Minimum economic scale of an efficient farms in dairy industry

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Paper prepared for presentation at the 113th EAAE Seminar "A resilient European food industry and food chain in a challenging world", Chania, Crete, Greece, date as in: September 3 - 6, 2009

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Abstract. The aim of our research is to determine - on the grounds of the facts of an average dairy family farm – the necessary economic size to provide subsistence for a four member family, which solely has income from this activity. Our study used three different calculation models. The models featured considerable differences. In the first one the primary aim of the producer is to survive, therefore the achieved gross income in farming includes neither amortization costs, nor the arising costs of repair and maintenance. On the contrary, the primary aim of the second model is to keep up the technology and the stock, which could fulfil the requirements of simple reproduction. The third model assumes a technological development corresponding with 10% of the invested asset value besides consolidation, thus ensuring the potential of reproduction on an increasing scale. The above mentioned calculations cover the period of several years. The studied years show differences in terms of the buying up price of milk, aid for milk production and the price of used inputs.

Our study compared farm sizes with the viable plant size defined according to the Standard Gross Margin. As for the SGM a farm is already viable with 10 dairy cows and their progenies. However, our calculations show that a 10 cowed farm is not able to provide sufficient income for a four member family, if their aim is not only survival, but also simple or enlarged reproduction.

The calculations reveal that among the fast changing market conditions of the dairy sector minimal farm size cannot be determined solely on the basis of profit figures in a given year, as in many cases it might lead to the exhaustion of reserves.

Keywords: dairy industry, family farm businesses, economic size, sustainability, Standard Gross Margin.

Introduction

The profitability of the dairy sector depends on the dynamic interaction of several factors. Therefore, it is expedient to follow up income development by the simultaneous examination of factors influencing production costs. Evidently, the maximization of net income is a key driver for farmers; however, not by all means. Possibly, production should not damage the environment, in the spirit of preserving the ecological conditions of farming for the coming years. Profit growth at whatever cost often leads to the wasteful management of resources, which indicates a short-term attitude without exception. The basic notions of sustainable development and sustainable agriculture are especially crucial in this sector.

The two relevant factors of profit growth are closely related to outputs and inputs, to input and output prices. In the majority of cases producers cannot influence the development of prices, as most farms follow price-accepting policies both in national and international markets. As for outputs, it is critical to enhance them in a way that production costs should not or should only moderately grow, not exceeding output growth. Just like in other sectors, the principle is clear: maximum output is not in correlation with maximum income.

. As regards costs, the question of income growth is: how to reduce costs so that outputs should not decrease or should only decrease only moderately. For example, at the present management level permanent costs are usually impossible to cut. In those cases when they are too high and impossible to cut in absolute value, the possibility of relative decrease is to be considered, i.e. permanent costs per a unit of meat or milk decrease by the growth of outputs; therefore intensification is a primary goal in production.

The dairy sector suffered one of the greatest damages in the wake of the political and economic restructuring at the beginning of the last decade, and the situation failed to improve when Hungary joined the European Union.

Milk production in Hungary in the early 90s was loss-making. Following these years, the profitability of milk production improved year by year. This upturn lasted until 1988, and then a massive income decline took place. (KAPRONCZAI, 2003)

The comparison between Hungarian data and similar data from benchmark European countries suggests that in terms of income, differences are insignificant and considerable milk price rise cannot be expected following our EU accession. According to expectations, wage costs amount to hardly 50% of those in Western-European countries. However, it is shocking that fodder costs in Hungary are significantly higher than in most EU countries. The background to this most likely lies in the low outputs of silage maize production, the "open-handed" composition of fodder doses and in general, wasteful management. It is a caution for the period after the accession: in terms of natural, economic and technological endowments Hungary is compatible with potential rivals, but the key to success is consistent fodder management drawn up by experts and the termination of wasteful management in general.

As opposed to the previously mentioned, regarding competitiveness, the outlooks of the small-scale sector are gloomy. Those small producers are likely to integrate in competitive commodity production who successfully managed to cope with the difficulties of establishing the basic technological conditions to grow their stocks (modern milking machines, refrigerators, silage maize production) and the development of the required fodder producing areas during the past years (STEFLER, 2003).

