Sustainability assessment of the farmers market - A case study in Tuscany

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Abstract

To assess the sustainability of the agricultural sectors of three farming systems of the Province of Massa (Tuscany, Italy) the analysis was performed on agro-environmental and economic aspects of 5 farms with different management systems: conventional and organic. The agro-environmental sustainability was measured through indicators of the soil, water, air and landscape-biodiversity. Economic indicators were carried out by detecting economic synthesis. The result shows that the analysed farms reach a good level of sustainability with regard to economic aspects and have positive impact on the environment in particular when managed as organic.

Introduction

In the 2011/12 University of Gastronomic Science conducted a rural development project named "Sustainability evaluation of agro-food products in the farmers market of Massa" (Tuscany, Italy). The general project objectives and UNISG role were the enhancement of agricultural and agro-food production and their connection with the short circuits of production/consumption. This farmers market has existed for 2 years, two days/week, 30 producers from the area, mainly organic, supported by the Province owner of the exposition space. In this paper we present the results of the first activities of this multidisciplinary project that consist in the sustainability assessment at farm level. We analysed the environmental sustainability by agro-ecological indicators and the socio-economic sustainability of the products sold at the market. Methodologies for assessing agricultural sustainability are many and use different matrices of indicators (Belle and Morse, 1999; OECD, 1999). Agricultural sustainability is a very complex issue as agriculture is multifunctional, multi scale and multi-issues terms and it need a multi-dimension and multi-criteria assessment and set of indicators. The results can be used by the policy makers in order to better plan the agricultural development of this area.

Material and methods

In order to fulfil the object of the research project, 5 farms have been identified among those participating in the farmers market in the centre of Massa (a small town in the north of Tuscany) representative of the area from three different production sectors potentially more interesting for the local development: 2 horticultural, 2 beekeeping, 1 livestock.

Agri-environmental evaluation

To assess the sustainability of farming systems with regard to agro-environmental aspect is adopted a methodology based on indicators of sustainability (Pacini et al., 2009; Migliorini and Scaltriti, 2012). The collection of farm information are captured through interviews with farmers, business documents and maps, estimates data during farm visits. To assess agricultural sustainability at farm level the following environmental subsystems have been identified: the soil system, the water and air system, the biodiversity and landscape system. For each subsystems different agro-ecological indicators are processed, aimed at evaluating a specific attribute of the system and its critical points. Each indicator is associated with a low (-1), medium (0) or high (+1) score which is derived from literature and adapted to the territorial context of reference (Table 2).

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Table 2: List of sustainability indicators identified for the various environmental systems, indicator description, unit measure (u.m.), low, medium and high levels of sustainability and relative weight (r.w.) (Migliorini et al. 2013)

ys te	Aspect	Indicator	u.m.	Low (-1)	Medium (0)	High (+1)	r.w.	%
Soil	Physical, chemical, biological fertility	Soil cover	%	<50	50-80	>80	16,67	100
		Crop rotation	year	<3	3-6	>6	16,67	
		Presence of meadows	%	<20	20-50	>50	16,67	
		Input of organic fertilizers	t/ha	<10	10-30	30<x>45	16,67	
		Green manure	n/year	<0,3	0,3-0,5	>0,5	16,67	
		Soil organic matter	%	<2	2-2,5	>2,5	16,67	
Water and air	Efficiency	Quantity	m3/m2	>3	3-2	<2	16,67	100
	Pollution	Pesticide	kg a.i./ ha	>20	5 - 20	<5	16,67	
	Alternative source	Recycling, rainwater utilisation	%	<30	30-50	>50	16,67	
	Quality	Nitrates in water	mg/l	>50	25-50	<25	16,67	
	Nitrous oxide (N2O)	Chemical nitrogen input	kg N/ha	>150	150-80	<80	16,67	
	Methane (Ch4)	Livestock intensity	LU/UAA	>2	1 - 2	<1	16,67	
Biodiversity	genetic	Local livestock breed	n	0	1	>1	16,67	100
		Local landrace of crop	n	0	1	>1	16,67	
	specie	crop specie	n	<6	6-20	>20	16,67	
		livestock specie	n	2	2-4	>4	16,67	
	Habitat and landscape	Wetlands	Mq	<500	500-1000	>1000	8,33	
		Hedges and rows	m/ha	<30	30-60	>60	8,33	
		Forest	% of UAA	<4	4-10	>10	8,33	
		recovery of dry stone walls	m	0	100-300	>300	8,33	

for beekeeping that do not have soil management, there is only one indicator of soil cover with 100% weight.

Socio-economic evaluation

We have analysed the economic aspects of same agro-food products present in the farmers markets of Massa (dairy, honey and horticultural). The parameters we analysed were production costs and gross income. The survey was conducted by visiting the farms and interviewing the farmers. The parameter "variable costs" concerns the costs of some farm inputs that are common to all the supply chains: pesticides, fertilizers, seeds, water and fuel; in the case of breeding we added costs for feed and pharmaceuticals products. The gross income is calculated by the simple multiplication of the amount of produce times the market price. The farmers markets include the shortening of the supply chain for the benefit of proximity between places of production and consumption.

