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## Differences between Italian specialty milk in large-scale retailing distribution

Valentina Maria Merlino<sup>\*,a</sup>, Stefano Massaglia<sup>a</sup>, Simone Blanc<sup>a</sup>,  
Filippo Brun<sup>a</sup>, Danielle Borra<sup>a</sup>

<sup>a</sup> Università degli Studi di Torino, Italy

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### Abstract

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The specialty milk market in Italy has shown positive trends in recent years. Companies, from small producers to market leaders, continue to invest in differentiating their product lines, increasingly orienting their production choices towards specialties linked to sustainability and health benefits. This trend not only meets the needs of consumers, who are increasingly attentive to sustainable and healthy foods, but it also has a significant impact on the production and profitability of milk companies. Thus, this research aims to analyse the composition of specialty cow milk assortments in different large-scale retail (LSR) stores in North-West Italy. The objectives were to define the assortment depth of sustainable and health-focused milk categories, as well as the marketing policies currently applied in the LSR market for such products. Differences in the assortment of seven specialty product categories were evaluated with regard to brands, milk origin and packaging material, using the Correspondence Analysis. Price differences between product categories were analysed using ANOVA and comparing the product brands and the different formats of large-scale retailers. The main results highlight the key characteristics and differences of the specialty milk supply, taking into consideration the main sales channel of this type of product.

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\* *Corresponding author:* Valentina Maria Merlino - Department of Agricultural, Forest and Food Sciences, University of Turin, Italy. E-mail: valentina.merlino@unito.it.

## Introduction

Consumer interest in sustainable and healthy products has increased due to environmental and nutritional concerns (Imami *et al.*, 2017; Magan *et al.*, 2021). Despite the negative scenario that has characterised the cow milk market in recent years, milk consumption over the last two years has shown signs of recovery, with consumers increasingly orienting their choices towards sustainable (local and organic) and health-focused product varieties (ISMEA, 2019, 2021a). Over the last five years, there has been a 7% decline in the amount of milk purchased by Italian households; this decrease in consumption mainly affects fresh milk, followed by long-life milk (Ultra High Temperature - UHT treated milk) (ISMEA, 2019a, 2021a, 2021b). In addition, after signs of recovery in UHT milk consumption during the Covid-19 pandemic, the consumption trend resumed its decline in 2020/2021 (ISMEA, 2021c). This trend may have been instigated by claims regarding the negative effects of cow's milk on human health (Haug *et al.*, 2007) and on the environment (Bava *et al.*, 2014; Capper and Cady, 2012; Castanheira *et al.*, 2010), which have seen consumers reduce/eliminate their milk consumption or choose alternative protein sources (Haas *et al.*, 2019).

In this sense, according to the Ismea-Nielsen Consumer Panel Service data recorded at the Italian national level, the drop in milk consumption was partly influenced by the emergence of new healthy eating styles and more environmentally and ethically sustainable production choices, rather than by economic ones (Haas *et al.*, 2019; Rizzo *et al.*, 2020; ISMEA, 2021a, 2021b). In fact, the economic crisis that marked the period from 2015 to 2020 only partially affected milk consumption trends, with a shift towards lower cost distribution channels such as discount stores. At the same time, several studies have shown how food choices, even in the case of milk, are closely related to the socio-demographic characteristics of consumers (Gulseven, 2018). A recent study conducted by ISMEA (Institute of Services for the Agricultural Food Market) in 2019 (ISMEA, 2019b) showed that, on average, 33% of consumers surveyed in this research do not consume milk; this proportion rises progressively as the age of the subjects increases, reaching 42% between the ages of 55 and 64. Among the under-18s, the proportion of those who gave up milk was much lower. Given that the Italian population is ageing and decreasing (ISTAT, 2021), the decline in milk consumption could be a result of this negative demographic trend.

However, in a context of general decline, the specialty milk categories have followed a positive trend. Highly digestible milk or lactose-free milk has undergone exponential growth with a 47% increase in purchases over the last five years, thanks both to a doubling of the number of purchasing

households and a significant expansion of the range and product types offered on the shelves (ISMEA, 2021a, 2021b). Functional (enriched) and organic milk specialities – respectively linked to healthiness and sustainability – and lactose-free products, are currently very appealing to consumers (Rama, 2019). In relation to certified organic cow's milk, numerous research projects reveal that consumers recognise this product as being a more sustainable alternative, linked to the local production area and to traditional farming systems (Carfora *et al.*, 2019; Gambelli *et al.*, 2003; Scotti *et al.*, 2015). Moreover, as revealed by a recent study on milk consumer preferences carried out in North-West Italy (Tabacco *et al.*, 2021), in a sample of 502 consumers, around 30% of individuals identified organic certification and local production as important drivers of their choice of milk.

Italian production of organic milk exceeds 300 million litres (about 2.7% of the total milk produced), with a value of 158 million Euros (equal to 3.5% of the national BPP, i.e. the base product price) and a premium price of 28% more than conventional milk (De Ruvio, 2016). On the other hand, household expenditure on organic dairy products in large-scale retail (LSR) chains is worth more than 100 million Euros, with these products representing about 12% of the total sales of certified food products in this distribution channel.

Functional or 'enriched' and/or 'flavoured' milk – i.e. supplemented with nutrients that can positively influence health, prevent pathological conditions or have therapeutic functions – suffered a 4.1% decrease in average price and 0.2% reduction in volumes before 2020. As explained by Rama (2019), this trend may be attributable to the growth in the share of hard discounters, where lower prices are usually recorded and for which there was a 15.9 % increase in volumes sold on an annual basis.

Since the first half of 2019, there has been an increase in purchases of 9.2%; this indicates that a recovery is currently underway, highlighting the emergent interest of consumers in functional products, such as those with added omega 3, vitamins, etc. In recent years, the increasing of selling price of these products has led producers – from small companies to leading brands – to differentiate themselves by creating various lines of functional products. In general, cow's milk producers have invested a great deal of resources in achieving more sustainable production systems and, at the same time, establishing brand repositioning strategies; they have done this by focusing on product categories considered more in line with consumer needs and following drivers of choice linked to product sustainability and healthiness (Redazione Dairy, 2020a).

## Background

Despite the numerous scientific publications on consumer preferences, perception, and choice orientations towards specialty milks such as organic and functional/enriched (Ares *et al.*, 2009a; 2009b; Dekker *et al.*, 2019; Palacios *et al.*, 2009; Peng *et al.*, 2006; Rizzo *et al.*, 2020), to the best of our knowledge, few studies have been carried out on the supply characteristics of specialty cow milk in Italian distribution channels (Trestini and Stiletto, 2020). This research focuses on the comparison between different types of product attributable to the milk specialties category by applying statistical techniques of investigation and comparison already adopted in our previous research dedicated to conventional milk (Merlino *et al.*, 2021). In particular, the comparative approach described in Merlino *et al.* (2021) made it possible to describe and compare some characteristics of the different products considered in detail.

The decision-making process underlying product assortment planning in large-scale retail is fundamentally important to a product's success on the market. The marketing choices on which assortment planning decisions are based, such as size, depth, positioning, window display, etc., change periodically considering each storage unit and the different LSR formats (Mantrala *et al.*, 2009; Merlino *et al.*, 2021). Indeed, as revealed by Merlino *et al.* (2021), product characteristics linked to marketing components (product, promotion, price and positioning) change considerably in the composition of the assortment, depending on the format (of the large-scale retail trade), product line and geographical area, in line with consumer demands, which are also heterogeneous in the different geographical contexts. For example, when considering different LSR formats, the product assortment changes from supermarkets, where there is a large assortment with low to medium prices, to discounters, where the level of service and quality of product display decreases in favour of more competitive prices, up to hypermarkets, characterized by a wide assortment with medium prices. In addition, convenience stores, which focus their offer on small-scale, locally marketed products with a higher price and service level, are becoming popular in large Italian cities (Chernev, 2011; Solgaard and Hansen, 2003).

Data reported in Rama (2019) showed that lactose-free and enriched milks have increased their share of purchases in recent years, mainly at hard discounters, at the expense of hyper/supermarkets. The assortment planning process is complex because, in addition to considering market dynamics – whose complexity depends on the nature of the product – they depend on the demands of end consumers (Dhar *et al.*, 2001). This is closely linked, amongst other things, to the opinion individuals have of the brand. Therefore, the brand directly influences the credibility and safety of the product.

