2. Types of artefacts and transformation, from personal to entrepreneurial use (by R.V.).

Iceboxes remained a luxury until the use of cold for conservation and processing was introduced in particular food sectors. In the meat and fish trade, for example, old seasoning and salting methods were complemented by the introduction of storage in underground cellars cooled with natural ice and pressed snow. The critical issue was the transport and preservation of the ice and snow [8]. In the North of Italy, these were brought in on wagons that travelled at night. Ice from the nearby Alps, or which simply formed on site during the colder winter nights, was preserved in wet jute bags. In southern Italy, instead, one had to wait for very rare temperature slumps to cause exceptional snows.

In certain places in northern Italy, such as the coastal towns of Cesenatico and Senigallia, iceboxes eventually came to play a role in the local economy. In the seventeenth century, underground iceboxes were essential equipment for fisheries. In the Genoa harbour, ice and snow kept in iceboxes was used in the galleys of merchant ships to preserve food during their long voyages. Iceboxes were used in food processing as well; in Milan, there were iceboxes at Favaglie and in the monastery of Sant'Ambrogio, and in Turin in the area between Porta Palazzo and under the Sanctuary of the Consolata. All these iceboxes belonged to adjacent farmhouses [9].

In the South of the peninsula, where ice was a scarce and hence valuable good, local ice-collecting traditions were established at several sites. On the island of Ischia in the province of Naples, for example, in the event of a heavy snow on Mount Epomeo an army of workers would gather to the sound of a traditional musical instrument called a tofa and move up to the mountain armed with shovels and sticks, dressed in traditional attire. They stowed their booty in underground caves, well covered with chestnut leaves, and resold it during the summer. On the occasion of a party in honour of king Ferdinand IV in the hot summer of 1783, snow was used to cool fine local products, and the king allegedly appreciated the coolness of the food; the historical background of this typical production is today at the core of local branding strategies [10]. On Mount Cerveti and along the Sorrento

coast, natural caves were regularly used to press and preserve ice for commercial purposes as well. The southern Italian ice-cream making tradition is rooted in these intangible and tangible cultural elements, where the precious ice from historical caves was mixed with typical local fruits such as citron and strawberries for privileged customers; these elements have been adopted in dedicated storytelling by local producers [11].

In Sicily, traditional ice-cream making has historically been linked to the use of iceboxes from the late nineteenth century [12]. The "Neviere di Sicilia" project has produced a cultural map of Sicilian ice-cream in the context of local food production [13].

All these examples show how UBH listings can connect food production to local facilities, as well as how these facilities can provide inspiration for local development and producers innovative marketing strategies.

2.2. Cellars

Throughout history, cellars have been used to preserve food that needs to be kept at a constant temperature, away from the sunlight, but not refrigerated. It is only thanks to cellars that raw food such as potatoes, onions, garlic, apples, etc., and typical Italian products such as wine, cheese, and oil, have managed to become over time the basic ingredients of local diets and food traditions. Cellars have been used and are used today at the family level, collectively by local communities, or by market-oriented enterprises in both the commercial and the production chains. Whatever the level of their use, they stand as a case of perfect management of several critical climatic issues.

As regards the promotion of cellars as cultural heritage and their inclusion in dedicated marketing strategies, there are two different cases. While private and collective cellars have often been promoted as cultural heritage as part of a building they belong to, such as private villas or monasteries, commercial activities have sometimes used their historical cellars as a self-standing element in their communication strategies. In the case of historical wine cellars, for example, authenticity is guaranteed both by the use of local grapes and by the aging of wine in specific local facilities. Local UBH can thus be profitably used to either promote the private enterprise they belong to, or for touristic purposes as an element in tourist routes, festivals, or merchandizing to support local communities.

In the Italian wine tourism sector, there is a long-standing tradition of holding an "Open Cellars" event every year. The first one was organized back in 1993. Ever since, the event has gained increasing popularity, expanding from the 25 wineries initially involved to more than 21,000 today and leading to the establishing of more than 170 dedicated local networks [14]. Wine tourism is indeed the most innovative phenomenon in touristic development in connection with the class of so-called "territorial intensive products" [15]. In Italy it has been recently perceived as a good opportunity in plans for the distancing of touristic fluxes due to the COVID-19 pandemic. In this context, wine cellars serve as an *access door* to dedicated itineraries and as links between intangible local values and traditional products according to given dedicated guidelines [16].