In recent years, the analysis of market potentials and the aspect of quality have received special emphasis. Many have stressed their significance and linked them with the issues of marketability and achievable profit. As for the schematic approach of the definition of optimal quality, inputs are to be increased until the difference between excess revenue from quality improvement and total costs (profit) reaches the maximum value. Following this, the interpretation of the problem becomes more complicated. For example, in the case of certain products, the criterion of marketability is a certain level of quality, which means extra quality milk for the dairy sector.

Material and method

In relation to incomes, difference is to be highlighted between incomes in small-scale production and large-scale production. Agricultural small-scale producers calculate so-called Gross Income (GI). Gross income is the difference of production value and production costs reduced by staff costs; therefore, besides net income, it includes wages as well. This is characteristically the theoretical income category of those small businesses where farmers or owners do not charge their or their families' wages demonstrably (which they would pay for other employees). For individual or family businesses which do not have employees and do not charge wages for their own work performance, the economic output gained by the deduction of costs from production value indicates their gross income. By virtue of its characteristics, this practice might seem to be profitable when in reality farming was at a loss. In production cost calculations family labour costs are to be regarded as so-called wage needs.

Characteristic features and criteria of economically viable businesses

EUROSTAT and the Farm Accountancy Data Network (FADN) rank enterprises according to farm size on the grounds of the Standard Gross Margin (SGM). SGM is the normative (referring to general weather conditions and operating conditions) gross margin determined for a unit size of an agricultural production activity (1 ha, 1 animal).

The total SGM value of a business expresses the steady income-generating capacity of a given enterprise, in relation to the supply of capital goods, the structure of production and the endowments of production areas.

The total SGM value of the business is expressed in EUR and every single 1200 EUR is called European Size Unit (EUME) [European Size Unit, ESU;]. Based on EUME, the member states of the European Union developed a threshold size for the minimal one which enables the subsistence of a family (Table 1.).

Table 1.

Development of threshold sizes in certain EU countries (1999)

Country	Threshold size unit
Netherlands	16
Belgium	12
Denmark, Finland, Austria, France, Luxemburg, Germany, Sveden, Wales, Scotland	8
Northern Ireland	4
Greece, Spain	2
Portugal	1

Source: MAGDA, 2003

Simplifying, Standard Gross Margin means that profit generating capacity (as the difference of production value and varying direct production cost) can be defined for all sectors by the method of the EU, and also the profit generating capacity of a business can be calculated if all the sectors are aggregated.

Criteria for economically viable businesses in Hungary

By the adoption of EU legislation, the Hungarian EU-conform information system has operated with national coverage since 2001 in conformity with the Council regulation of 76/65/EC stipulating the establishment and operation of the Farm Accountancy Data Network. In the framework of test operation network, businesses exceeding a minimum economic size were studied.

Economic size was defined on the grounds of a potential profit generating capacity of a business and it was called European Size Unit (ESU). As for the definition, one ESU equals 1200 EUR Standard Gross Margin. In the EU-conform information system businesses exceeding 5 ESU are monitored and in the AVOP support scheme this farm size is regarded as the basis of viability.

The calculation of the minimum economic size of a given business is based on the definition of the Standard Gross Margin (SGM) of agricultural activities in various sectors and it is performed by a specified methodology. SGM values are calculated by the multiplication of specific values defined on the grounds of the EU-conform information system presented in the table below, with spatial data as per the crop structure of businesses and the number of their animals included in the table and then the received results are aggregated. If the calculated SGM of the farm is higher than 5 ESU (i.e. 6000EUR), the business is regarded viable.

In the operation of the AVOP support scheme this becomes enforceable if the EU conform SGM is calculated on the basis of the table in relation to crop structure and the number of animals kept, required by business plans, and if it exceeds 5 ESU, the business (enterprise) which submits its application is regarded viable.

The table below shows the SGM data characteristic of the dairy sector and the related meadows and pasturelands at an exchange rate of 280HUF/EUR.

Table 2.