Given these premises, this research aims to analyse the assortment of specialty milks by examining the products marketed in various stores of large-scale retail chains in North-West Italy. In particular, the goal is to define the assortment depth ( $A_{\text{depth}}$ ) considering different categories of specialty milks and to compare factors related to product sustainability (Merlino *et al.*, 2021). In detail, the  $A_{\text{depth}}$  was compared considering the product brand, origin and packaging. These three product features have been considered as factors characterising specialty milk sustainability for the following reasons:

- in the case of local origin, it can be considered an indicator of sustainability by consumers as it is synonymous with short supply chain, a concept that simultaneously embodies the three pillars of sustainability: environmental, social and economic (Annunziata & Mariani, 2018; Aprile *et al.*, 2016; Balboni, 2017; Bentivoglio *et al.*, 2019; Wang *et al.*, 2019);
- the brand of a product combines the name, logo, slogan, storied communication and reputation. It is also a distinctive sign for the company that encompasses images and values, such as sustainability (Chen *et al.*, 2017; Grubor & Milovanov, 2017);
- packaging material is an important feature supporting product sustainability from the consumer perspective and its enhancement is a continuous challenge for the food producer (Chen *et al.*, 2019). However, recent research carried out on consumers' milk packaging preferences (Merlino *et al.*, 2020) found that consumers do not consider packaging to be an important driver when choosing products, but that they would be willing to pay a premium price for more sustainable packaging for milk and a high service value.

Lastly, specialty prices were evaluated by comparing different formats and brand categories to ascertain the price policies used by milk producers.

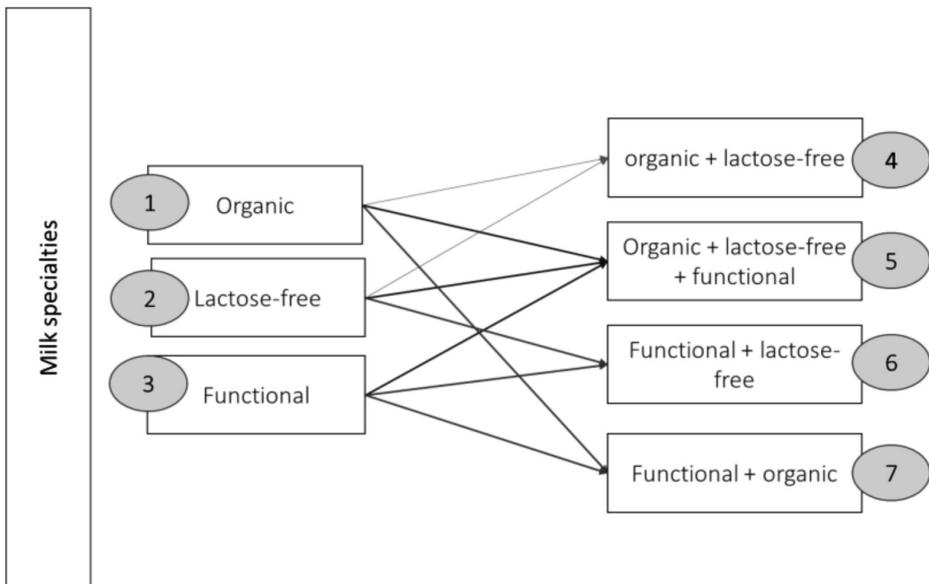
## **1. Materials and methods**

### *Sampling*

All information on the products that make up the cow's milk portfolio in the milk specialty categories was collected by visiting 52 points of sale of 8 different large-scale retailers (LSR), including hypermarkets, supermarkets, convenience stores and discount stores in North-West Italy (Piedmont and Lombardy regions). The considered area plays an important role in the national production of cow's milk; in fact, 53.5% of the milk produced in Italy comes from these two regions (ISMEA, 2021d; OMPZ, 2020). The survey period focused on March to June 2019. In particular,

the assortment depth ( $A_{\text{depth}}$ ) (which is the number of product variants or items, references or stocked units – SKUs – within a product category with separate designations in the offer price list) of seven product lines (Merlino *et al.*, 2021) was examined. Each item was assigned to a milk category, numbered from 1 to 7, following the classification criterion reported in Figure 1. Starting from the three main categories of speciality milks on the market, the references analysed in the shops were allocated to the three groups (1, 2 and 3) only if they were characterised by just one of the following features: being (1) organic, (2) lactose-free, or (3) functional. In particular, the “organic” category included all milk products originating from organic farms (EC 834/2007; EC 889/2008), while “lactose-free” included all products whose label contained the words “no lactose”, “0 lactose” or “lactose-free”. As the point-of-sale analysis revealed that many products included several characteristics at the same time (e.g. they were both organic and lactose-free), we created sub-categories by matching the three main product categories in different combinations (Figure 1).

Figure 1 - Classification criterion used to group and code specialty milk products into the seven categories



Finally, the “functional” group included all products with at least one of the claims listed in Table 1.

*Table 1 - Label claims considered for classifying functional milk*

<b>Label claim*</b>
-30% of sugar, with fibre (Inulin) and vitamins A and D3
-30% of sugar, source of magnesium and vitamins B6 and B12
-30% of sugar, source of protein
Enriched with vitamins A and D3
With vitamin D
1.6% fat
30% less sugar
34 kcal
With cocoa
With green coffee and ginger, lactose-free
With ginseng and liquorice, lactose-free

\* The presence of at least 1 or more of the following claims concurrently on the label meant the product was included in the “functional/enriched” category.

For each SKU the origin, brand, packaging materials and price features were collected from all considered outlets (Table 2).

*Table 2 - Product characteristics collected for all milk products sold at the different stores of large retail chains*

<b>Characteristic</b>	<b>Definition</b>
Origin	National, regional, EU, non-EU, other countries
Packaging material	Plastic, glass, laminated composite material
Brand	Distributor Brands or private label (DB), Leading producer brands (L) and Other Producers/brands (OP)
Price	Single price for each item

The brands were categorised into Distributor or Private label (DB), Leading producer brands (L) and Other Producers/brands (OP) following the criteria used by the Italian Dairy Association (Assolatte, 2018), already used in recent research by Merlino *et al.* (2021).

### *Statistical analysis*

In order to describe the association between the different milk specialty categories (from 1 to 7, see Figure 1) and the different product variables (origin, packaging material and brand), a series of Correspondence Analyses (CA) were conducted by analysing [specialty categories x brand category], [specialty categories x packaging material] and [specialty categories x milk origin].

CA is a statistical technique used to identify patterns and associations between category variables and simultaneously to organise them graphically with the considered specialty categories (nominal variables) in the same dimensional space (Ayele *et al.*, 2014; Lana *et al.*, 2017; Merlino *et al.*, 2021). The CA draws the frequency points of rows and columns of a contingency table in a same geometric space, constructing the data representation in an area structured by a chi-square distance; it then continues by representing the variables on the basis of the identified principal components (axes) (Ayele *et al.*, 2014; Beldona *et al.*, 2005; Gursoy and Chen, 2000). In the map, greater proximity between the points highlights a higher proportion associated with the different levels of rows and columns. Furthermore, this technique allows the number of prevalent dimensions to be determined based on the different associations of multinomial variables (Beldona *et al.*, 2005; Gursoy and Chen, 2000; Harcar and Spillan, 2006). In this research, singular values greater than 0.20 were considered (Hair *et al.*, 1998). In the results' section, all eigenvalues (estimated dimensions, single values, inertia, and the proportion explained by each dimension) were reported. Therefore, this technique provides a complete view of the data for effective interpretation.