2.3. Typical Productions

The subsoil has often played a role in the production of typical foods. The constant humid climate of underground spaces, the molds forming therein, and the absence of natural light can help to confer desirable organoleptic characteristics upon products. However, not all underground places are equally suited to this end. In some cases, food needs to be seasoned in caves with specific geological and geographical characteristics. In these cases, the quality of the final product depends on both aboveground and underground factors.

In Italy, many typical products are produced or seasoned in underground spaces. When artificial caves of special historic value are used to this end, they can be included in the UBH class. Does this inclusion, however, guarantee the link between a particular UBH and the food production process? More specifically, in cases where the final quality of protected foods is necessarily connected to the use of UBH in the production process, is this fundamental relationship reflected in the current legislation?

To answer these questions with regard to the Italian and European context, we have sought to ascertain whether this aspect is taken into consideration or not in certificates for the three levels of protection envisaged by EU Regulation 1251/2012 and its subsequent amendments and additions regarding the quality of agricultural products and foodstuffs: Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), and Traditional Specialty Guaranteed (TSG).

Table 1 presents a critical analysis of the regulatory provisions regarding PDO, PGI, and TSG certification. All the requirements that may involve UBH are underlined in red. It emerges that there may be several connections between physical historic elements involved in traditional production processes, PDO, PGI, and TSG certification, and product specifications. As regards physical historic elements, UBH can provide the connection with a specific geographical area, be part of a traditional production process, or even provide the climatic conditions required for a specific typical production. As regards the contents specified in a product specification (called in Italian *disciplinare*), the possible relationship between UBH and specific typical foods can instead be included from several angles. As the lower section of Table 1 shows, UBH can be part of the name of a PDO, PGI, or TSG certified product, be included only in the description of the product or of its production method, be part of the definition of the geographical area, or, as is the case with several TSG products, even be the key element connecting the product with a specific area.

Table 1. UBH and the current legislation for PDO, PGI, and TSG products in Italy (by R.C. and R.V.).

Protected Designation of Origin PDO	**Protected Geographical Indication PGI**	**Traditional Specialty Guaranteed TSG**
Requirements	Requirements	Requirements
(a) It originates in a specific place, area, or in exceptional cases, country (b) Its quality or characteristics are essentially or exclusively due to a particular geographical environment with its inherent natural and human factors (c) Its production steps all take place in the defined geographical area.	(a) It originates in a specific place, area or country (b) Its quality, reputation, or other characteristic is essentially attributable to its geographical origin © At least one of its production steps takes place in the defined geographical area.	(a) Its production, processing, or composition corresponds to traditional practice for that product or food (b) It is produced from traditional raw materials or ingredients
Product Specification		Product Specification
Name: It must be only in the local language, it must correspond to the one traditionally used, and it may include a mention of UBH **Description**: It includes the raw materials and the principal physical, chemical, microbiological, or organoleptic characteristics of the product; it may include the temperature of and moulds formed in UBH **Geographical area**: When mentioned, UBH should be located in the area and be the physical link of the product to the area **Description of the production method**: Authentic and unvarying local methods should include information concerning seasoning and packaging; UBH can be involved at all stages.		**Name**: it can include a mention of UBH in the language of the country where the product is made **Description**: It should include physical, chemical, microbiological, or organoleptic characteristics; it can include references to UBH **Description of the production method**: It should include the nature and characteristics of the raw materials or ingredients and the methods used to process them; it can include stages taking place in UBH **The key elements** Determining the product's traditional character; this can include UBH

Furthermore, in Italy there exists a fourth level of protection with a certification that may include a reference to UBH, namely, Traditional Agro-Food Products (TAP). This certification is granted to typical Italian food products included in a list published

yearly by the Italian Ministry for Agricultural Policy. In 2019, this list included 5128 local specialties [17].

3. UBH and Italian Cave Cheese: A General Approach

Four categories of Italian typical products may include UBH in their productive process: wine, cold cuts, vegetables, and seasoned cheeses; this last category probably includes the most representative examples of this relationship for several historical and morphological reasons.

