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Recent results supporting the Montasio PDO cheeses labelled “Mountain product” and “Only Italian Simmental breed”

A. Romanzin*, M. Corazzin, C. Fontana, E. Piasentier and S. Bovolenta

Dipartimento di Scienze Agrarie e Ambientali – Università degli Studi di Udine
Via delle Scienze 206, 33100 – Udine (Italy)
*e-mail: alberto.romanzin@uniud.it

Abstract. Montasio is one of the most important PDO cheeses in North-East Italy. Despite its mountain origin, it is mainly produced in lowlands. Recently, in order to differentiate mountain products and to link them to the breed more present in the territory, the PDO Montasio specification allows to labell products as ‘Mountain Product’ and ‘Only Italian Simmental breed’. A project is in progress with the aim of assessing the economic and technical frame of a possible production system and studying the range of variability of the product qualitative characteristics. In the first phase of the project, one cheese factory with 20 associated dairy farms and one alpine farm, for a total of 350 Italian Simmental cows, were involved. A survey at farm level provided data useful to support a marketing strategy. A first experimental trial focused on the quality of cheese produced from cows grazing on alpine pasture or kept indoors. A more recent study aimed to define the quality of the Montasio cheese in relation to pasture type and level of supplementation. The results of the project within the framework of the increase of product value will be discussed.

Keywords. Montasio PDO cheese – Mountain product – Italian Simmental cows – Alpine pasture.

Résultats récents supportant les fromages AOP Montasio étiquetés «Produit de montagne» et «Seulement de race Simmental italienne »

Résumé. *Le fromage Montasio est l’un des plus importants fromages AOP dans le Nord-Est de l’Italie. Malgré son origine de montagne, il est principalement produit en plaine. Récemment, afin de différencier les produits de montagne et de les associer à la race la plus présente sur le territoire, la spécification AOP Montasio permet d’étiqueter le produit comme «Produit de montagne» et «Seulement de race Simmental italienne». Un projet est en cours dans le but d’évaluer le cadre économique et technique d’un système de production possible et d’étudier l’étendue de la variabilité des caractéristiques qualitatives des produits. Dans la première phase du projet, une usine de fromage avec 20 fermes laitières associées et une ferme alpine, pour un total de 350 vaches Simmental italiennes, ont été impliquées. Une enquête au niveau des fermes a fourni des données utiles pour soutenir une stratégie de marketing. Un premier essai expérimental a été axé sur la qualité du fromage produit à partir de vaches qui paissaient sur des pâturages alpins ou étaient gardées à l’intérieur. Une étude plus récente visait à définir la qualité du fromage Montasio en fonction du type de pâturage et le niveau de supplémentation. Les résultats du projet dans le cadre de l’augmentation de la valeur du produit seront discutés.*

Mots-clés. *Fromage Montasio AOP – Produit de montagne – Vaches Simmental italiennes – Alpage.*

I – Introduction

The added value of mountain cheese is linked to the ability to evoke the production area and its environmental, historical and cultural values, as well as objective nutritional and sensorial characteristics (Piasentier and Martin, 2005; Bovolenta *et al.,* 2011).

The livestock sector in the mountain area of Friuli Venezia Giulia Region (FVG) follows the general trends of the Alps (ISTAT, 2013). A gradual reduction of pastures and meadows from over

30,000 ha in 1990 to about 12,000 in 2010 (-60%) was observed. This is due to a drastic reduction of the total number of farms, from nearly 1600 in 1990 to 406 in 2010 (-75%), and in particular to the reduction of the farms that use the summer pastures. Cattle breeds reared in the mountain area of FVG are mainly Simmental, followed by Brown and Holstein.

Montasio cheese is a semi-hard and semi-cooked cheese made from raw or thermized cow milk and is the unique Protected Designation of Origin (PDO) cheese in the Region. Although Montasio belongs to the group of alpine cheeses and takes its name from a mountain plateau, it is produced mainly in lowlands. Recently, in order to improve the value of the mountain cheese and to link it to the breed more present in the area, two additional labels: 'Mountain Product' (PDM – *Prodotto della montagna*) and 'Only Italian Simmental breed' (PR – *Solo di Pezzata Rossa Italiana*) were proposed.