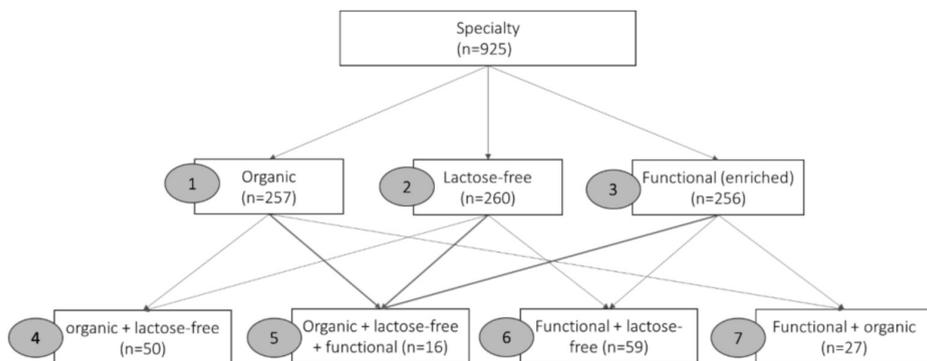
This technique is widely used in the scientific literature, and the theoretical properties of CA can be further explored by external consultation (Beldona *et al.*, 2005; Fotuhi *et al.*, 2019; Greenacre, 2017). The Analysis of Variance (ANOVA) test was performed to verify the H0 (there were no significant differences in the average prices of milk specialty groups across the different formats in large retailers) and the H1 (there were no significant differences in the average price of milk specialty groups considering the different brand groups). We performed several two-way ANOVAs in order to test the main effect and interaction effects of milk specialties (7 categories) with each of the other independent variables (LSR formats – 4 levels, and brand groups – 3 levels) on the average milk price (dependent variables). The ANOVA is able to identify the difference between the mean values, but not to specify the relationship between the averages. However, the calculation of main effects and interactions, used to explain the pattern of relationships between the averages, enabled us to minimise this methodological limitation (Buckless & Ravenscroft, 1990).

All statistical analyses were performed using SPSS 27.0 for Windows.

## 2. Results and Discussion

The analysis of data on the composition of the supply of cow's milk in different LSR stores reveals the great competitiveness of specialty milk in the drinking milk sector. Indeed, the portfolio of cow's milk specialties consisted of 925 product items. The three main product categories with only one classification criterion (only organic, only lactose-free, only functional) were equally distributed in terms of  $A_{\text{depth}}$ . From the product categories that were characterised by the presence of more than one product classification, the most important group in terms of  $A_{\text{depth}}$  was category 6 (functional and lactose-free), followed by category 4 (organic and lactose-free) (Figure 2).

Figure 2 - Composition of the cow's milk portfolio. All specialty categories considered with their depth ( $A_{\text{depth}}$ ) are described



These initial results reveal that the lactose-free characteristic is the most recurrent in the sample, confirming that this product characteristic appears in an increasingly wide range of milk categories, and dairy products in general (Dekker *et al.*, 2019). As reported in a survey published online (Food, 2019), in addition to the simple free-from claim, consumers reward the combination with other pluses. However, our results show that the  $A_{\text{depth}}$  of products with multiple claims (lactose-free + other) is much smaller than that of products coded as 1, 2 and 3.

The results of the Correspondence Analysis on the association between brand groups and milk specialty categories (brand groups x specialty categories) are described in Figure 3. The eigenvalues (estimated dimensions, single values, inertia and proportion explained by each dimension) are given in Table 3.

Table 3 - Correspondence analysis (brand categories x specialty categories). The chi square of independence between the two variables (columns and rows) and the p-value are also reported

Dimensions	Singular value	Inertia	Proportion explained %	Cumulative proportion %	Chi Square	Sign.
1	<b>0.548</b>	<b>0.301</b>	<b>0.986</b>	<b>0.986</b>		
2	0.064	0.004	0.014	1.000	260.988	***
Total		0.305	1.000	1.000		

The accepted dimensions are highlighted in bold. The p-value refers to the statistical significance level: \*\*\* <0.001, \*\* <0.01, \* <0.05; no value when not significant.

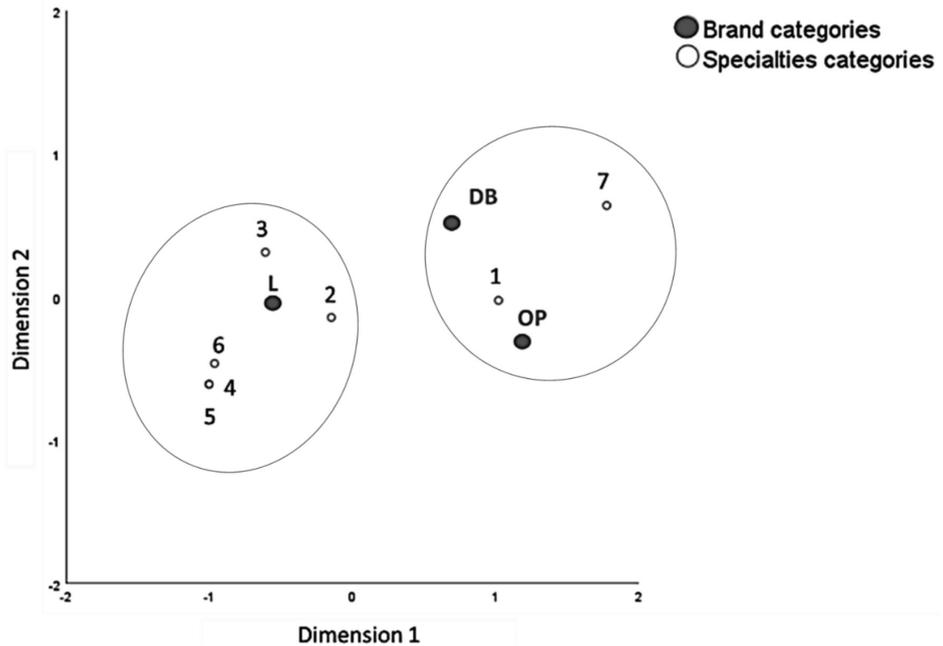
In this case, according to Hair *et al.* (1998), a one-dimensional solution can be accepted. In particular, dimension 1 shows the largest relative contributor to the total variance (98.60%) of the axis.

As shown in Figure 3, the “functional” and “lactose-free” milk specialties, even in their combinations, follow the same position and seem to be associated with leading brands (L). Consequently, the “organic” and “organic and functional” categories are mainly associated with brands of smallholder producers (OP) and retailers (DB).

These results show that leading brands focus on differentiating their products, mainly promoting milk products with healthy characteristics that meet the needs of consumers having intolerance problems or looking for a product with health benefits. Market leaders thus seem to focus on improving their own reputation by investing in products that are beneficial to consumers, which is currently also the most attractive and fastest growing market segment (Redazione Dairy, 2020b).

In contrast, both smallholder producers and retailers plan their specialty milk supply by offering primarily certified organic milk, some of which is also functional. It can therefore be inferred that the communication of the certified organic production – often linked to the environmental, social and economic sustainability by the consumer ( Naspetti *et al.*, 2021; Schiano and Drake, 2021) – is the strength of private labels and small companies, differentiating them from leading producers. The effect of value and retailer brand loyalty is stronger for consumers who frequently choose the same categories of purchased products (such as regular products like milk) (Merlino *et al.*, 2021; Morales *et al.*, 2005); this is also true in the case of retailer-branded organic milk, hence. This confirming that the product differentiation strategy can improve brand reputation, particularly for small producers (Chernev, 2011; Hoch and Lodish, 1998). The decision of the

Figure 3 - Correspondence Analysis (brand categories x specialty categories)



OP = other producers; L = leader brands; DB = private labels; 1 = organic; 2 = lactose-free; 3 = functional (enriched); 4 = organic and lactose-free; 5 = organic, lactose-free and functional; 6 = functional and lactose free; 7 = functional and organic.

“other producers” category to focus on organic certification, rather than on functional milks, could be due to the high degree of complexity involved in investing in R&D and technology upstream of enriched or free-from milk production (Dekker *et al.*, 2019; Fatkullin *et al.*, 2021). This result could also be interpreted as the response of small producers to the low margins and high uncertainty (mainly related to low competitiveness against the major players) that characterise the conventional milk market, in addition to the strong increase in consumer demand for organic food products (Antonioli *et al.*, 2019).

The extraction of the dimensional solution for the Correspondence Analysis between the variables (milk origin indication x specialty categories) considers two principal dimensions (axes) which account for 92.6% of the total variance (Table 4) as significant (following the limits of singular values greater than 0.20) (Hair *et al.*, 1998).

