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Quality strategies and local farm produce in Mediterranean mountainous areas: The case of handmade goat's cheese in the southeastern Spanish Betic Massif

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SUMMARY – After discussing some points concerning food quality and its constituent parts, we address the issue of the quality of farm produce generally and, particularly, of small ruminant-derived foodstuffs. This is followed by a study of on-farm goat's cheese manufacturing in the mountainous rural communities of south-eastern Spain, identifying and analysing what herd and farmer characteristics are associated with the knowledge of handmade cheese-making techniques and manufacturing. A number of conclusions and recommendations are drawn from this analysis.

Keywords: Local products, agro-food quality, small ruminants, Mediterranean mountainous areas, hand-made goat's cheese.

RESUME – "Stratégies de qualité et produits fermiers locaux dans les zones montagneuses méditerranéennes : Le cas du fromage fermier de chèvre dans le massif bétique du SE de l'Espagne". Dans le présent travail, suite à quelques considérations concernant la qualité alimentaire et ses composantes, on aborde le thème de la qualité des produits d'élevages en général, et ceux qui sont dérivés des petits ruminants, en particulier. On analyse postérieurement le cas de la fabrication du fromage de chèvre par les fermiers, en identifiant et analysant leurs caractéristiques et celles des troupeaux qui sont en relation avec la connaissance des techniques de fabrication du fromage artisanal et avec sa production. Suite aux résultats antérieurs, quelques conclusions et recommandations ont été présentées.

Mots-clés : Produits locaux, qualité agro-alimentaire, petits ruminants, zones de montagnes méditerranéennes, fromage fermier de chèvre.

Introduction

The growing consumer demand for food quality in its broadest sense has opened up an opportunity for certain local products. Being handmade and produced according to a natural mode of production often on the farm itself, such products can be positioned within the quality food segment. This is because handmade modes of production and knowledge of the origin of products are consumer utility function elements that have a positive impact on consumers' appreciation of the quality of a given foodstuff.

Of this local produce, farm products generally and, especially, products derived from raising small ruminants are a key opening for cashing in on a quality-induced added value with the resulting impact on farmers' earnings and, ultimately, on the income level in rural communities in the Mediterranean mountainous areas. In these areas, considering livestock produce as a component activity of rural development processes entails boosting the quality of the products through handmade and natural modes of production, designations of origin, etc.

In this paper, after discussing some basic concepts concerning food quality and its constituent elements, we examine what possibilities there are for quality livestock products to participate in the local development of mountainous areas in the European Mediterranean. Finally, based on a survey of 156 goat farms in the Spanish Betic Massif (mountainous areas of Granada, Jaén, Málaga and Almería) on-farm cheese-making has been analysed and factors having an effect on this activity have been identified.

This paper includes the interim results of the project titled "Livestock Farming Systems in the Rural Development of Less Favoured and Mountainous Areas: Situational Analysis and Design of Strategies to Further their Role", funded by the Andalusian Regional Government's Agriculture and Fishery Council as part of the Agricultural Sector R&D Programme, managed by the Andalusian Agricultural Research and Training Institute (IFAPA).

Food quality and local products

Food quality is a subjective concept related to what utility an individual gets out of the features of a given product. Consumers have, in some way, always rated the quality of the goods and services that they have the benefit of, but, lately, everything touching upon quality, and very especially with respect to the agrofood sector, has become a widespread social demand on the part of consumers, an element of the production function, with its respective cost, for the producers, and an institutional issue of great social importance for law-makers and the political class (Calatrava, 2005).

This as far as demand is concerned. On the supply side, we should add the potential that quality has as a marketing strategy, both as regards its appeal to consumers as well as its use as an element of supply-side segmentation and diversification. Linked at the institutional level to development policies, quality can prove to be an instrument for adding value to endogenous resources in rural areas, which, taking into account growing market demands, it would be difficult to efficiently and competitively exploit otherwise.

Numerous definitions are given in the literature for quality from different (functional, biological, organoleptic, regulatory, ethical, legal, health, etc.) viewpoints. From the viewpoint of consumer economic theory, quality is identified with a judgement issued by the consumer about a product's features. In this respect, Calatrava (2005) defines food quality as "the result of an ordinal judgement issued by the consumer regarding the components or attributes of a food from which he or she is likely to have utility". There are a variety of definitions based on the idea of "quality judgement", the first to use this concept in Spanish being perhaps Rivera's definition (1995).

