Research on Characteristics of Traditionalism of Buffalo Cheese from Marin Village and Indicators for Organic Certification

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Abstract

Certified organic food production aims at creating sustainable agricultural systems, balanced and diversified through the protection of natural resources but also to human health. The quality of agricultural production represents a competitive advantage for agricultural producers from Marin village, Salaj County, Romania, contributing to the cultural and gastronomic heritage of the area. This paper aims to investigate the socio-territorial indicators, economic indicators and indicators of traditionalism of Marin buffalo cheese certification allowing the area to get a group of organic and local certification products, in order to increase the agricultural potential of the area through a quality approach. In this study is used the IDEA method, a method suitable for organic certifications and traditional attestation, individual or for a group of farmers. After a complex analysis of the specific indicators, results show that the product Buffalo cheese of Marin, brings together the criteria relating to organic certification respectively traditional attestation, according to the European Regulations. The overview conclusion of this study is that local certification could major contribute to the sustainable development of rural area, preserves the last hundreds of years of tradition and protects the Romanian native values, these being often the only way to increase the rural areas.

Keywords: Marin cheese, organic certification, traditional attestation, rural economy, sustainable development of rural areas

Introduction

During the European Commission in 2014, the European Union made a new Action Plan of Organic Production for the future, which consists in combining environmental practices, biodiversity, the preservation of natural resources and the application of high animal welfare standards, and a production method that follows preferences and natural substances and processes choices of certain consumers (European Commission, 2014). These are part of the organic production, a complex system of farm management and food production. The organic market in the EU has

been driven by a steadily increasing demand and has developed considerably in the last few years (19.7 billion euro with a 9% growth rate in 2011). Alongside, in the last 10 years, there have been registered an increase in the rows of organic producers and the area of organic production, yearly 500.000 hectares of agricultural land being converted to organic. During the time span 2000-2012, there has been a 6.7% yearly on average increase, reaching an estimated 9.6 million ha, over the total organic area, representing 5.4% of the total utilized agricultural range. Another branch that has been growing fast after the

Figure 1. Recognition of quality labels (Eurobarometer, 2016)

introduction of EU rules in 2009 is the organic aquaculture production. According to the Special Eurobarometer 440 - Europeans, Agriculture and the CAP, a Survey conducted by TNS political & social at the request of the European Commission, Directorate-General for Agriculture and Rural Development, more than six out of ten Europeans (63%) know at least one logo, an unchanged trend since a survey conducted in 2012 (Fig.1). However, there is a third category of Europeans that do not recognize any of the logos, representing a difference of two percentage points decrease in comparison to the 2013 survey. The most known logo remains **Fairtrade** (37%, no change from 2013, +1 percentage point since 2012), then the **Organic farming** logo, that has hit a slump since the previous surveys (23%, -2 since 2013, -1 since 2012). The third most recognized since 2013, is the **Protected designation of origin** logo (20%, +7pp since 2013, +6pp, 2012) – one in five Europeans know it. Other logos that experienced an increase in their European recognition since the last survey in 2013 (Eurobarometer, 2016), are the **Protected geographical indication** logo (17%, +3pp since 2013, +3pp 2012) and the **Traditional specialty guaranteed** logo (15%, +3pp since 2013), both increasing by three points (Eurobarometer, 2016).

Another study, published by the European Commission and in particular its Directorate General Health and Consumer Protection Health and Food, in 2014 in Eurobarometer 246,

mentioned that certified organic food production aims at creating sustainable agricultural systems, balanced and diversified through the protection of natural resources, but also to human health. Recent studies (Eurobarometer, 2014) show that only 1/4 of the European population does not accept to buy organic and traditional products. Manifesting others to buy these products comes from the need for sustainable health and the desire for an unpolluted environment. In Romania the percentage of organic agro-food products consumed by the population is less than 1%, while in other EU countries is between 3 and 5 percent. This small percentage is due to lack of certified organic processors and/or certified traditional.