Table 4 - Correspondence analysis (milk origin indication x specialty categories). The chi square of independence between the two variables (columns and rows) and the p-value are also reported

Dimensions	Singular value	Inertia	Proportion explained %	Cumulative proportion %	Chi Square	Sign.
1	0.318	0.101	0.641	0.641		
2	0.212	0.045	0.285	0.926		
3	0.081	0.007	0.042	0.967	134.957	***
4	0.070	0.005	0.031	0.998		
5	0.017	0.000	0.002	1.000		
Total		0.158	1.000	1.000		

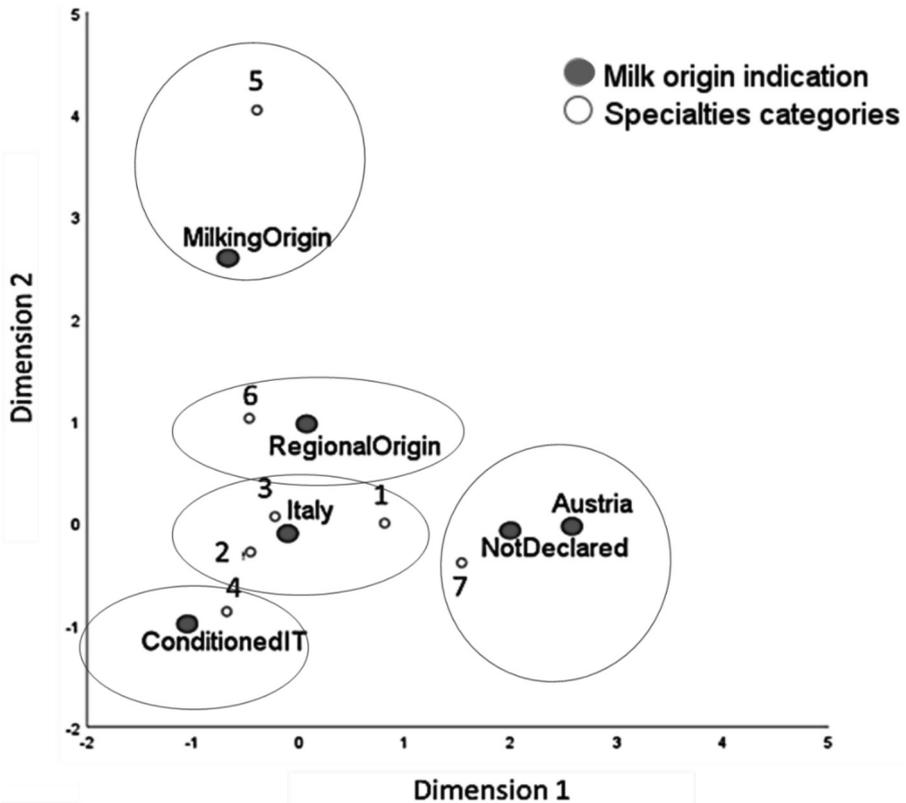
The accepted dimensions are highlighted in bold. The p-value refers to the statistical significance level: \*\*\* <0.001, \*\* <0.01, \* <0.05, no value when not significant.

As can be seen from Figure 4, there is a high association between specialty categories 1, 2, 3 and national origin. This is an interesting result which reveals that milk producers have disclosed the country of origin of the milk on the label, despite the fact that, for most of these functional products (they are mostly UHT) and for organic products, there is no such regulatory obligation; a generic origin, such as “EU countries”, can be indicated. This is in line with the result of a great deal of research carried out even nationally, which found that the indication of national origin is the most important attribute of choice for cow’s milk (Tabacco *et al.*, 2021; Tempesta and Vecchiato, 2013).

By contrast, the association between the most complex product category (5) and “functional and lactose-free” (6), with the origin of the indication of the milking process and the indication of regional origin, respectively, is quite surprising. In the latter case, companies aim at product differentiation while promoting the health benefits of the functional product for consumers and the regional/national origin of the product. While UHT was initially the only lactose-free option on the market, the range is now also growing in the refrigerated section, indicating continued growth of the segment. Additionally, inspired by the high quality national/regional origin of these products, households are increasingly switching to lactose-free dairy products when a single member is lactose intolerant, driving sales in this segment (Dekker *et al.*, 2019).

Conversely, product categories where organic certification is associated with other characteristics (e.g. functional or lactose-free milk) originate mainly from European countries.

Figure 4 - Correspondence Analysis (milk origin indication x specialty categories)



**ConditionedIT** = EU origin, conditioned in Italy; **Austria** = Austrian milk origin; **Italy** = Italian milk origin; **RegionalOrigin** = indication of the Italian region of milk origin; **MilkingOrigin** = indication of the region or area of product milking; **NotDeclared** = milk origin not declared on the label; **1** = organic; **2** = lactose-free; **3** = functional (enriched); **4** = organic and lactose-free; **5** = organic, lactose-free and functional; **6** = functional and lactose free; **7** = functional and organic.

From analysing the correspondence between “packaging materials x specialty categories”, a one-dimension solution emerged as significant, accounting for 98.7% the total variance (Table 5).

Figure 5 shows the net grouping of specialty categories 4, 5, 6 and 2 associated with plastic packaging material. In parallel, categories 3, 1, and 7 appear to be associated with laminated composite material (i.e. Tetra Pak). As a counter-trend, glass material (the minority of material used for packed milk) is only associated with the “functional” product. Although glass is positively correlated with environmental sustainability and consumer

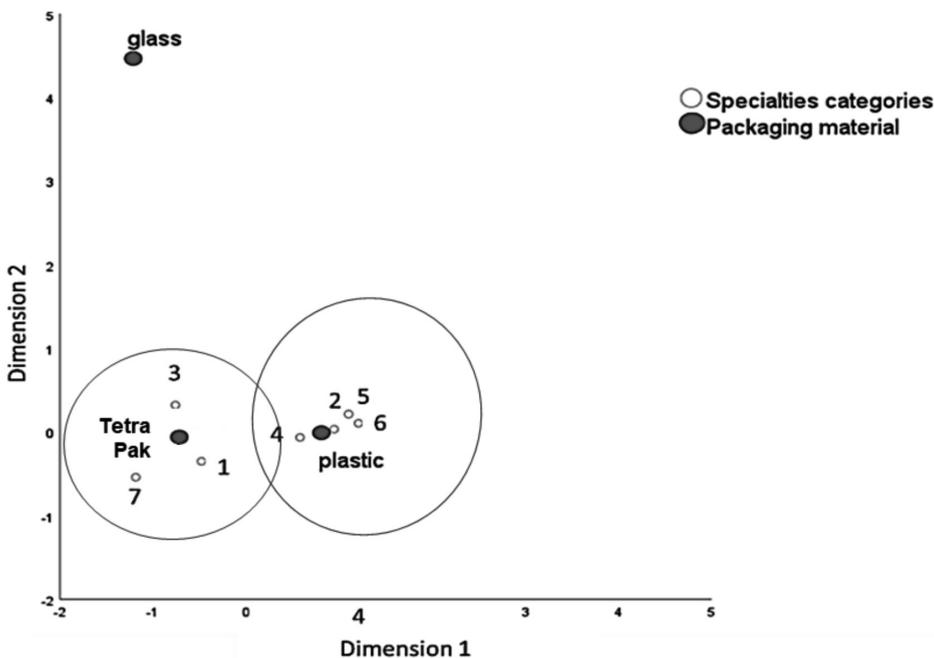
Table 5 - Correspondence analysis (packaging materials x specialty categories). The chi square of independence between the two variables (columns and rows) and the p-value are also reported

Dimensions	Singular value	Inertia	Proportion explained %	Cumulative proportion %	Chi Square	Sign.
<b>1</b>	<b>0.628</b>	<b>0.395</b>	<b>0.987</b>	<b>0.987</b>		
2	0.071	0.005	0.013	1.000	341.859	***
Total		0.400	1.000	1.000		

The accepted dimensions are highlighted in bold.

The p-value refers to the statistical significance level: \*\*\* <0.001, \*\* <0.01, \* <0.05, no value when not significant.

Figure 5 - Correspondence Analysis (milk packaging x specialties categories)



**Glass** = milk packaging in glass bottle; **plastic** = milk packaging in plastic bottle; **Tetra Pak** = milk packaging in laminated composite material container; **1** = organic; **2** = lactose-free; **3** = functional (enriched); **4** = organic and lactose-free; **5** = organic, lactose-free and functional; **6** = functional and lactose free; **7** = functional and organic.

perception in terms of quality and tradition (Centrale del Latte di Torino, 2019), the logistical issues associated with its use mean it is rarely used for milk packaging. While for conventional milk, plastic is still the main packaging material used (Merlino *et al.*, 2021), speciality milks largely use laminated composite material, followed by plastic. However, differences emerge between the various product categories, demonstrating that functional and organic milks are those most associated with laminated composite material, while the use of plastic is associated with lactose-free milk. In this case, the association between the use of laminated composite material and organic milk is in line with the needs of Piedmont consumers, who are interested in organic milk (Tabacco *et al.*, 2021) and its sustainability in relation to the possibility of recycling and the environmental sustainability of the packaging (Merlino *et al.*, 2020).