There are a wide range of food consumption preference elements, which, being likely to give utility to consumers, are potential quality judgement components, the most common being: health (food safety), taste, smell, freshness (conservation), other organoleptic features, ease of purchase, origin, conditions and mode of production, visual appeal (packaging, presentation, etc.), brand, novelty, fashion, ethical elements, etc.

According to this definition, quality is subjective and depends on each individual, as does utility and its associated value. Producing quality is then synonymous with trying to satisfy consumer preferences.

The companies supplying food markets try, on the one hand, to comply with what they consider to be the mean or modal quality of all consumers and, on the other hand, diversify their product, by means of different quality levels, to meet the demands of particular groups of consumers or market segments. Company quality policy is, then, a response to the market and also a marketing strategy (Calatrava, 2005).

Locally produced foods are doubly important in the consumer utility function: on the one hand, as regards the key "health" component and, on the other, with respect to the specification of origin and the system of production. Consumers perceive local products to be handmade (as opposed to mass produced), natural, free of artificial additives and, therefore, healthier and more wholesome. Being handmade and natural, they are even perceived to have a positive differential in terms of organoleptic attributes, particularly taste and smell.

There are cases in which even the standard product is classed as "rural", "natural", etc., even if not all its varieties and forms are. Indeed, Calatrava and Sayadi (2006) show how, according to a Spanish Ministry of Agriculture, Fishery and Food survey (MAPA, 2004), Spanish consumers generally class goat's cheese as being more "rural", "handmade" and "natural" as compared with cheese made from cow's and sheep's milk, which they associate with other attributes.

Additionally, knowing exactly where a product comes from and even acquiring the product at origin is a positive element in the consumer utility function. Consumers have confidence in the quality of a product when they know how and where it is produced and even more so if they have seen it being made and/or have acquired it at the very place where it was produced.

Although there are European and national regulations defining and protecting certain forms of local products, i.e. Protected Designations of Origin (PDO) and Protected Geographical Indications (PGI), and Traditional Specialities Guaranteed (TSG) (see Calatrava and Sayadi, 2006, as regards local livestock products), there is, in our opinion, a massive vacuum as regards the regulations governing local and handmade products generally, both internationally [World Trade Organization (WTO) regulations], nationally and regionally. This is an impending challenge, which should be taken up by the competent organisations and institutions in the immediate future.

Local livestock products and quality

Foods derived from livestock produce are likely to acquire the dimension of "handmade", "natural", "local" products, etc., that satisfy, as mentioned above, the consumer utility function. A whole new production and marketing strategy is needed to gain this dimension, which should be based, however, largely on local tradition and know-how (Flammant *et al.*, 1998).

In earlier work, Calatrava and Sayadi (2006) examined the reasons why it is important to include local livestock produce in rural development processes in Mediterranean mountainous areas (tradition and local knowledge, rural tourism demand, economic diversification, etc.), as well as what factors block the promotion of these livestock products in development processes (limited knowledge regarding different market demand, climatic dependence, deficient infrastructure, etc.). Some of these reasons and factors are prominent as regard quality.

The local handmade livestock product can generate a differential added value with respect to conventional mass produced products in two ways: by fetching higher prices on the market, because of the quality differential, and by enabling shorter and more direct marketing channels, leading to a higher added value for producers.

When putting forward a possible "added value through quality" strategy for handmade livestock products, a number of strategic elements should be considered and analysed, including: *place of production, production process used, where and how to get the product to consumers, level of diversification of outputs in the production process, and quality management and control system* applied, if any.

In the following, we study the case of small-scale traditional handmade goat's cheese production by *farmers themselves*, within their *household unit*, *sold directly* on the farm or to local consumers and/or retailers, generally, *without certified quality systems*. In an earlier paper, Calatrava and Sayadi (2003) dealt with handmade cheese produced by small local industries that buy the milk from stockbreeders.