Over time, recognition of organic farming has also extended into other EU policy areas, such as research, and some areas of market development (Dabbert *et al.*, 2004; Stolze and Lampkin, 2009). Yet, despite the growing consumer demand in many EU countries, supply remains insufficient to meet that demand. Not only that EU citizens prefer organic methods of production, but a high proportion also believe that farmers should receive encouragement to produce more organic products (Eurobarometer, 2010). Researchers and policymakers now also recognize the potential of agro-ecological practices and innovation (IAASTD, 2009 apud IFOAM, 2014; SCAR, 2011 apud IFOAM, 2014; Levidow *et al.*, 2013).

It is appreciated in scientific literature that one of the major technical issues in the production of buffalo cheese is salt-related in the form of a preservative in terms of both qualitative and quantitative, knowing that the trend on the market demanded by consumers is due to a reduction in the amount of preservative. There are many authors focused on the study of the impact of the brine type (proteolysis, lipolysis, organoleptic qualities, microbial growth, potassium salt salting), microbiology and enzymatic relationships of salt in cheese, salt influence on cheese structure, cheese texture, functional properties of cheese, extensibility, fat retention, browning, savor) (Ayyash and Shah, 2011; Thibaudeau, 2011; Dong *et al.*, 2009; Floury *et al.*, 2009; Melilli *et al.*, 2005).

The second major research trend related to the production of buffalo cheese is related to food safety and especially to the risk of contamination with *Escherichia coli*. There are a number of studies that focus on Verocytotoxin-producing *Escherichia coli* (VTEC) management, one of the most important microbiological risk factors in food safety (Alam and Zurek, 2006; Alonso *et al.*, 2007; Arthur *et al.*, 2002; Bardiau *et al.*, 2012; Barkocy-Gallagher *et al.*, 2003; Baylis, 2008 and 2009; Baylis *et al.*, 2008; Betts, 2000; Bielaszewska, 2011; Blanco *et al.*, 2003).

Most studies focus on technological indicators and only a few research take into account global qualitative analysis indicators and the potential of the buffalo cheese traditionalism, which explains why we have focused our research on a holistic qualitative analysis, while also integrating and classical technological indicators, especially physico-chemical and microbiological ones.

In Romania, the certification process for a product is given by: Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labeling of organic products and repealing Regulation (EEC) No 2092/91 and Commission Regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control. The traditional attestation is given by Council Regulation (CE) No. 509/2006 of 20 March 2006 regarding the traditional specialities guaranteed from agricultural products and food, and by Order of MAPDR No. 690/2004 approving

the rule concerning the conditions and criteria for the accreditation of traditional products.

This paper aims to investigate the socio-territorial indicators, economic indicators and indicators of traditionalism of Marin buffalo cheese certification allowing the area to get a group of organic and local certification products, in order to increase the agricultural potential of the area through a quality approach.

Materials and methods

The quality of agricultural production represents a competitive advantage for agricultural producers from Marin village, Salaj County, Romania, contributing to the cultural and gastronomic heritage of the area. A characteristic activity of the Marin village since ancient times is the growth of bubalins (milk buffaloes) and milk processing in Cheese, documentary attested in the 15th century. To maintain and to be recognized both nationally and internationally, this activity must be promoted and supported through a legal approach frame by the European Quality Regulation that integrates organic, traditional, local, mountain and ethical certification. Two of these five approaches, eco-certification and traditional attestation fit well with the needs of this product and the specificity of the area (Bockstaller and Girardin, 2003).

To validate our study and to give the study a high degree of coverage and validity, we have randomly chosen 10 farms from Marin village, as subjects of traditional and organic certification.

The method used to analyze the ecological and traditional potential of the product and area is the IDEA model – Farm sustainability indicators, developed by Vilain (2008). This is a diagnostic tool based on farm sustainability indicators by analyzing the strengths and weaknesses of the production system and identifying ways to improve sustainability as a way to give a practical expression the concept of sustainable farm (Zahm *et al.*, 2008). The indicators chosen in this method are „variables that provide information about other variables that are less accessible, and they also serve as a guide when making a decision” (Gras *et al.*, 1989). The scores for these indicators are from 1 (the worst) to 10 (the maximum) mark.