As regards the historical aspect, the link between Italian cheese and underground artefacts can be traced all the way back to Homer's Odyssey (Book Nine) and Lucius Junius Moderatus Columella's De Re Rustica (Book Seven). As regards the morphological aspect, all over Italy the subsoil is known to provide cool temperatures—usually between 10 and 15 °C—and constant percentages of high humidity, usually in the 80/90% range. In particular, tuff caves are widespread in several southern and central Italian Regions, limestone and sandstone subsoils are very common in the Tuscan–Emilian Apennines, and Karst habitats are typical of northern Italy.

Based on these considerations, it is hardly surprising that in Italy the practice of seasoning cheese in underground cavities has given rise to a wide range of local specialties known collectively as "cave cheese". The seasoning cells of cave cheeses are the physical artefacts that link local intangible and tangible cultural values; as such, they may of course be included in the UBH class and in the cheese's *disciplinare*.

For PDO cheeses, such as those of Asiago, the focus is on the geographical area, and "the seasoning must be carried out in the same area as production" [18]. In the case of Bra cheese, instead, the nature of the underground artefact is underlined; the seasoning should be carried out "in natural cellars, or in artificial caves that reproduce the climatic and humidity conditions of the natural caves that characterize the product" [19]. In the case of Fiore Sardo cheese, "seasoning must be done in dedicated caves" [19]. In the case of Fontina cheese, the *disciplinare* mentions the historic value of "traditional caves" [18]. Sometimes, the *disciplinare* stresses the natural suitability of certain caves for production; in the case of Castelmagno cheese, for example, "seasoning must be done in cool and humid natural caves" [19]. In other cases, the intangible values connected to the traditional character of production are underlined. The *disciplinare* of Pecorino di Filiano, for example, rules that "the cheese [should be] left to season in traditional tuff caves, or suitable rooms, for the cheese to season at a temperature of 12–14 °C and a relative humidity of 70–85% for at least 180 days" [20]. In the case of Taleggio cheese, too, the connection between the product and historic local caves is explicitly mentioned: "during the entire seasoning phase, the delicate conditions characteristic of the typical caves of the Bergamo valley called Taleggio must be maintained, where a natural balance of the climate of the caves (temperature, humidity, ventilation) allows slow natural seasoning" [18]. Sometimes, the equipment of those spaces is protected as well; in the case of Fossa di Sogliano, the disciplinare explicitly mentions it: "before the caves are used for seasoning they must be equipped for performing the following historic techniques . . . " [21].

For certain IGP products—such as, for example, Canestrato di Moliterno cheese—the link with UBH is very strong: seasoning in underground cellars "must be done exclusively in the traditional area of production, the town of Moliterno" [22].

Thus, UBH is often mentioned in the correspondent *disciplinare*. An exception, however, is the case of Pecorino Romano PDO; while it is traditionally seasoned in the Etruscan and Roman caves in the area, this fact is not mentioned at all in the *disciplinare* for this product [18].

The mentioning of a UBH element in a product's *disciplinare* is only one possible means of promoting "cave cheese".

Table 2 highlights several possible connections of a selection of Italian "cave cheese" with UBH. The first column shows the image of the registered logo, the second its relationship with a UBH element, the third the name of the product, the fourth the reference to the

UBH element in the name, and the fifth the mention of UBH in the *disciplinare*. In the sixth, seventh, and eighth columns the inclusion of UBH on the web pages for each product and its use, if any, in dedicated storytelling either at consortia or at the individual dairy-farm level, are analyzed.

From the analysis in Table 2, several interesting facts emerge. For example, for the famous PDO Taleggio, UBH is not referred to anywhere except in the *disciplinare*. On the contrary, in the case of the Regione Campania PAT Caciocavallo Irpino di Grotta [23], the UBH used for its production is highlighted in all the forms of communication under consideration, including impressive storytelling by several farms, for example, Caciocavalleria [24], Valsana [25], and Collebianco [26]. This approach seems typical of this class of products. It is evident, as we have seen, in the case of Regione Puglia PAT Caciocavallo Pugliese di Grotta [27], starting from the name of the product. In the case of Regione Puglia PAT Pallone di Gravina [28], the connection is instead indicated by reference to the town of Gravina, one of the most important underground settlements in southern Italy [29–31].