The PDM Register was founded by a national law (L. 289/02, Art. 85, Mipaf 30/12/03) to further characterize the PDO products, if the entire production chain, from milk production to cheese ripening, takes place in the mountain area. Since 2008, the National Association of Cattle Breeders of Italian Simmental breed (ANAPRI) gives the label PR for dairy or meat products from animals recorded in the Herd Book. Regarding dairy products, the product specification provides that they must be obtained exclusively from raw milk with the only addition of rennet and salt. Recently, on the basis of a legal agreement, the Consortium of Montasio cheese has recognized this monobreed label and allows to pair it with own. The production of monobreed cheese will therefore be subjected to more restrictive constraints of the two product specifications.

A project is in progress with the aim of assessing the economic and technical frame of a possible production chain and studying the range of variability of the cheese characteristics. This paper aims to present the first results obtained.

II – Production chain of Montasio PDO-PDM-PR

For this purpose 20 livestock farms, one cheese factory located in the bottom valley (*Caseificio di Ugovizza*), and one alpine farm provided with dairy factory (*Malga Montasio*) were chosen in the mountain area of FVG.

A survey on livestock farms, concerning buildings, utilized agricultural area (UAA), milk production, livestock management, forage self-sufficiency, animal welfare, and other useful information was performed. Vertical transhumance of cattle is adopted: during winter the animals are kept indoors in tie-stall barns, while, during summer, cows graze on mountain pastures for a total of about 100 days. The UAA was 35.6 ha on average, used mainly for pastures and meadows. The forage self-sufficiency, related to the winter period, ranged between 66% (farms with over than 20 cows) to 100% (farms with less than 10 cows). The average number of dairy cows per farm was 15, 89% of which belongs to the Simmental breed. The cheese factory (*Caseificio di Ugovizza*) annually processed 800 tons of milk (fat: 3.9%; protein: 3.2%).

The Welfare Quality Consortium (Welfare Quality, 2009) and the ANI-35L (Bartussek, 1999) methods were considered for animal welfare assessment. With the first method, 30% of the farms were classified as "enhanced" and the other 70% as "acceptable". This is due to the housing system (tie-stall), which is particularly penalized by the method. With the second method the overall value (22.2 points) corresponds to an evaluation of "average suitable".

Malga Montasio includes nearly 500 ha of pastures, facilities for animal housing, milk processing and cheese ripening. About 120 dairy cows (mainly Simmental) are kept on pasture day and night. On the basis of preliminary studies, pasture vegetation can be divided into three principal areas. The lower part of the pasture, flat or slightly inclined, is characterized by several species with a good forage value –*Phleum alpinum*, *Festuca pratensis* and *Poa alpina*– and other species typical of a medium fertile pasture, such as several species of clover (*Trifolium badium*, *T. repens*,

T. pratense), *Lotus corniculatus*, *Alchemilla vulgaris*, *Crepis aurea* and *Leontodon hispidus*. The upper areas of the pasture are characterized by species such as *Sesleria coerulea*, *Koeleria pyramidata* and *Nardus stricta*. In many areas close to the stables, in the presence of a strong eutrophication of the soil, there are nitrophilous phytocoenoses characterized by *Deschampsia caespitosa*, *Veratrum lobelianum*, and *Rumex alpinus*.

III – Experimental results

The first trial was aimed to study the qualitative characteristics of Montasio PDO cheese made from milk of Italian Simmental cows. The main results, previously published (Romanzin *et al.,* 2013) are reported here. Cheeses obtained from two cow breeding systems (grazing on high altitude pasture or kept indoors with a hay-based diet), in two periods (early-July and late-August) and ripened for two times (two or six months) were considered (Table 1). Pasture-derived cheese presented higher fat and lower protein content, and was yellower (b* index) than hay-derived ones. Textural parameters (hardness, gumminess, chewiness) were highest in pasture-derived cheese, which presented also a more favorable fatty acid profile. Indeed it showed lower saturated fatty acids, higher n-3 polyunsaturated fatty acids and CLA content. Conversely, only limited effects of period and ripening time were observed on cheeses.