In this study, the three dimensions for establishing the sustainability of traditional and ecological characteristics are the socio-territorial, economic and traditional dimension of agricultural

Table 1. Evaluation of socio-territorial indicator I1 for the 10 farms

Indicator analyzed	Score obtained by 10 Farms									
	A	B	C	D	E	F	G	H	I	J
I1. Food quality										
1. Average composition of nutritional constituents of buffalo milk	10	10	10	10	10	10	10	10	10	10
2. Vitamin content	10	10	10	10	10	10	10	10	10	10
3. Physico-chemical characteristics of milk	8	9	10	9	8	10	8	8	8	8
4. Microbiological characteristics of milk	9	8	8	10	9	8	9	9	10	9
5. Water content of the cheese	8	9	8	9	9	8	8	9	8	9
6. Lipid content of the cheese	8	9	8	8	9	8	8	9	9	8
7. Protein content of the cheese	8	9	9	8	9	9	9	8	9	8
8. PH level of the cheese	8	8	7	9	8	9	8	8	8	8
9. Clotting mechanisms of cheese	8	8	9	9	8	9	9	10	9	9
10. Microbiological characteristics of cheese	10	9	10	8	8	10	10	9	8	10
11. Comparative analysis of manufacturing defects	8	9	9	8	10	9	8	10	8	9
12. Qualitative analysis of food casein	9	8	8	8	9	8	8	8	9	8
13. Qualitative analysis of whey	10	9	7	10	8	9	9	10	8	8
14. Comparative analysis of the shelf life of the cheese	8	8	9	9	8	9	9	8	10	8
15. Content in pesticides	10	10	10	10	10	10	10	10	10	10
16. Content in heavy metals	10	10	10	10	10	10	10	10	10	10
17. Content in nitrates and nitrites	10	10	10	10	10	10	10	10	10	10
Total indicator I1	152	153	152	156	153	156	153	156	154	152

activity at the level of individual farms or limited geographical area at the level of a community, namely the Marin village in Salaj County. The value of durability is given by the highest score of the three dimensions. The score of each dimension was obtained by summing the score obtained by its components.

The **socio-territorial indicators** studied for the traditional certification of the Marin Buffalo Brewery product are:

- Food quality (residual, organoleptic, technological, visual, nutritional and ethical);
- Use of built heritage and landscape;
- Accessibility of space;
- Social involvement of Farmers;
- Short chain trading;
- Services, multiple activities;
- Creating jobs;
- Collective work;
- Perenniality provided;
- Contribution to global food balance;
- Training;
- Labour intensity;

- Life quality;
- Degree of isolation of the locality and of the farms.

The **economic indicators** studied for organic certification are:

- Economic viability;
- Level of economic specialization;
- Financial autonomy.

For the **traditional attestation**, an evaluation grid has been used that takes into account indicators such as:

- intrinsic characteristics of traditionalism;
- the link between the product and the territory;
- the link between the product and cultural or religious holidays;
- the traditional method of production, processing and storage;
- short chains for sale.

Results and discussions

The socio-territorial indicators analyzed concern the intrinsic characteristics of the product and, on the other hand, the socio-

Table 2. Evaluation of economic indicators for the 10 farms

Indicator analyzed	Score obtained by 10 Farms									
Economic indicators	A	B	C	D	E	F	G	H	I	J
I1. Economic viability	9	8	6	8	7	7	7	8	7	7
I2. Level of economic specialization	5	4	3	5	4	5	4	5	4	4
I3. Financial autonomy	8	8	8	10	9	10	8	10	9	8
Total indicator I1+I2+I3	22	20	17	23	20	22	19	23	20	19