Table 2. Analysis of selected Italian cave cheeses; NA = not applicable (R.C.).

LOGO	Name of the Product	Classification	UBH in the Logo	UBH in Name	UBH in the Disciplinare	UBH on the Web	UBH in Storytelling (Consortium)	UBH in Storytelling (Individual Farm)
	Asiago	PDO	NO	NO	YES	NO	NO	NO
	BRA	PDO	NO	NO	YES	NO	NO	NO
	Fiore Sardo	PDO	NO	NO	YES	NO	YES	NO
	Castelmagno	PDO	NO	NO	YES	NO	NO	YES
	Pecorino di Filiano	PDO	NO	NO	YES	YES	NO	YES
	Pecorino Romano	PDO	NO	NO	NO	NO	NO	NO
	Taleggio	PDO	NO	NO	YES	NO	NO	NO
	Fossa di Sogliano	PDO	YES	YES	YES	YES	YES	NO
	Canestrato di Moliterno	PGI	YES	NO	YES	YES	NA	NO
	Grotta del Caglieron	NA	YES	YES	NA	YES	YES	YES
	Pallone di Gravina	TAP	NO	NO	NA	YES	NA	NO
ND	Gran Cru di Grotta	NA	NA	YES	NA	YES	NA	YES
ND	Caciocavallo irpino di grotta	TAP	NA	YES	NA	YES	NA	YES
ND	Caciocavallo pugliese di grotta	TAP	NA	YES	NA	NO	NA	NO

In the case of the Gran Cru di Grotta by Brisighella, a special cave cheese from a private dairy which is not protected by any certification, the term grotta (cave) is included in the name itself. Its traditional production process is advertised by referring to the "noble molds reigning undisturbed in the traditional cellars" by both exporters and the producer [32,33].

In addition to being mentioned in the *disciplinare* of protected products, connections with UBH are sometimes pointed out in designations or descriptions of non-protected products, particularly as part of their marketing. Such a connection may be emphasized in a registered logo or in the name of a product. Sometimes the historic significance of

a product or its links with specific local assets are expressed by references to UBH on websites or by dedicated storytelling by a consortium or individual producer.

Table 2 summarises the situation in this regard for eight PDO, one PGI, three TAP, and three unprotected products, while in Figure 3 a geographical distribution of "cave cheese" production in Italy is presented.

It emerges that even though UBH strongly characterizes several Italian "cave cheeses", there is no common approach to the promotion of this feature for either protected or unprotected products.

To get a clearer picture of this situation, in the next section five "cave cheeses" are analyzed: two PDO-certified, one IGP-certified, and one a niche product. We have selected PDO Taleggio to determine at what level of its marketing strategies UBH is included. PDO Fossa Di Sogliano is considered to be a true role model in branding that includes references to UBH. IGP Canestrato di Moliterno has been the object of interesting lawsuits. TAP Pallone di Gravina, instead, is a good example of the link between the karst habitat and its production. Finally, Grotta del Caglieron is the symbol of the area where it is produced, using UBH at various production stages.