Production of handmade goat's cheese by farmers

From a survey of 156 goat keepers in the South-eastern Spanish Betic Massif, we found that 71% of farmers sell milk to dairy companies or processing stations outside the district, all of which it used for cheese manufacture, 19.4% sell it to small local cheese-making companies or through cooperatives, and 9.6% of farmers, accounting for 6.8% of goats and milk production (663,000 litres/year), manufacture 75 tonnes of cheese on the farm/within the family unit and also sell 175,000 litres of milk to the outside. Of the cheese produced, 10% is for self-consumption and 90% is for sale. As half of the farmers that make cheese sell some of the milk that their herd produces to third parties, about 5% of farmers use all the milk that their herd produces to manufacture handmade cheese on the actual farm. From the above sample values, we estimate that farmers make some 2.500 tonnes of handmade goat's cheese across the whole region under study, of which approximately 10% is self-consumed and the remainder sold locally to destinations listed later.

Livestock farming families that produce cheese on their farm do so in relatively small quantities, seldom exceeding 500 kg/month in the production season. The cheese is used for sale and self-consumption by the family. Sales are made to neighbours, relations and local shops, although cheese is sometimes sold to private persons from another municipality or tourists acquainted with local cheeses. As regards self-consumption, the mean is 3 kg/month, where minimum and maximum self-consumption is 0.8 kg and 8 kg/month, respectively.

There are different types of farm cheeses, the most common being fresh and, to a lesser extent, semi-hard cheeses. When farmers keep mixed herds, more mature cheeses are sometimes made from a mixture of goat's and sheep's milk, always containing a higher percentage of goat's milk. It's worth to point out that despite the quantitative importance of Andalusian goat milk production, there is no one protected figure (PDO, PGI and ISG) concerning any goat dairy product in the region.

We also have found that almost half (48.1%) of farmers have, within their family unit, someone with knowledge of how to make the traditional cheeses of the region, although only 9.6% of farmers actually do make cheese. It is the farmer's mother (50.7%), wife (32.3%) or the farmer itself (17%) who has local knowledge of handmade cheese manufacture. We find then that the knowledge of cheese-making on farms is basically a female concern, and cheese manufacture, which used to be a widespread practice among livestock farming households, although it is now confined, as mentioned, to just one in every ten livestock farming families, is likely to have been so too.

Despite the above figures, the manufacture of handmade cheese by stockbreeders in Andalusia is much lower than in Spain as a whole. According to Spanish Ministry of Agriculture, Fishery and Food statistics (MAPA, 2002), some 40 million litres of goat's milk (39,725 million litres) are used to manufacture farm cheese in Spain, which is just under a tenth (9.16%) of what is sold to cheese-making industries (433,486 millions litres), whereas, in Andalusia, this percentage is only 3.63% of what is sold to factories (240 million litres), which accounts for 56% of the national total. The region where most milk is used to manufacture farm cheese is the Canary Islands, standing at 27 million litres, which is just over 50% of what is sold to the industrial cheese-making channel in the region (53.8 million litres). At the other end of the scale is Castile La Mancha, for example, where almost 100% of goat's milk (65.4 million litres) is sold to the cheese-making industry, there being almost no on-farm production.

With the idea of identifying what factors are related both to the knowledge and manufacturing of handmade farm cheese, we have specified and fitted two binomial probit models, the characteristics and results of which are described below.

Factors determining the knowledge and manufacturing of farm cheeses in the Andalusian Massif

To examine what farm- and farmer-related characteristics are linked with the knowledge of traditional cheese-making techniques in the family unit, we specified and fitted a binomial probit model, identifying this variable (YES there is knowledge – NO there is no knowledge) as dependent variable.

The initial explanatory variables of the model included the different levels of multinomial explanatory variables were: farm type (Farmtype), making a distinction between goat only and mixed goat and sheep or other farms; employment type (Dedication); farm size: no. of breeding females (Farmsize); housing (Housing); farmer's age (Age); attendance of agricultural training courses (Course); educational attainment (Education); marital status (Mstate) and intention of continuing with goat farming in the long term (Contfarm) (See Table 1). The prediction model results, including only significant variables, are shown in Table 2.