Table 3. Evaluation indicators of traditionalism for the 10 farms

Indicator analyzed	Score obtained by 10 Farms									
Traditionalism indicators	A	B	C	D	E	F	G	H	I	J
I1. Intrinsic features of traditionalism	9	9	9	10	9	10	9	10	10	9
I2. The link between product and territory	9	9	9	9	9	9	9	9	9	9
I3. The link between product and celebrate cultural or religious	10	10	10	10	10	10	10	10	10	10
I4. The traditional method of production, processing and storage	10	10	10	10	10	10	10	10	10	10
I5. Short chain trading	7	7	7	9	7	9	7	9	8	7
Total indicator I1+I2+I3+I4+I5	45	45	45	48	45	48	45	48	47	45

economic characteristics of the production area. Both categories of indicators are essential in purchasing a traditional and / or organic product by a consumer. With regard to the quality indicators of the Buffalo Marin Branch, in the evaluation procedure we took into account 17 elements of physical, microbiological, nutritional, technological, organoleptic and visual quality to have a correct image of the product. This cumulative and qualitative analysis method allows us to take into account the opportunity of organic and traditional product certification due to a correct per-indicator level in terms of the value obtained.

So, a complex analysis of the 14 social indicators, together with the specific sub-indicators (17 food quality indicators) presented in Table 1, together with the score they obtained, could allow us to appreciate if the Marine Buffalo Cheese product gather the minimum criteria for the potential procedure of traditional certification, respectively ecological certification, broken with the European legislation in force. The evaluation of the socio-territorial indicators, economic indicators and traditionalism indicators for the 10 farms analyzed are presented below, in Table 1, Table 2, Table 3.

The I2-I14 group of socio-territorial indicators are treated as an assembly because of the closer links between them, which does not require a sequential analysis on each parameter. In fact, this rating scale allowed us to quantify the farmers' philosophy of life in terms of their care for items associated with the product itself. These indicators are presented below, in Table 5.

Aggregating the above results obtained by the 10 farms, we can present further the average results of the studied indicators at the level of the entire Marin village (Tab. 4, Tab. 5, Tab. 6, Tab. 7), for the selected product (buffalo cheese).

The context in which cheese is produced is sometimes equally important to the consumer. Thus, in the analysis, we quantified the farmer's concern for the preservation of heritage built on the farm, the potential of the consumer to reach the farm and the social involvement of farmers in the social activities of the community.

It also quantifies the farmer's concern with the work with the employees, with the jobs created for the family members, respectively with the other fellow consumers who have other trades in life. Last but not least, we evaluated the intensity of farmers' work and the degree of social isolation and culture of Marin.

Table 4. Evaluation of socio-territorial indicators for Marin village (I1)

Item no	Indicator analyzed	Score obtained	The maximum score for the indicator
I1	11. Quality of food (detailed study)	152	170
1.1	1. Average composition in nutritional constituents of buffalo milk	10	10
1.2	2. Vitamin content	10	10
1.3	3. Physico-chemical characteristics of milk	8	10
1.4	4. Microbiological characteristics of milk	9	10
1.5	5. Water content of the cheese	8	10
1.6	6. Lipid content of the cheese	8	10
1.7	7. Protein content of the cheese	8	10
1.8	8. PH level of the cheese	8	10
1.9	9. Clotting mechanisms of cheese	8	10
1.10	10. Microbiological characteristics of cheese	10	10
1.11	11. Comparative analysis of manufacturing defects	8	10
1.12	12. Qualitative analysis of food casein	9	10
1.13	13. Qualitative analysis of whey	10	10
1.14	14. Comparative analysis of the shelf life of the cheese	8	10
1.15	15. Content in pesticides	10	10
1.16	16. Content in heavy metals	10	10
1.17	17. Content in nitrates and nitrites	10	10

Table 5. Evaluation of socio-territorial indicators for Marin village (I2 to I14)

Item no	Indicator analysed	Score obtained	The maximum score for the indicator
I2	Use of built heritage and landscape	9	10
I3	Space availability	9	10
I4	Social involvement of farmers	9	10
I5	Short chain trading	10	10
I6	Services, multiple activities	10	10
I7	Create jobs	8	10
I8	Collective work	9	10
I9	Perenity provided	7	10
I10	Contribution to global food balance	5	10
I11	Forming	4	10
I12	Labour intensity	8	10
I13	Quality of life	7	10
I14	Degree of isolation of the village and farms	5	10
Total		80	130

Such a complex analysis allows us to conclude that, from a socio-territorial point of view, the Marin Buffalo Cheese is made in a socio-economic context that allows us to build a relationship of trust between the consumer and the producer,

concerns the intrinsic quality of the product, respectively in terms of the life frame in which it is produced, in view of the ecological certification and the traditional certification according to the legislation in force.