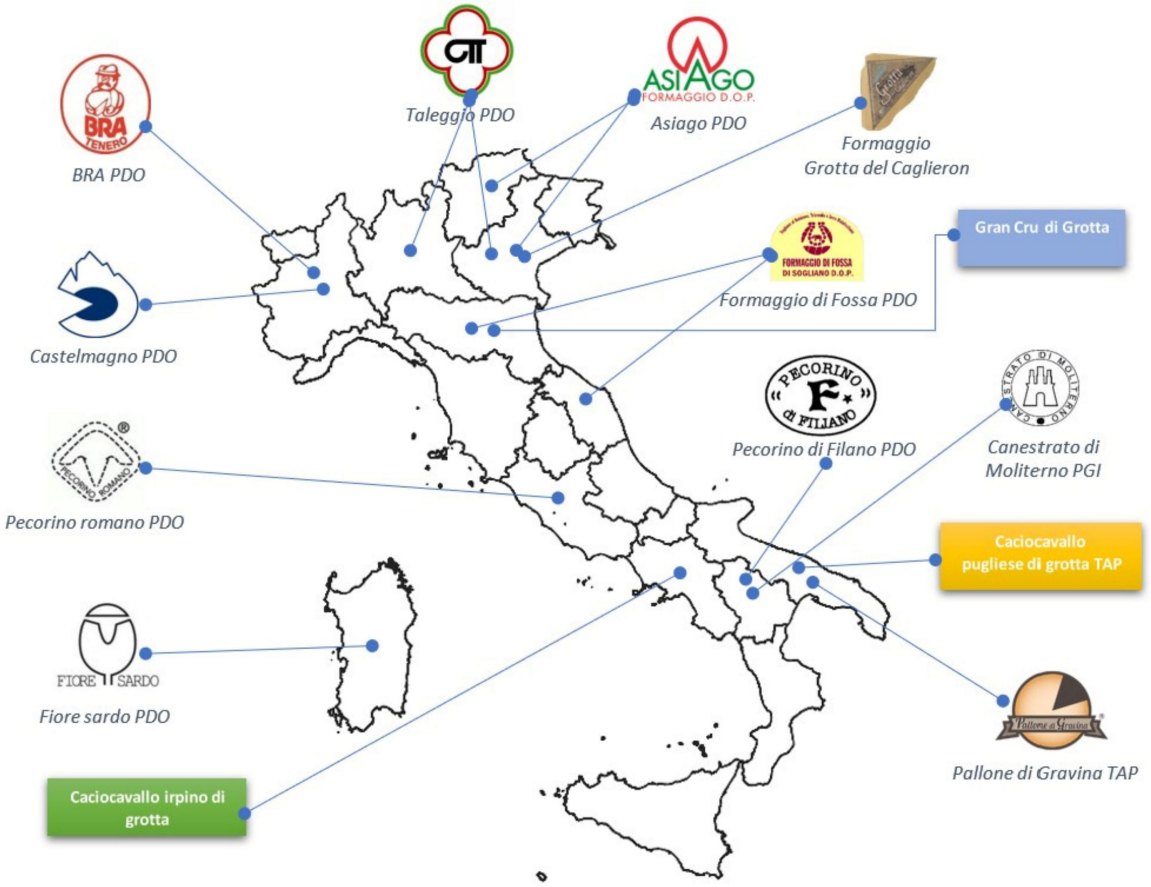

Figure 3. Cave cheese production in Italy (by R.C.).

4. Taleggio, Fossa di Sogliano, Canestrato di Moliterno, and Grotta del Caglieron Cave Cheeses

4.1. Taleggio

Taleggio cheese has such a special relationship with its production area that it is nicknamed the "valley of cheese". The historic caves used in the production of this specialty date back to the second half of the nineteenth century, when local stone constructions with underground passages were first used to store fresh cheese. The required climatic conditions were guaranteed by special cellars, the so-called casere (from cacio, an Italian term for cheese). These were dug several metres underground and were characterized by natural

cool and humid ventilation. These caves are regarded as so relevant within the cultural landscape of the valley that they were mentioned in the 2013 application dossier for the establishment of the Grigna Valsassina and Como Lake Geopark [34].

We selected the case of Taleggio cheese because in spite of its significant connection with UBH, this connection is not indicated in either the logo or in the consortium storytelling.

Actually, the four stylized arches in the logo may indeed represent caves, although this is far from self-evident. As for the consortium storytelling, its failure to mention UBH seems to be a missed opportunity, considering the positive effects of the successful inclusion of UBH in the storytelling of the Cademartori brand. The marketing strategy of Cademartori cheese emphasizes the historical role of UBH in the production process. This approach turned out to be an opportunity to diversify the services offered by the brand by including accessorial products such as guided tours to the Introbio cave and several events organized in the UBH for clients and tourists, as shown in Figure 4.

4.2. Fossa di Sogliano Cheese

The underground layers of the last section of the northern Apennines include sea sedimentations dating back to the Pliocene. The resulting limestone has always been dug to obtain cavities, mostly used as cellars where cereals, wines, and cheese were stored. The first report of such usage dates back to 1496, while the term grotta is mentioned for the very first time in 1701.