The price analysis in the various categories of specialty milk revealed significant differences when comparing both LSR formats and brand categories.

In particular, as shown in Table 6, the organic, functional and lactose-free categories appear in all the analysed formats, while the other categories reveal a lower  $A_{\text{depth}}$ , even amounting to 0 in discounters for products 7 and 4. Considering the average prices of the different categories (Table 6), higher prices can be seen for groups in which the various characteristics (claims) are combined (groups 4 to 7), compared to products belonging to groups 1, 2 and 3 (organic, functional and lactose-free only).

This result is understandable given the greater complexity, including technological issues, that characterises more expensive products (Dekker *et al.*, 2019). Among the specialties in groups 1, 2 and 3, the category that has the highest average price is functional milk, which is priced about 40% higher than the conventional product marketed in the same geographical area (Merlino *et al.*, 2021). This price differential is in line with the average recorded in literature, where the lactose-free product was found to be 4 to 166% more expensive than conventional milk (Świąder *et al.*, 2020) (Suri *et al.*, 2019).

As described in Table 7, the ANOVA analysis demonstrates that it was largely the single effect of the “format” that significantly influenced price differences between the various categories, except in the case of the main effect of the “functional” variable.

Table 6 - Average price (€/l) recorded for each category of specialty milk comparing the formats in large-scale retail chains (LSR)

Format	Organic		Lactose-free		Functional		Organic and functional		Lactose-free and organic		Lactose-free, organic, and functional		Lactose-free and functional	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Discount	1.190 (n=4)	0.209	0.985 (n=6)	0.266	1.911 (n=2)	0.322	/	/	1.259 (n=3)	0.125	/	/	1.265 (n=5)	0.026
Hypermarket	1.582 (n=113)	0.340	1.402 (n=110)	0.423	1.810 (n=161)	0.660	1.556 (n=10)	0.058	1.885 (n=30)	0.095	1.855 (n=10)	1.756 (n=30)	0.395	
Convenience store	1.705 (n=39)	0.814	1.534 (n=27)	0.477	1.624 (n=20)	0.519	1.520 (n=7)	/	1.965 (n=5)	0.065	2.04 (n=1)	1.630 (n=7)	0.493	
Supermarket	1.621 (n=101)	0.534	1.440 (n=117)	0.431	1.833 (n=73)	0.717	2.860 (n=10)	1.628	1.97 (n=12)	0.197	2.50 (n=5)	1.803 (n=17)	0.188	
Total mean	1.610 (n=257)	0.514	1.425 (n=260)	0.432	1.806 (n=256)	0.666	2.110 (n=27)	1.173	1.910 (n=50)	0.134	1.892 (n=16)	1.736 (n=59)	0.271	

*Table 7 - ANOVA results: effect of each specialty category, format and interaction of product price*

<b>Factors</b>	<b>Independent variable</b>	<b>df</b>	<b>Quadratic mean</b>	<b>F</b>	<b>Sig.</b>	<b>Partial <math>\eta^2</math></b>
Organic vs. format	Format	3	1.236	4.341	***	0.004
	Organic	2	7.313	25.688	***	0.150
	Format * Organic	5	0.384	1.347	0.241	0.002
Lactose-free vs. format	Format	3	1.691	5.827	***	0.005
	Lactose-free	3	0.809	2.788	*	0.020
	Format * Lactose-free	6	0.309	1.065	0.381	0.002
Functional vs. format	Format	3	0.325	1.164	0.322	0.001
	Functional	1	5.966	21.357	***	0.050
	Format * Functional	3	0.593	2.122	0.095	0.002
Functional and organic vs. format	Format	3	7.564	26.179	***	0.023
	Functional and organic	2	0.855	2.960	0.085	0.001
	Format * Functional and organic	1	3.073	10.635	***	0.006
Functional and lactose-free vs. format	Format	1	1.691	5.837	**	0.002
	Functional and lactose-free	3	5.557	19.188	***	0.017
	Format * Functional and lactose-free	2	0.124	0.428	0.652	0.000
Lactose-free and organic vs. format	Format	3	5.557	19.188	***	0.017
	Lactose-free and organic	1	1.691	5.837	*	0.002
	Format * Lactose-free and organic	2	0.124	0.428	0.652	0.000
Functional, organic and lactose-free vs. format	Format	3	5.575	19.189	***	0.017
	Functional, organic and lactose-free	1	0.676	2.328	0.127	0.001
	Format * Functional, organic and lactose-free	1	0.026	0.089	0.765	0.000

The p-value refers to the statistical significance level: \*\*\* <0.001, \*\* <0.01, \* <0.05.

These results explain how the type of functional/enriched products significantly affects the average price revealed in the different LSR formats. The interactions between variables are not significant, except in the case of “Format \* Functional and Organic”. In particular, discounters market products in the different categories, generally at the lowest price, except in the case of organic milk.

In most of the cases considered, excluding the “lactose-free and functional group”, convenience stores and supermarkets set the highest prices for each category of specialties. In general, both the  $A_{\text{depth}}$  and the average prices of specialty categories comply with the pricing policy and assortment planning strategies commonly used in the different formats of large-scale retailers (Solgaard and Hansen, 2003; Zielke, 2010). The purchasing channel is therefore a discriminating factor in the definition of the price of milk specialties (Stiletto, 2020). In addition, supermarkets and hypermarkets reveal a comparable depth of assortment for the two best-selling categories in the

specialty milk market (organic and lactose-free). Despite the differences in assortment depth between these two formats, the planning policies of these two product lines seem to be moving towards equalising the number of the type of items available. Indeed, in recent years, an increase in the volumes of specialty milks sold in supermarkets only has been observed (Rama, 2019).

The largest Partial  $\eta^2$  (expressing the effect size of each variable) emerged in relation to the main effect of the organic variable (0.15), evidencing reasonable effect size and indicating that this variable explains 15% of variance in the definition of the average price. Finally, even when comparing the different brand categories, the average prices for each specialty varied significantly. In this case, the  $A_{\text{depth}}$  was very heterogeneous between the different brand groups (Table 8), highlighting how the specialties refer mainly to private labels (or brand of distributor), followed by the leading brands.

This result is in line with the definition of market leader and also with the choices made by distributors to increasingly differentiate the range of products available in the various stores. As reported in the recent Assolatte report (Assolatte, 2018) and in the research by Merlino *et al.* (2021), a large amount of milk present in LSR distribution is identifiable based on the distributor's brand. Private labels, on the other hand, allow retailers to increase the degree of product differentiation, while simultaneously building up the level of customer loyalty and the brand value of the product through unique identification with the point of sale.

Across the three main milk specialty categories, the highest average price was recorded in leading brands for organic and functional milk, while for "Other producers" the highest price was for lactose-free milk. In general, the distributor brands held the cheapest product items in all specialty categories (Bonanno and Lopez, 2005; Kumar, 2007).

By analysing the ANOVA table (Table 9), it can be seen that the main effect of the brand group is always significant, except in the case of lactose-free milk, for which it is the "brand group\*lactose-free" interaction that has a significant influence on the product price setting.