Table 6. Evaluation of economic indicators for Marin village

Item no	Indicator analysed	Score obtained	The maximum score for the indicator
I1	Economic viability	6	10
I2	Level of economic specialization	3	10
I3	Financial autonomy	9	10
Total		18	30

Table 7. Evaluation indicators of traditionalism for Marin village

Item no	Indicator analysed	Score obtained	The maximum score for the indicator
I1	Intrinsic features of traditionalism	9	10
I2	The link between product and territory	9	10
I3	The link between the product and cultural or religious holidays	10	10
I4	The traditional method of production, processing and storage	9	10
I5	Short chain trading	7	10
Total		44	50

Figure 2. Traditionalism indicators

An important element in assessing the sustainability of an agro-food business is linked to its economic capacity to project over time. In the present case, due to the specificity of the farms in which it is produced, the Buffalo Marin Cheese can meet the average economic sustainability requirements as can be seen in Table 6, the score being an average level. The key point of this sustainability is the diversity of farm activities that show us a low level of economic specialization, a key element in boosting farm sustainability.

In order to certify the traditional character of an agro-food product, it is essential to analyze the indicators that characterize the product's traditionalism and its connection with the territory, presented in Table 7. The legislation in

force compels us to provide written, audio and video evidence about the intrinsic links of the product with the territory.

In this study, we speak of a secular tradition of the village regarding the growth of buffaloes and the production of specific cheeses. As it can be seen in Figure 2, by achieving a high score obtained by all 10 farms analyzed, the 5 indicators analyzed allow us to appreciate favorable conditions for the traditional certification of this product.

Conclusions

First, the analysis of the economic potential of the product and of the Marine area, based on the three socio-territorial, economic and traditional

dimensions, enables product certification, according to the legislation:

- socio-territorial evaluation: 232 of 300 total points, i.e. a score of 77.33%;
- economic evaluation: 18 of 30 total points, i.e. a score of 60%;
- traditional evaluation: 44 of 50 total points, i.e. a score of 88%.
- Second, in this case study, the evaluation of the ecological indicators in the IDEA method shows us the fulfillment of the ecological technical conditions for certification in organic farming.

Third, the two ecological and traditional assessment systems can be the basis of a marketing strategy where cheese makers in Marin can choose the most appropriate formula to build the identity of their products.

Starting from the analysis of the traditionalism indicators analysed in this study, we can also imagine a European product attestation on variants of GPI (Geographical Protection Indication), POD (Protected Origin Designation) or TG (Traceability Guaranteed).

The overview conclusion of this study is that local certification could major contribute to the sustainable development of rural area, preserves the tradition for the last hundreds of years and protects the Romanian native values, these being often the only way to increase the rural areas.