Figure 4. Taleggio cheese: the icon of the cheese valley (by R.V.).

The caves used to produce cheese can have an open or a closed front. Cows' milk, sheep's milk, or a combination of the two is used depending on the type of cheese. The cheese is commonly seasoned for three months.

Thanks to the use of UBH in its production, Fossa di Sogliano cheese is the highest expression of the link between the distinctive features of an area and its food production [35]. This is clearly indicated by the logo and graphics employed in the product's communication strategy, which emphasizes a map of the area. This story has already stimulated research in a sector on which little academic research has been done [36].

As a sign of continuity with traditional methods of production, historic pictures showing caves and workers are often used as part of the communication strategy, as shown in Figure 5.

Figure 5. Fossa di Sogliano cheese as an expression of the area and its traditions (by R.V.).

The potentialities of the link of Fossa di Solignano cheese with the local material and immaterial heritage is at the core of the gallery of the Cave Cheese Museum, a popularization centre included in the Emilia-Romagna taste museum itinerary. The cheese museum was created by incorporating several historical cellars dated between the eleventh and the twelfth centuries, and stands as a role model in the musealization of UBH.

4.3. Canestrato di Moliterno Cheese

Canestrato di Moliterno cheese is one of the prime products of the Basilicata Region. Its production is connected to the underground cultural heritage that was at the core of Matera's role as the 2019 European Capital of Culture [37]. Despite this, the logo of this "cave cheese" does not evoke the UBH used in its production at all. The link with local cultural heritage is guaranteed instead by the inclusion of the local castle in the logo. The absence of UBH, however, should not be misinterpreted; in fact, there is no product that is so closely linked to UBH as to have actually given rise to a legal suit over its protection. All the requirements UBH needs to possess in order to be used for the seasoning of Canestrato are prescribed: history, shape, size, and building materials. Only if all these requirements are met can a cave, locally called a fondaco, be used for seasoning: six months for Primitivo quality, one year for Seasoned, and more for Extra.

Fondaci are cold, dry and well-ventilated UBH that can be found only in the town area of Moliterno at an altitude of above 700 m. They are characterized by having walls that are 40 cm or more thick, at least two sides underground, and two openings for air circulation. The historic sites in the city centre had the same features at the beginning of production.

Fondaci are large single rooms with a simple square or rectangular plan and a slightly sloping floor to drain away water. The ceiling is made of wooden beams, and windows provide ventilation. The rooms are divided by several arches, usually two or three. This arrangement is necessary to distribute the cheese at different stages of maturation so that the fresh product does not "disturb" the product at a more advanced aging stage. The building materials are typical of the period when this production began. Local stone is used for the walls, chestnut or fir wood for the load-bearing structures, and red bricks for the floor. Coarse-grained lime mortar is used for plastering. The wall surfaces are rough and spongy. As an effect of all these factors, the correlation between the immaterial values connected to the production and the material values expressed by the elements of UBH

involved are at the core of marketing actions, and are largely adopted in communication as well (Figure 6).

Figure 6. Canestrato di Moliterno cheese (by R.V.).

When the characteristics of UBH used in food production are defined in such detail, it is hardly surprising that this relationship is protected by law. The Decree of 4 March 2014 assigns Agroqualità Spa the task of supervising the requirements of the fondaci adopted in the production of Canestrato di Moliterno IGP [38].

Its improper use has given rise to legal disputes that are true cornerstones in this sector. Notably, in 2018, two producers were brought to trial precisely for the adoption of seasoning cellars unsuitable for the production of Canestrato.

4.4. Pallone di Gravina

The case study of Pallone di Gravina cheese is unique. Although this TAP product is not placed under a *disciplinare*, the connection with local UBH plays a very important role in its characterization as a typical product (Table 2). This role is made explicit by reference to the gravina, the karst fracture where the caves in which the cheese is traditionally made are located. Gravina is the name of the town where it is produced as well, one of the most significant examples of a rock-carved village in Italy and one of the most significant case studies for UBH [29] (Figure 7). The history of this cheese is linked to the use of the caves, originally dug as quarries, to protect the cheese from the raids of bandits. This security measure ended up lending the product its distinctive quality, as the humid environment caused mould to form on the cheese.