The time spent on livestock farming is directly related ($p = 0.033$) to knowledge of traditional local cheese-making, in the sense that farmers working full-time are more likely to have someone in the family unit with knowledge of cheese-making techniques. There is also a direct relationship ($p = 0.002$) between farmer's age and the likelihood of there being local cheese-making knowledge. This is an important point, as it is precisely the older farmers that more often have someone in their family unit with this knowledge. This likelihood is, moreover, significantly greater ($p = 0.008$) among farmers

with small herds than those that own farms with larger-sized herds¹. Similarly, farmers that state that they have less intention of continuing with goat farming in the long term are significantly ($p = 0.002$) more acquainted with how to manufacture traditional local cheeses. This places the know-how of handmade local cheese-making in the Betic Massif at risk. The likelihood of having this knowledge is greater ($p = 0.091$) among farmers with extensive herds than those that fully house their livestock.

Table 1. Definition of the explanatory variables of the binomial probit model

| Variables | Description |
|--------------|---|
| Constante | Constant term |
| Farmtype | 1, if the farm is goat only (monoactivity) and 0, otherwise |
| Dedication | 1, if goat farming is your only full-time employment, and 0, otherwise |
| Farmsize | Size of goat farm (no. of breeding females) |
| Housing | 1, if there is full housing, and 0, otherwise |
| Age | Farmer's age (years) |
| Education _1 | 1, if you are unqualified or have primary education, and 0, otherwise |
| Education _2 | 1, if you have lower secondary education, and 0, otherwise |
| Education _3 | 1, if you have upper secondary education, and 0, otherwise |
| Course | 1, if you regularly attend agricultural training courses, and 0, otherwise |
| Mstate | 1, if you are married and 0, otherwise |
| Contfarm | 1, if you intend to continue with goat farming in the long term, and 0, otherwise |

Table 2. Results of the "Knowledge of traditional local cheese-making" binomial probit model

| Variables | Coefficients | t | p |
|------------|-------------------|--------|--------|
| Constant | -4.861500175 | -3.113 | 0.0019 |
| Dedication | 0.5191786175 | 2.121 | 0.0339 |
| Farmsize | -0.2076815245E-02 | -2.622 | 0.0087 |
| Age | 0.6617830175E-01 | 3.065 | 0.0022 |
| Housing | -0.3956398590 | -1.686 | 0.0919 |
| Contfarm | -0.8343739839 | 0.0025 | 0.0025 |

Log likelihood function: -95.38679; Restricted log likelihood: -108.0155;
Chi-squared: 25.25752; Degrees of freedom: 5; Significance level:
 $p > 0.001$; PCC: 62.82%.

Paradoxically, neither educational attainment nor attendance of agricultural training courses has a significant influence on the knowledge of cheese manufacture in the family unit. Furthermore, marital status has no significant relationship to knowledge of local cheese-making.

Of the above points, the most worrying is the direct relationship between knowledge of cheese-making techniques and age, on the one hand, and the intention of giving up farming, on the other. These two aspects are cause for concern, as they indicate a possible loss of local knowledge in the short to medium term. Additionally, the age factor is doubly worrying because, according to farmers' responses, it is mostly their mothers that are in possession of the handmade cheese-making knowledge, and this is a generation that is on the verge of disappearance.

In a second stage of the analysis, a binomial Probit model, for stockbreeders who expressed their knowledge of traditional cheese-making technique, has been fitted to identify the farm- and farmer-related characteristics that most influence local cheese manufacturing in the family unit. This model

¹ Whereas the mean size of the surveyed herds is 210 head, the mean size of herds where there is knowledge of local cheese manufacturing within the family unit is 147 head.

has as dependent variable the binomial YES cheese is made – NO cheese is not made. The explanatory variables that the model specification accounted for initially were the same as in the previous model (see Table 1). The results of this model, including only significant variables, are shown in Table 3.

Table 3. Results of the "Cheese-making in the family unit" binomial probit model

| Variables | Coefficients | T | p |
|------------|-------------------|---------|--------|
| Constant | -4.711374991 | - 3.171 | 0.0015 |
| Age | 0.6617830175E-01 | 3.065 | 0.0022 |
| Dedication | 1.619505069 | 2.498 | 0.0125 |
| Farmsize | -0.2687875281E-01 | -2.599 | 0.0093 |
| Contfarm | - 2.494246803 | -2.953 | 0.0032 |

Log likelihood function: - 13.27164; Restricted log likelihood: - 51.58618; Chi-squared: 76.62908; Degrees of freedom: 4; Significance level: $p > 0.001$; PCC: 60.32%.