References

1. Alam MJ, Zurek L (2006). Seasonal Prevalence of *Escherichia coli* O157:H7 in Beef Cattle Feces; *J. Food Prot.* 69(12):3018–3020.
2. Alonso S, Mora A, Blanco M, Blanco JE, Dahbi G, Ferreira MT, Lopez C, Alberghini L, Albonetti S, Echeita A, Trevisani M, Blanco J (2007). Fecal carriage of *Escherichia coli* O157:H7 and carcass contamination in cattle at slaughter in northern Italy; *Int. Microbiol.* 10, 109–116.
3. Arthur MT, Barkocy-Gallagher GA, Rivera-Betancourt M, Koohmaraie M (2002). Prevalence and characterization of non-O157 Shiga Toxin-producing *Escherichia coli* on carcasses in commercial beef cattle processing plants; *Applied and environmental microbiology*, 4847–4852.
4. Ayyash MM, Shah NP (2011a). Effect of partial substitution of NaCl with KCl on proteolysis of halloumi cheese. *Journal of Food Science*, 76:31–37.
5. Ayyash MM, Shah NP (2011b). The effect of substituting NaCl with KCl on Nabulsi cheese: chemical composition, total viable count, and texture profile. *Journal of Dairy Science*, 94:2741–2751.
6. Ayyash MM and Shah NP (2011c). Effect of substitution of NaCl with KCl on chemical composition and functional properties of low-moisture mozzarella cheese. *Journal of Dairy Science*, 94(8):3761–3768.
7. Ayyash MM and Shah NP (2011d). Proteolysis of low-moisture mozzarella cheese as affected by substitution of NaCl with KCl. *Journal of Dairy Science*, 94(8):3769–3777.
8. Bardiau M, Gregoire F, Muylaert A, Nahayo A, Duprez JN, Mainil J, Linden A (2012). Enteropathogenic (EPEC), enterohaemorrhagic (EHEC) and verotoxigenic (VTEC) *Escherichia coli* in wild cervids; *Journal of Applied Microbiology* 109:2214–2222.
9. Barkocy-Gallagher GA, Arthur TM, Rivera-Betancourt M, Nou X, Shackelford SD, Wheeler TL, Koohmaraie M (2003). Seasonal prevalence of Shiga toxin-producing *Escherichia coli*, including O157:H7 and non-O157:H7 serotypes, and *Salmonella* in commercial beef processing plants; *J. Food Prot* 66:1978–1986.
10. Baylis C (2008). Growth of pure cultures of Verocytotoxin-producing *Escherichia coli* in a range of enrichment media; *Journal of Applied Microbiology* 105:1259–1265.
11. Baylis C, Smith H, Bolton E, O'Brien S (2008). Review of past and current research on Verocytotoxin-producing *Escherichia coli* (VTEC) in relation to public health protection; issue date 23 June 2008, FSA Project No. B11010, Report No: MB/REP/106304.
12. Baylis C (2009). Raw milk and raw milk cheeses as vehicles for infection by verocytotoxin-producing *Escherichia coli*; *Int. J. Dairy Technol.* 62:293–307.
13. Betts CD (2000). Controlling *E. coli* O157:H7. *Nutrition and Food Science* 30:183–186.
14. Bielaszewska M, Mellmann A, Zhang W, Kock R, Fruth A, Bauwens A, Peters G, Karch H (2011). Characterisation of the *Escherichia coli* strain associated with an outbreak of haemolytic uraemic syndrome in Germany, 2011: a microbiological study; *Lancet Infect Dis.* 11:671–76.
15. Blanco J, Blanco M, Blanco JE, Mora A, Gonzalez EA, Bernardez MI, Alonso MP, Coira A, Rodriguez A, Rey J, Alonso JM, Usera MA (2003). Verotoxin-Producing *Escherichia coli* in Spain: Prevalence, Serotypes, and Virulence Genes of O157:H7 and Non-O157 VTEC in Ruminants, Raw Beef Products, and Humans; *Experimental Biology and Medicine*, 228:345–351.
16. Bockstaller C, Girardin P (2003). How to validate environmental indicators ? *Agricultural System.* 76 (2):639–653.
17. Dabbert S, Häring AM, Zanoli R (2004). Organic farming: policies and prospects. London: Zed Books.
18. Dong JY, Chen LJ, Maubois JL, Ma Y (2009). Influence of medium-concentration factor microfiltration treatment on the characteristics of low-moisture Mozzarella cheese, *Dairy Science and Technology*, 89:139–154.
19. Floury J, Camier B, Rousseau F, Lopez C, Tissier JP, Famelart MH (2009). A Reducing salt level in food: Part 1. Factors affecting the manufacture of model cheese systems and their structure–texture relationships, *LWT-Food Science and Technology*, 42:1611–1620.
20. Gras R, Benoit M, Deffontaines J-P, Duru M, Lafarge M, Langlet A, Osty P-L (1989). Le fait technique en agronomie,