Table 1. Chemical composition, ripening index, colorimetric parameters and fatty acid content of cheeses (n = 48) (Romanzin *et al.,* 2013)

	Rearing system		Period		Ripening time		SEM
	Pasture	Indoor	July	August	60d	180d	
DM† (%)	69.7^{A}	67.8^{B}	68.3^{b}	69.2^{a}	66.6^{B}	70.8^{A}	0.16
Fat (%DM)	54.2^{A}	50.9^{B}	52.3	52.7	52.6	52.5	0.21
Protein (%DM)	38.6^{B}	42.3^{A}	40.9	40.0	40.7	40.2	0.25
Ripening index†	13.5	14.8	14.3	14.1	12.1^{B}	16.2^{A}	0.31
L*	75.6^{B}	77.8^{A}	76.9	76.6	77.4^{a}	76.1^{b}	0.27
a*	2.2^{A}	0.6^{B}	1.2^{B}	1.5^{A}	1.4	1.4	0.04
b*	25.1^{A}	16.1^{B}	20.1^{b}	21.1^{a}	19.7^{B}	21.5^{A}	0.16
C18:3 n-3	1.21^{A}	0.41^{B}	0.78	0.84	0.80	0.82	0.017
cis9trans11-CLA†	1.53^{A}	0.46^{B}	0.96^{b}	1.03^{a}	0.94^{B}	1.06^{A}	0.013
SFA†	64.61^{B}	71.72^{A}	68.55^{a}	67.78^{b}	67.45^{B}	68.88^{A}	0.120
MUFA†	31.71^{A}	27.13^{B}	29.13^{b}	29.70^{a}	30.22^{A}	28.62^{B}	0.100
PUFA†	3.68^{A}	1.16^{B}	2.32^{b}	2.52^{a}	2.33^{B}	2.51^{A}	0.032

Significance: $^{a, b}$: P < 0.05, $^{A, B}$: P < 0.01; † DM: dry matter, Ripening index: WSN/TN (x100), WSN: water soluble nitrogen TN: total nitrogen, CLA: conjugated linoleic acids, SFA: saturated fatty acids, MUFA: monounsaturated fatty acids, PUFA: polyunsaturated fatty acids.

With the aim to understand if consumers were able to distinguish the cheeses, a sensory test was performed. Although consumers perceived the cheeses different in terms of colour and holes, they expressed a similar overall liking, 27 ± 1.1 (mean ± SE) which, in a LAM (Labelled Affective Magnitude; from -100 to +100) scale, corresponds to a judgment of moderately like (Cardello and Schutz, 2004).

Afterwards, in order to assess whether the information about breed and rearing system may modify the consumer liking, two kind of cheeses, monobreed and monobreed from pasture, were tasted (Romanzin *et al.* 2012). Consumers evaluated the cheeses in two sessions. In the first one they assessed the cheeses in blind condition (perceived liking). Then they were asked to read

information about the breed and rearing system and to give their liking expectation (expected liking). In the second session, the same consumers tasted cheeses with the linked information (actual liking). Mean scores of perceived liking were not statistically different. Expected liking and actual liking scores were higher for pasture than only monobreed cheese. For both cheeses the expected liking was higher than the perceived one. Consumers have assimilated their liking for both cheeses in the direction of expectations, completely for monobreed and partially (87%) for monobreed from pasture cheese.

Finally, a third trial was aimed to characterize Montasio cheese produced from milk of cows grazing on two alpine pastures with different botanical composition and receiving different levels of supplementation (1.5 *vs* 3.0 kg/day/head). Pasture composition and supplement level had a limited effect on physical and chemical characteristics of cheeses, while an effect of pasture on volatile profile, with particular regard to ketones, phenolic and monoterpenes compounds, was found. A total of 61 volatile compounds were identified.

IV – Conclusions

The project evaluated a possible production chain of the Montasio DOP-PDM-PR cheese. The producers identified are firmly rooted in the territory and able to guarantee an adequate production, ensuring the necessary cooperation. In the future it is hoped to involve other local producers. The product is generally liked by potential consumers. However, this liking can be further enhanced if properly linked to correct information about the product origin that can highlight its peculiarities such as the strong link with the territory of production (use of local fodder, use of local cattle breed, maintenance of traditions and alpine landscape).

It will be necessary in the future to assess the variability factors of product quality in relation to technological and microbiological aspects. Last but not least, even with the help of data concerning the environmental and social sustainability of farms, it will be useful to set an appropriate marketing campaign to support the product in order to ensure economic sustainability for producers.

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