This result confirms the importance of the brand, a key element for the company, as a discriminating factor in defining the selling price, above the type of product itself, and as an element of differentiation of a product (Sudari *et al.*, 2019). In our research, each company seems to have a different price management strategy, highlighting the importance of this element for the consumer's evaluation of the product. The result is price inhomogeneity among product types influenced by the brand. Thus, in the case of the speciality milk, the brand reflects the high reputation of the producer/brand, the high level of customer loyalty, and the level of satisfaction. From this dynamic, it appears that product choice is almost exclusively dictated by brand choice (Mariska *et al.*, 2019). At the same time, the combined effect of

Table 8 - Average price (€/l) recorded for each category of milk specialty comparing the brand categories

Brand Group*	Organic		Lactose-free		Functional		Organic and functional		Lactose-free and organic		Lactose-free, organic, and functional	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
OP	1.569 (n=112)	0.724	1.719 (n=43)	0.514	1.527 (n=9)	0.401	2.525 (n=18)	1.489	/	/	/	/
DB	1.480 (n=83)	0.246	1.393 (n=35)	0.094	1.259 (n=32)	0.417	1.557 (n=9)	0.058	1.910 (n=50)	0.134	1.892 (n=16)	0.233 (n=1)
L	1.807 (n=62)	0.133	1.359 (n=174)	0.423	1.901 (n=211)	0.664	/	/	/	/	/	1.739 (n=58)
Total mean	1.610 (n=257)	0.514	1.425 (n=260)	0.432	1.806 (n=256)	0.666	2.110 (n=27)	1.173	1.910 (n=50)	0.134	1.892 (n=16)	0.233 (n=59)

\* Brand groups: OP = other producers; DB = private labels; L = leader brands.

brand and lactose-free in the definition of the price suggests that, in the case of lactose-free products, consumer choice is also dictated by the nutritional characteristic of milk (lactose-free), in addition to the to the product brand. The health issue behind the choice to buy lactose-free milk defines a purchasing pattern especially based on the safeguarding of consumer health. Indeed, in the consumer's decision-making process for lactose-free milk, the prevention of gastric disturbances is the first choice motivation, for which the consumer would also be willing to pay a higher price (Rizzo *et al.*, 2020).

Considering the size effect, the Partial  $\eta^2$  are low in all cases, except between organic and brand groups.

## Conclusions

This research aimed to explore the characteristics of specialty milk supply in different formats of large-scale retail distribution, investigating aspects related to product sustainability (such as origin and packaging), assortment depth, proportion of branding, and pricing policies used for the various product categories. We adopted the same methodology used in our previous research pertaining to conventional cow milk allowing the characterization of the whole cow's milk supply, both of conventional and specialty products, available in the large-scale retailing distribution of the considered market.

Our key findings show that the supply of the specialty milk assortment is characterized by a wide range of organic and functional products to meet the demands of consumers who are increasingly attentive to sustainable and healthy milk. Furthermore, the massive presence of leading and OP branded products especially linked to the indication of national or local origin on the label, highlights how the indication of origin is an important differentiation and recognition factor used by specialty milks producers.

The specialty milk market is continuously growing and has major strengths compared to the conventional product, related to the high level of differentiation, product innovation and price competitiveness. In this sense, research demonstrates a high penetration rate of these products, which are offered on the market in different combinations, widely in different LSR formats and at a price higher than that of the commodity. In addition, we have seen how specialty milk producers encourage the implementation of product features according to consumer needs (from choice of packaging to indication of origin), creating clear growth opportunities for an increasingly competitive and expanding market.

This research highlights the strengths that characterise the specialty milk market; however, the limited geographical area investigated should be considered a limit of this research. Given the socio-demographic

heterogeneity and lifestyles of the Italian population, which certainly determine different food choices, it would be interesting to replicate the research in north-east, central and southern Italy and make a cross-area comparison of the characteristics of the special milks supply. Although this market segment represents an important source of income for producers, these results could provide ideas and concrete tools for growth and differentiation (e.g. indication of origin, differentiation of packaging) also for the conventional milk market which, even now, is continuing its negative trend mainly due to the constant decrease in consumption. Therefore, these results can be used by companies as a tool to evaluate the LRO in terms of milk specialties in order to increase company awareness and the added value of product differentiation strategies on the market.

## References

- Antonoli, F., Ben Kaabia, M., Arfini, F., & Gil, J.M. (2019). Price transmission dynamics for quality-certified food products: A comparison between conventional and organic fluid milk in Italy. *Agribusiness*, 35(3), 374-393. doi: 10.1002/agr.21568.
- Annunziata, A., & Mariani, A. (2018). Consumer perception of sustainability attributes in organic and local food. *Recent patents on food, nutrition & agriculture*, 9(2), 87-96.
- Aprile, M.C., Caputo, V., & Nayga Jr, R.M. (2016). Consumers' preferences and attitudes toward local food products. *Journal of food products marketing*, 22(1), 19-42.
- Ares, G., Baixauli, R., Sanz, T., Varela, P., & Salvador, A. (2009). New functional fibre in milk puddings: Effect on sensory properties and consumers' acceptability. *LWT-Food Science and Technology*, 42(3), 710-716. doi: 10.1016/j.lwt.2008.10.004.
- Ares, G., Gimenez, A., & Gambaro, A. (2009). Consumer perceived healthiness and willingness to try functional milk desserts. Influence of ingredient, ingredient name and health claim. *Food Quality and Preference*, 20(1), 50-56. doi: 10.1016/j.foodqual.2008.07.002.
- Assolatte (2018). *L'andamento delle vendite dei mercati – latte in pillole*. -- URL [WWW Document]. <https://mercati.assolatte.it/201803/index.html> (accessed 1.12.21).
- Ayele, D., Zewotir, T., & Mwambi, H. (2014). Multiple correspondence analysis as a tool for analysis of large health surveys in African settings. *African Health Sciences*, 14(4), 1036-1045. doi: 10.4314/ahs.v14i4.35.
- Bava, L., Sandrucci, A., Zucali, M., Guerci, M., & Tamburini, A. (2014). How can farming intensification affect the environmental impact of milk production? *Journal of Dairy Science*, 97(7), 4579-4593. doi: 10.3168/jds.2013-7530.
- Balboni, V. (2017, maggio 18). Origine del latte in etichetta: Ecco i marchi che scelgono materia prima italiana. Viaggio tra gli scaffali del supermercato. *Il Fatto Alimentare*. -- <https://ilfattoalimentare.it/origine-latte-marchi-supermercato.html>.

- Beldona, S., Morrison, Alastair, M., & O'Leary, J. (2005). Online shopping motivations and pleasure travel products: A correspondence analysis. *Tourism Management*, 26(4), 561-570. doi: 10.1016/j.tourman.2004.03.008.
- Bentivoglio, D., Savini, S., Finco, A., Bucci, G., & Boselli, E. (2019). Quality and origin of mountain food products: The new European label as a strategy for sustainable development. *Journal of Mountain Science*, 16(2), 428-440.
- Bonanno, A., & Lopez, R.A. (2005). Private label expansion and supermarket milk prices. *Journal of Agricultural & Food Industrial Organization*, 3(1). doi: 10.2202/1542-0485.1085.
- Buckless, F.A., & Ravenscroft, S.P. (1990). Contrast Coding: A Refinement of ANOVA in Behavioral Analysis. *The Accounting Review*, 65(4), 933-945.
- Capper, J.L., & Cady, R.A. (2012). A comparison of the environmental impact of Jersey compared with Holstein milk for cheese production. *Journal of Dairy Science*, 95(1), 165-176. doi: 10.3168/jds.2011-4360.
- Carfora, V., Cavallo, C., Caso, D., Del Giudice, T., De Devitiis, B., Viscecchia, R., Nardone, G., & Cicia, G. (2019). Explaining consumer purchase behavior for organic milk: Including trust and green self-identity within the theory of planned behavior. *Food Quality and Preference*, 76, 1-9. doi: 10.1016/j.foodqual.2019.03.006.
- Castanheira, E.G., Dias, A.C., Arroja, L., & Amaro, R. (2010). The environmental performance of milk production on a typical Portuguese dairy farm. *Agricultural Systems*, 103(7), 498-507. doi: 10.1016/j.agsy.2010.05.004.
- Chen, Y.-S., Hung, S.-T., Wang, T.-Y., Huang, A.-F., & Liao, Y.-W. (2017). The influence of excessive product packaging on green brand attachment: The mediation roles of green brand attitude and green brand image. *Sustainability*, 9(4), 654.
- Chernev, A. (2011). Product assortment and consumer choice: An interdisciplinary review. *Foundations and Trends in Marketing*, 6(1), 1-61. doi: 10.1561/17000000030.
- D'Oronzio, M.A., & Vivo, C.D. (2021). Organic and conventional farms in the Basilicata region: A comparison of structural and economic variables using FADN data. *Economia agro-alimentare/Food Economy*, 23(3), Article 3. doi: 10.3280/ecag2021oa12775.
- De Ruvio (2016). *I numeri del latte bio*. Rapporto ISMEA. -- [www.anabio.it/uploads/article/inumeridellattebioismeabologna2f-ad6c70c1a8.pdf](http://www.anabio.it/uploads/article/inumeridellattebioismeabologna2f-ad6c70c1a8.pdf).
- Dekker, P.J., Koenders, D., & Bruins, M.J. (2019). Lactose-free dairy products: Market developments, production, nutrition and health benefits. *Nutrients*, 11(3), 551. doi: 10.3390/nu11030551.
- Dhar, S.K., Hoch, S.J., & Kumar, N. (2001). Effective category management depends on the role of the category. *Journal of Retailing*, 77(2), 165-184. doi: 10.1016/S0022-4359(01)00045-8.
- EC 834/2007, Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91.
- EC 889/2008, Commission Regulation (EC) No 889/2008 of 5 September 2008 on organic production and labelling of organic products with regard to organic production, labelling and control.