Gravina cheese is already recorded in the Lectures on Agriculture, Chemistry, and Geology of 1847 and in the Dizionario Geografico-Istorico-Fisico del Regno di Napoli, published in 1796.

All these intangible values are emphasized in the storytelling adopted by the local slow food presidium, the Murgiamadre association, and by all producers [39–41].

Due to the above-mentioned factors, the case study of Pallone di Gravina is the perfect example of cheese production in which the value does not lie in the milk used for it or in

the skill of the cheesemakers, but in the fact that both its processing and its seasoning take place in specific UBH that lends the product its intangible and tangible cultural properties.

The fact that most marketing actions profitably stress this aspect make Pallone di Gravina cheese a perfect case for our study.

Figure 7. UBH in Gravina di Puglia: the perfect scenario for cave cheese branding (by R.V.).

4.5. Grotta del Caglieron Cheese

The Caglieron caves are a distinctive feature of the landscape of Fregona, in the Veneto Region. This is a rural and naturalistic area of great beauty, where the river Caglieron has dug a series of cavities which were then enlarged by sandstone quarrying from the sixteenth to twentieth centuries. This area has a historical propensity for agricultural production, notably of the famous Montasio cheese (PDO) [42] and of several high quality wines and distillates.

The idea of combining the area's quarries with its naturalistic and productive features dates back to 2008, when a small farming cooperative, AgriCansiglio [43], decided to use local UBH to characterize a particular type of cow cheese.

There is a legend handed down from father to son about how this practice arose. It is told that during the quarrying period workers used to take their lunch break with food brought from home, and once, after the winter pause, food left in one of those caves was found in the late spring. The bread and salami were spoiled, but the cheese, even though it had a layer of mold on its surface, was still good.

The experimentation and the related site approval procedure subject to European Regulations [44,45] and national health regulations lasted about four years, from 2008 to 2012. At that time, the Caglieron Park had not been established yet, and the link between cheese production and the area's history and natural features were guaranteed by the raw material—cow's milk from two local mountain farms—and the UBH adopted in the production, the San Leucio cave.

The San Leucio cave has a constant humidity of 99% and a temperature ranging from 14 to 16 degrees Celsius, which is constantly checked by a data-logger. The cave can contain up to 40 2-kg cheeses and up to 180 600/700-g cheeses. Thanks to the cave's humidity, the cheeses do not lose weight after seasoning. After 90 days' seasoning, the cheese is taken to the dairy, where its rind is brushed and it is packaged. The cooperative, which is now part of a larger group, has an average annual turnover of EUR 3.5 million based on its diversified offerings of local and PDO cheeses.

Caglieron cave cheese belongs to the first group, that of local cheese. It is a niche production deeply linked to the area. At the moment, the product is sold by several direct sellers to visitors to the Caglieron Park by the local Horeca chain and by 15 specialized stores in the area.

Caglieron cheese (Figure 8) is at the core of several local development strategies enacted by AgriCansiglio and the town of Fregona. The use of the San Leucio cave, its monitoring, and the use of the cheese to promote the Natural Park of San Leucio are the most significant actions in this context. This UBH-based production is located within the LEADER area, where the Alta Marca Trevigiana Local Action Group [46] operates with the Local Development Plan as part of the programming of the European Agricultural Fund for Rural Development ex FEASR [47]. This has allowed the Caglieron cave cheese producer to be the leader of the "Amica—The good chain of Alta Marca" [48], a project addressed towards cooperation for the development of short supply chains, through which the partners of the project (farmhouses and local producers) have developed a short supply chain for the sale of local products.

Figure 8. Caglieron cave cheese: history, nature, and typical productions (by R.V.).

5. Conclusions

The present study shows how UBH strongly characterizes certain productions by defining many of their characteristics, both tangible and intangible. Whether it is historical cellars, underground workshops, or seasoning caves, this cultural heritage is an integral part of the production process and intimately links the food product to its local historical and cultural context.