Hungarian SGM values related to the dairy sector

Code	Name	Quantity:	Value
F01	Meadow and pastureland with the exception of naturally growing grasslands	EUR/ha	38.05

F02	Natural grasslands	EUR/ha	38.23
J02	Bovines younger than 1 year	EUR/animal	71.20
J02A	Bovines younger than 1 year, male	EUR/animal	136.14
J02B	Bovines younger than 1 year, female	EUR/animal	15.88
J03	Bovines, 1 year old or more but younger than 2 years, male	EUR/animal	170.18
J04	Bovines, 1 year old or more but younger than 2 years, female	EUR/animal	19.85
J05	Bovines, two years old and more, male	EUR/animal	187.20
J06	Bovines two years old or more, heifers	EUR/animal	21.84
J07	Dairy cows	EUR/animal	560.34
J08	Other cows	EUR/animal	76.85

Source: FVM AVOP. 2004.

Results and conclusions

Hereafter a model calculation is presented, of which detailed quantitative data are shown in Table 3. In the model, based on the data of an average small-scale milk farm the necessary economic size is to be identified, which provides subsistence for a four member family living exclusively on this activity. The calculations presuppose a specific output of 7500 l/cow, which is higher than average Hungarian milk output per cow, but lower than outputs in the most competitive farms in Western Europe.

Three types of model calculations were performed. The following differences were premised between the certain models: in the first one, the primary driver for the farmer is to survive; therefore his gross income from farming does not include amortisation and incurring repair or maintenance costs. On the contrary, the key objective of the second model is to consolidate the stock and the technology, which complies with the conditions of simple reproduction. The third model assumes a technological development corresponding with 10% of the invested asset value besides consolidation, thus ensuring the potential of reproduction on an increasing scale. The above mentioned calculations were performed for the years of 2003, 2004 and 2005. The years revealed differences as per the buying in price of milk, support for milk production and the prices of spent inputs.

Although in 2003 the selling price was 0.27 EUR/l with national supplementary aid, this price reduced to 0.22 EUR by 2004, without aid (AKII, 2004). For 2005, the buying in price of 0.22 EUR/l was calculated again, with the difference that it was completed with the supplementary sum of 0.02 EUR/l as follows.

As a result of reduced market support for the sector, measures for income support are to be introduced for producers. Direct aid for producers has been introduced since 2005. The sum of direct milk quota-based aid became 5.75 EUR/t by 2005, whereas supplementary aid was 13.9 EUR/t (COUNCIL REGULATION (EC) No 1259/1999).

In compliance with KSH (Central Statistical Office) (2002) data, the profit need of a four-member family is determined on the basis of annual expenditure per person in households, the sum of which is corrected with the rate of inflation in certain years. In the preparation of models staff costs were not calculated, as the determination of gross income was the crucial goal. It is presumed that the family members perform all the farming activities and do not give work to external employees. The full gross income as a result of their activities would provide subsistence for the family. The necessary economic size, i.e. the number of cows is determined on the grounds of the revenue need of a four-member family and gross income per one cow and its progenies.

The model calculations suggest that in 2003 minimally 10 cows and their progenies were sufficient to provide the profit need of a four member family (Model 1.). However, this farm size is

merely a theoretical category; models 2. and 3. are suitable for the study of long-term viable farming. For simple reproduction 13 and for reproduction on an increasing scale 16 cows and their progenies are needed. In 2004 buying in prices for raw milk declined and the lack of aid caused the minimal economic size necessary for subsistence to rise to 200-250%.

Against this, calculating with expectable average support sums, the necessary cow number might get somewhat lower again by 2005, which is still 150-200% as compared to the figure in 2003. The new study with data from 2009 indicates that the number of necessary cows for subsistence has started to rise again.

The calculations reveal that among the fast changing market conditions of the dairy sector minimal farm size cannot be determined solely on the basis of profit figures in a given year, as in many cases it might lead to the exhaustion of reserves.

The farm sizes in our research work have been compared to the viable farm size determined by the Standard Gross Margin as well. SGM suggests that a given farm is viable with 10 dairy cows. On the contrary, our calculations indicate that a farm with ten cows fails to provide a four member family with profit if their goal is not only survival but simple reproduction or reproduction on an increasing scale as well.

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