Results

Figure 1 shows the overall result as the sum of environmental sustainability indicators in the three agricultural sectors (beekeeping, horticultural and livestock farms) and the two management methods (conventional and organic) converted to values -1 (bottom), 0 (medium) and +1 (high) multiplied by the weight percentage corresponding to the indicator. Please note that the extremes are -300 and + 300. The analysis shows that environmental sustainability of these 5 farms is medium strong (+56.66) with large differences for the environmental system (Fig. 1A). In particular, the sustainability of both soil system (+36.67) and water and air (+40.00) is positive, while it is slightly negative in the landscape and biodiversity system (-20). Among the three productive sectors (Fig. 1A), sustainability is strong in the honey (+139.16); medium in the livestock production (+6.65) and in the horticultural (-0.82). In particular, these results are influenced by the positive values on the soil and water and air systems by both beekeeping farms (organic and conventional). Discordant results are found in the two horticultural farms that get opposite values depending on the organic and conventional production method, respectively on the soil system (+33.33 and -50.00), on the water and air system (+60.00 and -20.00) and on the landscape and biodiversity system (-16.16 and -8.32) with an overall scoring of +76.67 and -78.32 in organic and conventional respectively. Results of the comparison between organic and conventional method, by adding the values of the farms (Fig. 1B), show that the first have a stronger environmental sustainability than the second (+75.55 vs +28.34

respectively). The data collected in the economic analysis shows a quite good situation. The dairy supply chain consists of small farms unable to develop economies of scale, but that takes advantage of the passion of part-time entrepreneurs, who use their time-off from their main occupation. Probably co-marketing actions could lead to economies in the distribution that is currently almost on time and carried out by the individual entrepreneur. The cost of production is found to 19.67 €/Kg which almost equals the selling price at the farmer market is about 20 €/kg. The production costs of honey are calculated as equal to € 10.88. Honey is on the market at different price (from 6 € a wildflower to the 10/11 € of acacia honey). For this reason, the only strategy for farmers is to pursue the highest quality, since only the quality can cover the production costs, which are particularly high due to the amount of manual labour required. The lettuce has been chosen as an example of the fruit and vegetable supply-chain, which is characterized by high level of products perishability. The production costs show that almost 70% of the costs to be represented by the manual operations (transplanting and harvesting). In the case of lettuce, profitability is quite interesting. The cost of production is in fact equal to 1.33 €/kg while the price, depending on variety, time and weather conditions may vary from 1,80 €/kg in rare cases up to 3 €/kg. Even in the case of lettuce direct selling is an exciting opportunity as it ensures the freshness of the product, but also provides an alternative to the large-scale distribution circuits.

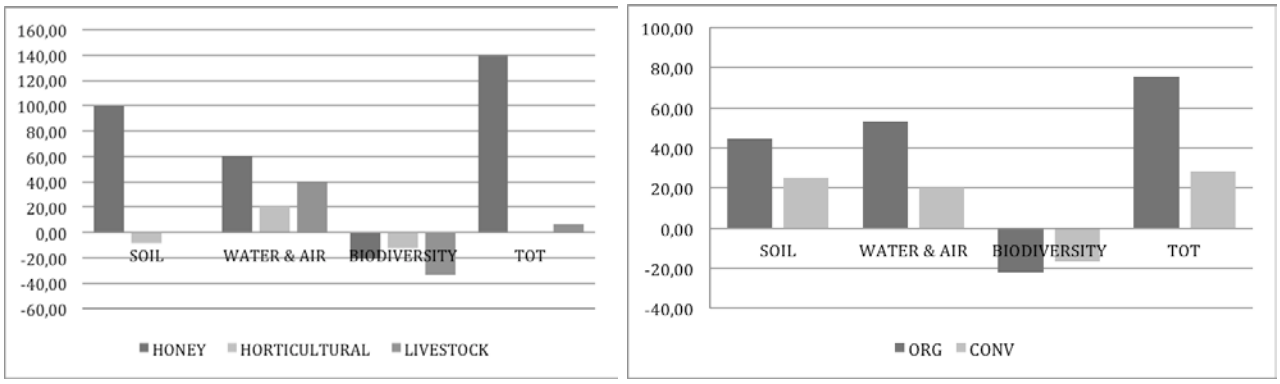

Figure 1. Sum of environmental sustainability indicators in (A) the three agricultural sectors (beekeeping, horticultural and livestock) and (B) in the two management methods. Con: conventional; Org: organic.

Discussion and Conclusion

The analysis of the environmental sustainability of agricultural farms of the farmers market of Massa showed good levels of environmental sustainability with differences depending on the system measured and on the production system. Beekeeping are better than livestock and horticultural sector and organic is better than conventional. The present work has shown that the profitability of agricultural food production is often threatened by market conditions that do not provide sufficiently remunerative prices of the factors of production, especially when it comes to labour intensive productions. Often this situation arises when the counterparty of agricultural producers is represented by large operators such as supermarket chains. In this framework an initiative as the farmers market of Massa represents a important alternative, which can be a place in which: a) producers are able to obtain an adequate price, with no mark-ups of the subsequent stages of the supply chain that are downloaded on to consumers; b) producers are able to communicate the quality of their product and to establish a direct relationship with its customers; c) consumers can enter into a relationship with the farmers and their products, overcoming information asymmetries and the criticality of long chain and very long.

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