In the specific case of Italian cave cheeses, we have shown here that this link exists for both protected productions such as PDO, PGI, and TAP, and for niche productions, as well as that it is not protected and exploited in the same way by all consortia and manufacturers.

As regards PDO and PGI productions, we found that the regulations almost always refer to UBH as an expression of the production area and of the traditional techniques that determine the final characteristics of the protected product. However, we found that this protection does not always go hand in hand with an effective marketing policy aimed at promoting the intangible value of the products.

On the other hand, TAP local productions, although they do not have a *disciplinare* protecting their link with UBH, tend to emphasize their link with specific local cultural and manufacturing traditions in their marketing strategies.

The link between UBH and niche cave-cheese productions is even stronger; in these cases, the locution "cave cheese" is often included in the product's commercial name, and references to the caves are very common in the producers' storytelling and marketing policies.

The cases examined here, which concern a specific category of cultural heritage, that included in the UBH class, bear witness to the general potential of elements of local cultural heritage in food product promotion actions.

However, we must consider how the use of historical artifacts in production processes, which is widespread in Italy, is reconciled with food safety and health regulations, which are not always compatible with this use.

The specific rules we are referring to are the provisions of the common integrated legislation to guarantee the safety and healthiness of food, launched in 1997, and the subsequent 2000 White Paper on food safety [49]. These documents have paved the way for a series of regulatory standards called the "Hygiene Package", whereby the same rules apply throughout the European Union, guaranteeing standardized sanitary behavior and controls and facilitating product circulation within the so-called "European Food Union" [45,50,51].

In this context, the general principles are:

- Integrated controls throughout the food chain
- Interventions based on Risk Analysis
- The primary responsibility of the sector operator for each transformed, imported, and commercialized product
- Tracking of products along the whole supply chain
- Consumers as active actors in food safety

The rules for the application of Hazard Analysis and Critical Control Points (HACCP) must be respected as well, of course [44]. These refer to the risk analysis, and therefore prevention and control criteria through pre-established procedures and continuous checking, in order to identify, eliminate, or reduce to acceptable levels any potential danger at all stages of the production, transformation, and distribution of the product.

All these principles, underlined in manuals of good hygiene practice, are of course applicable to UBH when it is used for the seasoning and storage of processed or unprocessed primary products.

However, in consideration of the typical nature of certain local productions, including several involving the use of UBH, the same regulation [44], in article 13, allows for possible derogations for small businesses and for Member States, allowing them to make changes to national regulations by using less stringent parameters in order to allow the uninterrupted use of traditional methods at any stage of food processing, storage, or distribution and to allow for the needs of food businesses located in regions subject to particular geographical constraints.

As regards the farms where local specialities are produced with traditional methods, EU regulations specify that local health authorities can grant a special sanitary stamp to authorize the production of primary foodstuffs, particularly of animal origin. The authorization is granted upon verification of the existence of all the parameters required by the legislation for the various foods. One of the exceptions is the storage of products of animal origin that do not require temperature-controlled storage conditions.

In this context, our research presented a case study in which, in compliance with the regulations for the protection of consumer health, elements of tangible cultural heritage were profitably used to guarantee both the authenticity of the products and their links with the territory to which they belong. The research highlighted how, in the case of cave cheeses, the elements belonging to the UBH class represent the tangible aspect of productions that contain multiple intangible values typical of the production area. This is an aspect, however, that has already emerged in anthropological research which underlined how the protection of traditional spaces adopted for cheese production can be included in the standardization of traditional production systems in order to preserve the authenticity of the final products and the enhancement of the local cultural heritage [52,53].

In conclusion, the approach adopted in this research can be considered as a prototype for multidisciplinary research to be carried out in the future. In fact, it could be extended to other types of elements of cultural heritage connected to typical productions in a perspective in which the combination of tangible and intangible elements of local cultural heritage contributes to the promotion and development of the territory to which they belong, bringing mutual benefits and sustainable economic development.

Future actions are expected in the following directions: institution of a common framework dedicated to the comparative analysis of case studies; definition of shared guidelines for the classification of elements of cultural heritage connected to food production; and institutionalization of the linkage between tangible and intangible values in the food sector. Contributors from local bodies, consortia, and producers can be expected to support ongoing research from scholars and researchers in this sector.

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