The more time farmers spend on farming is directly ($p = 0.012$) related to cheese being manufactured on the farm. There is also a direct relationship ($p = 0.002$) between farmer's age and the likelihood of these cheeses being manufactured in the family unit. This likelihood is significantly greater ($p = 0.009$) among farmers with small herds than those that have farms with larger-sized herds. Similarly, farmers that have fewer intentions of continuing with goat farming in the long term are, significantly ($p = 0.003$), the ones that more often manufacture cheese in the family unit.

Logically, the significant variables are the same as for the knowledge variable, with the exception of housing (which is only significant at the ($p = 0.090$) level in the first model), since farmers who manufacture cheese have to know how to do it. Nevertheless, there are many who know how to make cheese but do not do so, because they prefer to sell the milk to third parties. In doing so, they avoid taking up even a local retailer role, something which livestock keepers and farmers generally are traditionally reluctant to do.

Neither the way in which animals are housed, the farmer's educational attainment, marital status, nor attendance of agricultural training courses have a significant influence on the likelihood of cheese being manufactured within the family unit.

Conclusions

Consumers' general growing demand for food quality contributes, among other factors to a demand for local handmade products, as localism and handmade agrofood produce are valued in the food quality judgement. In the case of small ruminant-derived products, this creates a market opportunity for locally manufactured handmade meat products, cheeses, other dairy produce, etc. This opportunity based on local quality means that livestock farming activities can take an integral part in the local development processes of rural areas, leading not only to economic but also to social and environmental benefits.

The Spanish region of the Andalusian Massif (eastern part of Andalusia-Spain) is a mountainous area where, traditionally, the keeping of goats, with approximately one million head, has been an important economic activity. As regards handmade cheese produced specifically on the farm, farmers from the area do have local knowledge of handmade cheese-making, as half of goat keepers have someone in their family unit that possesses this knowledge. Gender plays some role in this knowledge, as it is mostly women (farmers' elderly mothers in half of the cases) that possess this knowledge.

Although knowledge is relatively widespread, only one in every 10 farmers (9.5%) manufactures

cheese in their family units. Of the cheese manufactured by farmers, 10% is for self-consumption and 90% is sold through local channels mostly to relations, neighbours and local retailers and also, seasonally, to rural tourists.

The farmer's age is directly linked to both local knowledge of manufacturing techniques and actual cheese-making, which is particularly worrying taking into account that it is the farmer's mothers that possess the knowledge of the handmade cheese-making techniques. Related to some extent to the above, a greater proportion of the people who know how to make and actually do make cheese are farmers who are less likely to continue with livestock farming. Another variable related to both cheese-making knowledge and handmade cheese manufacturing is full-time employment in farming. This relationship could be more of a cause than an effect.

Variables like educational attainment, farmer's marital status or having taken part in agricultural training courses are generally unrelated to both knowledge and manufacturing of handmade cheeses by farmers.

The profile of a farmer that regularly manufactures cheeses in the family unit is, thus, generally *an older person*, who is a *full-time* goat farmer, managing a *relatively small herd*, and who logically has *few intentions of continuing* with goat farming in the future.

Results obtained from the Probit models are really not very promising, as there is the risk of the knowledge of traditional local cheese-making techniques disappearing, leading to the demise of the handmade production of those cheeses. Thus, strategies for rescuing and boosting local traditional cheese-making know-how call necessarily for actions aimed firstly at identifying the handmade manufacturing processes and then improving or adapting any suitable technology, without detracting from the product's "handmadeness". The strategy for maintaining and developing the production of handmade cheeses by farmers should necessarily entails a training programme for young farmers, based on the local knowledge there is on cheese-making techniques. Furthermore, the development of the current very little small-scale cooperativism existing for manufacturing and marketing farm cheeses would be also an important strategy. As regards marketing, there is a need for an increase and control of quality (and even certification) of the production and marketing process. In the future, increased production and process quality could lead to qualification for, in some more important cases, a Protected Designation of Origin, Protected Geographical Indication or, at least, Traditional Speciality Guaranteed.

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