- Fatkullin, R., Naumenko, N., Popova, N., Ruskina, A., Kalinina, I., & Potoroko, I. (2021). Explaining Consumer Intentions for Foods with Antioxidant Properties: Predictors of Choice and Purchase Barriers. *International Journal of Food Science*, 2021, e9971425. doi: 10.1155/2021/9971425.
- Food (2019). *Bakery, è il momento del lactose free* (2019, dicembre 23). *FOOD*. -- [www.foodweb.it/2019/12/bakery-e-il-momento-del-lactose-free](http://www.foodweb.it/2019/12/bakery-e-il-momento-del-lactose-free).
- Fotuhi, H., Amiri, A., & Taheriyoun, A.R. (2019). A novel approach based on multiple correspondence analysis for monitoring social networks with categorical attributed data. *Journal of Statistical Computation and Simulation*, 89(16), 3137-3164. -- <https://doi-org.bibliopass.unito.it/10.1080/00949655.2019.1657429>.
- Gambelli, D., Naspetti, S., & Vairo, D. (2003). Why are consumers buying organic meat and milk? A qualitative study of the Italian market. Socio-economic aspects of animal health and food safety in organic farming systems. In M. Hovi, A. Martini, & S. Padel (Eds.), *Proc. 1<sup>st</sup> SAFO Workshop*, 125-141.
- Greenacre, M. (2017). Correspondence analysis in practice. *Chapman and hall/crc*. doi: 10.1201/9781315369983.
- Grubor, A., & Milovanov, O. (2017). Brand strategies in the era of sustainability. Interdisciplinary Description of Complex Systems: *INDECS*, 15(1), 78-88.
- Gulseven, O. (2018). Estimating factors for the demand of organic milk in Turkey. *British Food Journal*, 120(9), 2005-2016. doi: 10.1108/BFJ-12-2017-0712.
- Gursoy, D., & Chen, J.S. (2000). Competitive analysis of cross cultural information search behavior. *Tourism Management*, 21(6), 583-590. doi: 10.1016/S0261-5177(00)00005-4.
- Haas, R., Schnepps, A., Pichler, A., & Meixner, O. (2019). Cow Milk versus Plant-Based Milk Substitutes: A Comparison of Product Image and Motivational Structure of Consumption. *Sustainability*, 11(18), 5046. doi: 10.3390/su11185046.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (1998). *Multivariate data analysis (Vol. 5)*. Prentice hall Upper Saddle River, NJ.
- Harcar, T., & Spillan, J.E. (2006). Exploring Latin American family decision-making using correspondence analysis. *Journal of World Business*, 41(3), 221-232. doi: 10.1016/j.jwb.2006.01.009.
- Haug, A., Høstmark, A.T., & Harstad, O.M. (2007). Bovine milk in human nutrition – a review. *Lipids in Health and Disease*, 6(1), 25. doi: 10.1186/1476-511X-6-25.
- Hoch, S.J., & Lodish, L.M. (1998). *Store Brands and Category Management*.
- Imami, D., Skreli, E., Zhllima, E., & Chanb, C. (2017). Consumer attitudes towards organic food in the Western Balkans – The case of Albania. *Economia agro-alimentare*. doi: 10.3280/ECAG2017-002004.
- ISMEA (2019a). *Settore lattiero caseario, scheda di settore*.
- ISMEA (2019b). *Vissuto del consumatore di latte e formaggi*. -- [www.ismeamercati.it](http://www.ismeamercati.it). [www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/9953](http://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/9953).
- ISMEA (2021a). *PIANO ZOOTECNICO - La filiera del bovino da latte Acquisti domestici di latte: Dinamiche e determinanti di scelta delle famiglie italiane nell'ultimo quinquennio (2012-2016)*. -- [www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/7870](http://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/7870).
- ISMEA (2021b). *Latte e derivati – Dati – Acquisti domestici*. -- [www.ismeamercati.it](http://www.ismeamercati.it). [www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/2102](http://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/2102).

- ISMEA (2021c). CONSUMI ALIMENTARI I consumi domestici delle famiglie italiane. Report no. 1/2021. -- [www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/11321](http://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/11321).
- ISMEA (2021d). SETTORE LATTIERO CASEARIO, SCHEDA DI SETTORE. -- [www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/3521#MenuV](http://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/3521#MenuV).
- ISTAT (2021). PREVISIONI DELLA POPOLAZIONE RESIDENTE E DELLE FAMIGLIE | BASE 1/1/2020. Futuro della popolazione: Meno residenti, più anziani, famiglie più piccole. -- [www.istat.it/it/files/2021/11/REPORT-PREVISIONI-DEMOGRAFICHE.pdf](http://www.istat.it/it/files/2021/11/REPORT-PREVISIONI-DEMOGRAFICHE.pdf).
- Kumar, N. (2007). Private label strategy: How to meet the store brand challenge. *Harvard Business Review Press*.
- Lana, R.M., Riback, T.I.S., Lima, T.F.M., da Silva-Nunes, M., Cruz, O.G., Oliveira, F.G.S., Moresco, G.G., Honório, N.A., & Codeço, C.T. (2017). Socioeconomic and demographic characterization of an endemic malaria region in Brazil by multiple correspondence analysis. *Malaria Journal*, 16(1), 397. doi: 10.1186/s12936-017-2045-z.
- Magan, J.B., O'Callaghan, T.F., Kelly, A.L., & McCarthy, N.A. (2021). Compositional and functional properties of milk and dairy products derived from cows fed pasture or concentrate-based diets. *Comprehensive Reviews in Food Science and Food Safety*, 20(3), 2769-2800. doi: 10.1111/1541-4337.12751.
- Mantrala, M.K., Levy, M., Kahn, B.E., Fox, E.J., Gaidarev, P., Dankworth, B., & Shah, D. (2009). Why is Assortment Planning so Difficult for Retailers? A Framework and Research Agenda. *Journal of Retailing*, 85(1), 71-83. doi: 10.1016/j.jretai.2008.11.006.
- Mariska, A., Soesanto, H., & Mahfudz, M. (2019). The effect of brand reputation, product reliability, price and brand admiration on purchasing decision (Study on Food Products that Sold through Instagram at Semarang). *Jurnal Sains Pemasaran Indonesia (Indonesian Journal of Marketing Science)*, 17(3), 164-176. doi: 10.14710/jspi.v17i3.164-176.
- Merlino, V.M., Brun, F., Versino, A., & Blanc, S. (2020). Milk packaging innovation: Consumer perception and willingness to pay. *AIMS Agric Food*, 5, 307-326. doi: 10.3934/agrfood.2020.2.307.
- Merlino, V.M., Mastromonaco, G., Borra, D., Blanc, S., Brun, F., & Massaglia, S. (2021). Planning of the cow milk assortment for large retail chains in North Italy: A comparison of two metropolitan cities. *Journal of Retailing and Consumer Services*, 59, 102406. doi: 10.1016/j.jretconser.2020.102406.
- Morales, A., Kahn, B.E., McAlister, L., & Broniarczyk, S.M. (2005). Perceptions of assortment variety: The effects of congruency between consumers' internal and retailers' external organization. *Journal of Retailing*, 81(2), 159-169. doi: 10.1016/j.jretai.2005.03.007.
- Naspetti, S., Mandolesi, S., Buysse, J., Latvala, T., Nicholas, P., Padel, S., Van Loo, E.J., & Zanolini, R. (2021). Consumer perception of sustainable practices in dairy production. *Agricultural and Food Economics*, 9(1), 1-26. doi: 10.1186/s40100-020-00175-z.
- Osservatorio sul Mercato dei prodotti zootecnici OMPZ, 2020. -- URL. [www.ompz.it/prodotti/latte/produzione/italia.html](http://www.ompz.it/prodotti/latte/produzione/italia.html).