- Activité agricole, concepts et méthodes d'étude, INRA-Éditions L'Harmattan. IFEN.
21. Levidow L, Pimbert M, Stassart P, Vanloqueren G (2013). Agroecological practices in Europe: Conforming – or transforming the dominant agro-food regime? Based on conference Agroecology for Sustainable Food Systems in Europe: A Transformative Agenda. 26-27 June 2013, Brussels.
 22. Melilli C, Carcò D, Barbano DM, Turmino G, Carpino S, Licitra G (2005) Composition, microstructure and surface barrier layer development during brine salting, *Journal of Dairy Science*, 88:2329-2340.
 23. Stolze M and Lampkin N (2009). Policy for organic farming: Rationale and concepts. *Food Policy*, 34 (3):237-244.
 24. Thibaudeau E (2011). Impact de la réduction du sodium dans une production de fromage mozzarella. Mémoire présenté à la Faculté des études supérieures et postdoctorales de l'Université Laval dans le cadre du programme de maîtrise en Sciences et technologie des aliments pour l'obtention du grade de Maître ès sciences (M. Sc.). Available from: <http://bit.ly/2j7oCar> (accessed on 01.12.2017).
 25. Vilain, L. (2008). La méthode IDEA: Indicateurs de durabilité des exploitations agricoles - guide d'utilisation, troisième édition actualisée. Educagri éditions, Dijon, France.
 26. Zahm F, Viaux P, Girardin P, Vilain L, Mouchet C (2008). Assessing Farm Sustainability with the IDEA Method - from the Concept of Agriculture Sustainability to Case Studies on Farms, Proceedings and outputs of the first Symposium of the International Forum on Assessing Sustainability in Agriculture (INFASA), March 16, 2006, Bern, Switzerland.
 27. *** Commission Regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control. Available from: <http://bit.ly/2Az46cR> (accessed on 02.12.2017).
 28. *** 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. Available from <http://bit.ly/2g5PnbD> (accessed on 02.12.2017).
 29. *** Council Regulation (EC) No 509/2006 of 20 March 2006 on agricultural products and foodstuffs as traditional specialties guaranteed. Available from <http://bit.ly/2jFWEC3> (accessed on 02.12.2017).
 30. *** Eurobarometer (2010). Europeans, Agriculture and the Common Agricultural Policy. Special Eurobarometer, 336. Brussels: European Commission. Available from: <http://bit.ly/2zv9qYh> (accessed on 01.12.2017).
 31. *** Eurobarometer 246 (2014). Health and food. Available from: <http://bit.ly/2j6Uaxf> (accessed on 01.12.2017).
 32. *** European Commission (2014). Communication from the commission to the European Parliament, the council, the European economic and social committee and the committee of the regions - Action Plan for the future of Organic Production in the European Union. Brussels, 24.3.2014 COM(2014) 179 final. Available from: <http://bit.ly/2AxJAZT> (accessed on 01.12.2017).
 33. *** European Commission (2016). Special Eurobarometer 440 - Europeans, Agriculture and the CAP. Survey conducted by TNS political & social at the request of the European Commission, Directorate-General for Agriculture and Rural Development. Available from: <http://bit.ly/2j7IYAz> (accessed on 01.12.2017).
 34. *** IFOAM EU Group, FiBL and CIHEAM-IAMB (2014). Organic in Europe - Prospects and Developments. Available from: <http://bit.ly/2ALogAR> (accessed on 01.12.2017).
 35. *** International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) (2009). Agriculture at a Crossroads. Global Report. Washington, DC: Island Press. Available from: <http://bit.ly/2iDqcUE> (accessed on 02.12.2017).
 36. *** Standing Committee on Agricultural Research (SCAR) (2011). Sustainable food consumption and production in a resource-constrained world: 3rd SCAR foresight exercise. Brussels: European Commission. Available from: <http://bit.ly/2AOp0oF> (accessed on 01.12.2017).