- Palacios, O.M., Badran, J., Drake, M.A., Reisner, M., & Moskowitz, H.R. (2009). Consumer acceptance of cow's milk versus soy beverages: Impact of ethnicity, lactose tolerance and sensory preference segmentation. *Journal of Sensory Studies*, 24(5), 731-748. doi: 10.1111/j.1745-459X.2009.00236.x.
- Peng, Y., West, G.E., & Wang, C. (2006). Consumer Attitudes and Acceptance of CLA-Enriched Dairy Products. *Canadian Journal of Agricultural Economics/Revue Canadienne d'agroeconomie*, 54(4), 663-684. doi: 10.1111/j.1744-7976.2006.00072.x.
- Rama, D. (2019). *Il mercato del latte – Rapporto 2019. Osservatorio sul Mercato dei Prodotti Zootecnici*. -- [www.ompz.it/fileadmin/user\\_upload/Il\\_mercato\\_del\\_latte\\_Rapporto\\_2019.pdf](http://www.ompz.it/fileadmin/user_upload/Il_mercato_del_latte_Rapporto_2019.pdf).
- Redazione Dairy (2020). Il mercato del latte: Attualità e prospettive. *Dairy Summit*. -- [www.dairysummit.it/il-mercato-del-latte-attualita-e-prospettive](http://www.dairysummit.it/il-mercato-del-latte-attualita-e-prospettive).
- Redazione Dairy (2020b). *Costruire lo scaffale attorno al latte fresco italiano*. -- [www.dairysummit.it/costruire-lo-scaffale-attorno-al-latte-fresco-italiano](http://www.dairysummit.it/costruire-lo-scaffale-attorno-al-latte-fresco-italiano).
- Rizzo, P.V., Harwood, W.S., & Drake, M.A. (2020). Consumer desires and perceptions of lactose-free milk. *Journal of Dairy Science*, 103(8), 6950-6966.
- Schiano, A.N., & Drake, M.A. (2021). Invited review: Sustainability: Different perspectives, inherent conflict. *Journal of Dairy Science*, 104(11), 11386-11400. doi: 10.3168/jds.2021-20360.
- Scotti, R., Bonanomi, G., Scelza, R., Zoina, A., & Rao, M.A. (2015). Organic amendments as sustainable tool to recovery fertility in intensive agricultural systems. *Journal of Soil Science and Plant Nutrition*, 15(2), 333-352. doi: 10.4067/S0718-95162015005000031.
- Solgaard, H.S., & Hansen, T. (2003). A hierarchical Bayes model of choice between supermarket formats. *Journal of Retailing and Consumer Services*, 10(3), 169-180. doi: 10.1016/S0969-6989(03)00008-0.
- Sudari, S., Tarofder, A., Khatibi, A., & Tham, J. (2019). Measuring the critical effect of marketing mix on customer loyalty through customer satisfaction in food and beverage products. *Management Science Letters*, 9(9), 1385-1396. doi: 10.5267/j.msl.2019.5.012.
- Suri, S., Kumar, V., Prasad, R., Tanwar, B., Goyal, A., Kaur, S., Gat, Y., Kumar, A., Kaur, J., & Singh, D. (2019). Considerations for development of lactose-free food. *Journal of Nutrition & Intermediary Metabolism*, 15, 27-34. doi: 10.1016/j.jnim.2018.11.003.
- Świąder, K., Kulawiak, M., & Chen, Y.-P. (2020). Types of lactose -free products and their availability on the Polish market. *Postępy Techniki Przetwórstwa Spożywczego*, 1. -- <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-54f9fa52-eecd-4d46-8520-79fe0c1120bf>.
- Tabacco, E., Merlino, V.M., Coppa, M., Massaglia, S., & Borreani, G. (2021). Analyses of consumers' preferences and of the correspondence between direct and indirect label claims and the fatty acid profile of milk in large retail chains in northern Italy. *Journal of Dairy Science*. doi: 10.3168/jds.2021-20191.
- Tempesta, T., & Vecchiato, D. (2013). An analysis of the territorial factors affecting milk purchase in Italy. *Food Quality and Preference*, 27(1), 35-43. doi: 10.1016/j.foodqual.2012.06.005.

- Trestini, S., & Stiletto, A. (2020). Does Italian origin really determine a price premium for fluid milk? Evidences from a hedonic price analysis. *Economia agro-alimentare/Food Economy - Open Access*, 22(1). doi: 10.3280/ecag1-2020oa10064.
- Wang, M., Tupa, J., Kumar, V., Kumari, A., Garza-Reyes, J.A., Akkarangoon, S. (2019). *How Sustainable is Short Food Supply Chains? A Comprehensive Systematic Review*, Proceedings of the 9<sup>th</sup> International Conference on Industrial Engineering and Operations Management (IEOM), Bangkok, Thailand, March 5-7. Michigan: IEOM Society, 1-11.
- Zielke, S. (2010). How price image dimensions influence shopping intentions for different store formats. *European Journal of Marketing*, 44(6), 748-770. doi: 10.1108/03090561011032702.

**Valentina Maria Merlino**

Department of Agricultural, Forest and Food Sciences - University of Turin, Italy  
Largo Braccini, 2 - 10095 Grugliasco (Turin), Italy

E-mail: valentina.merlino@unito.it

Research fellow, she holds a degree in Livestock Science and Technology (79/S - Livestock Management) (Grugliasco, 2010). Her research activity focuses on the study of food supply chains, agri-food products' consumer analysis and food marketing. Her recent studies explored the supply composition, assortment and evolution of some animal productions markets.

**Stefano Massaglia**

Department of Agricultural, Forest and Food Sciences - University of Turin, Italy  
Largo Braccini, 2 - 10095 Grugliasco (Turin), Italy

E-mail: stefano.massaglia@unito.it

Associate Professor in Agricultural Economy and Rural Appraisal. In 2003 he obtained the Phd in Agricultural Economics and Politics at the University of Padua. Since 2009 he focused his research fields on food supply chains sustainability issues (economic and environmental sustainability), agri-food products' consumer analysis and wine marketing.

**Simone Blanc**

Department of Agricultural, Forest and Food Sciences - University of Turin, Italy  
Largo Braccini, 2 - 10095 Grugliasco (Turin), Italy

Tel: + 39 011 6708684

E-mail: simone.blanc@unito.it

Holds a degree in Science and Management of Rural and Forestry Resource and got a Doctoral Degree at the University of Torino. Researcher at the University of Turin since April 2000 in Agricultural Economics and Appraisal. Current research interests include: qualitative and quantitative analysis of economic, management and estimation aspects of agroforestry supply chains; evaluation of the efficiency of agroforestry enterprises according to the principles of sustainable development; analysis of consumer behaviour and willingness to pay for innovative agro-food products.

**Filippo Brun**

Department of Agricultural, Forest and Food Sciences - University of Turin, Italy  
Largo Braccini, 2 - 10095 Grugliasco (Turin), Italy

Tel: +39 011 670 8628

E-mail: filippo.brun@unito.it

Forest Science Degree at University of Torino (1989, 110/110 with praise), Doctorate of research (PhD, 1994) at University of Padova, Post - Doctorate (1995) at University of Torino. Researcher at the University of Torino since February 1997, Associate Professor since 2005 and Full Professor since 2015. He is responsible of the Economic Unit of the Department and its current research interests include forest and rural appraisal, agricultural, forestry and environmental economics and policy.

**Danielle Borra**

Department of Agricultural, Forest and Food Sciences - University of Turin, Italy  
Largo Braccini, 2 - 10095 Grugliasco (Turin), Italy

E-mail: [danielle.borra@unito.it](mailto:danielle.borra@unito.it)

Associate professor in Agricultural economics at the University of Turin, she obtained a master degree (Italian graduation level 2) in Agricultural in 1982. Currently she teaches “Marketing of agri-food products” at the first cycle degree courses of the Agricultural, Forest and Food Sciences Department (Food Technology) and “Principles of Pet Food Marketing” at first cycle degree courses on Animal Production at Veterinary Sciences. Present research interests include food supply chains sustainability issues (economic and environmental sustainability, agri-food products’ consumer analysis and food marketing.