

PhD THESIS

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ECONOMIC ANALYSIS OF SMALL SCALE EGG
PRODUCTION IN THE SOUTH TRANSDANUBIAN
REGION

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1. PRELIMINARIES AND OBJECTIVES OF THE RESEARCH

The share of the small scale production in the Hungarian egg sector is traditionally high. It has been so since the beginning of the last century through the socialism and change of the regime up to the recent days. Its share is estimated as fifty percent in the whole stock, and 40 to 45 percent in the production. In Hungary, though the egg sector supplies primarily the domestic demand, such a high share of the small scale production caused market disorder of the large scale production many times. These small producers – which in total represent a significant production - are mainly „back yard hen keepers”, which are free range with natural light. As a consequence, the production is seasonal with a peak during spring and summer time. This factor results in a high annual variability of the egg price, which influences the effectiveness of the large scale production and their profitability.

Besides its disadvantages, the small scale egg production has positive features as well. The coming EU enlargement and the membership put commitments on the egg sector. Out of these, the small scale production *ab ovo* fulfil the requirements of animal welfare, because the regulation does not cover hen stocks with less than 350 birds. It is also important to mention that small production helps in the self-supply of the countryside population and gives the producers - more or less - continuous income.

It has to be mentioned that the consumers' habits in the Western European countries have changed: in case of poultry, the consumers expect the producers fulfil the animal welfare requirements and they also prefer free range or other extensive keeping systems. Numerous publications have proved that more consumers are willing to pay for the higher price of such produce (egg). The consumers' demands have resulted in the high share of the alternative compared to the traditional cage systems in the EU countries. If the hypothesis comes to be proven that the technological parameters of the small scale production meet the requirements of „free range”, the Hungarian small scale egg producers (based on the examples of Germany and the Netherlands) can count on, as well as, a twice higher egg price. From the other hand, Hungary will join to the EU with an extremely high share of free range egg among both the EU member and the candidate countries.

The aim of the dissertation was that after defining the basic parameters of the smallest producing units of the egg sector to give an economic picture, to emphasise the particularities of the production and its role in the consumption, to reflect on its future opportunities from the aspect of the changing consumer habits and to define their size of economy.

A set of investigations was carried out. In order to achieve the aim, the basic parameters, the parameters of production and keeping and also the economic parameters of the production of the stocks that are supposed to be small scale units had to be analysed. In the other part of the investigations, the consumers' opinion and demand had to be defined for egg and for animal welfare issues.

2. MATERIALS AND METHOD

Because of the regional aspect of the investigation and in order to define the size of economy of the units, a set of own tests was carried out. The whole investigation covered 650 interviews.

2.1. MATERIALS AND METHODS IN THE PRE-TESTS

2.1.1. Definition of the basic parameters of small scale egg production in county Somogy

Date and place of the investigation: 1999 county Somogy. Method: personal interview with recording parameters n=200

Plan of the investigation: Representative on the structure of the settlements and on the share of population in the county (based on Central Statistical data of 1998). The number of the samples was assigned to the randomly chosen settlements. Within the categories, the number of the samples was similar to each other where it was possible. **Randomness** was provided by "random walking" sampling.

Parameters recorded

Basic parameters: size of stock kept by the producer, size of area per hen (m²), average egg production (pcs/day), peak production (pcs/day), minimal production (pcs/day), genetics of the stock (share); way of purchase, average age of the stock, mortality, (hen/year).

Feeding: amount of daily feed totally (kg), components of the daily feed intake (in kg), calculation of feed usage and utilisation.

Other factors of the production: share of own consumption and sell, way of sell (pcs/year), put working hours (hour/day) and its distribution, purchase price of the birds, age of buildings related to the production, maintenance costs, legal form.

Method of processing the data

The data of the questionnaires were recorded in Microsoft Excel software and organised in groups. Average value and variation were calculated, and graphs and diagrams were edited.

During the processing of the basic data, correction was not made; however, some of the calculated values (direct variable costs) were difficult to define. It was so in case of the value or cost of the own produced feed. The most frequently used grains in the feed mix were corn, wheat and barley, for which the specific production costs published by the AKII were used. This can describe best, in my opinion, the costs of the self-supplying feed production. In case of the purchased feedstuffs, the average of the purchase costs was calculated and taken into consideration.

The direct costs of the production contain the feed costs (purchased and own produced feed), purchase cost of the producing stock (average and specific costs – HUF/hen/year) and maintenance and disinfection costs (average and specific costs – HUF/hen/year). There was not use calculating depreciation, as the age of both the buildings and the machinery was higher than 20 years. Neither was the cost of labour calculated. The total production cost per egg was deducted from the average consumer prices recorded in the county, which gave the gross income per egg.

2.1.2. Consumers' views on animal welfare in Kaposvár

Date and place of the investigation: 200, Kaposvár. Method: personal interview with recording parameters n=100

Plan of the investigation: **Representative** on the age and gender of the Hungarian population. As the recent data of age and gender of the town was not available (only of 1990), the data of the country provided up-to-date information. Thus, the „freshness” of the data compensated the peculiarities of the town. (KSH 2000).

Randomness was further provided by "random walking" sampling.

Parameters recorded:

- 1, General questions on: degree of knowledge on animal welfare regulations, sources of information, own opinion on animal welfare, the key point of the food-chain where the weakest is the welfare.
- 2, Questions on „animal welfare produce” whether: the person has ever bought such product, agrees with its higher price, the flavour of the product is different, how much more expensive to produce such product, which one would the person chose at same price?

Method of data processing

The data of the questionnaires were recorded in Microsoft Excel software and organised in groups. Average value and variation were calculated, and data tables were edited. In order to being comparable with the answers given on the interviews of LATOUCHE (1999), the same questions were asked in the recent tests. The own results are shown together with the previously mentioned results. However, the consequences of the comparison can be drawn only with considering the differences of the methods, geographic conditions, and date of the two interviews.

2.1.3. The consumers' views on the egg in county Somogy

Date and place of the investigation: 2002 county Somogy. Method: personal interview with recording parameters n=300

Plan of the investigation: **Representative** on the structure of the settlements and on the share and age of population in the county (based on Central Statistical data of 2001). **Randomness** was provided by **randomly chosen** settlements (within the category groups) and **"random walking" sampling**.

Parameters recorded

Place and amount of purchase, main visible requirements towards the egg, weight and order of certain parameters, main requirements of cooking eggs, other demands.

Method of processing the data

The data of the questionnaires were recorded in Microsoft Excel software and organised in groups. Average value and variation were calculated, and graphs and diagrams were edited.

Also the importance (calculated weighted average) of each group of parameters was analysed. The order of importance was set within the groups, which gave the importance grade of the parameter and the degree of the importance was shown on a 1 to 10 scale.

2.2. MATERIAL AND METHOD OF THE MAIN TEST

Date and place of the investigation: 2002 South Transdanubian region (counties Somogy, Tolna, Baranya). Method: personal deep interview, structured with recording parameters n=50

Plan of the investigation: Representative on the structure of the settlements and on the share of population in the counties. The test was based on systematical survey, because of many reasons that excluded the opportunity for randomness.

Parameters recorded

Basic parameters: number of kept hens, area per hen (m²), average egg production (pcs/day), peak production (pcs/day), minimal production (pcs/day), genetics of the stock (share); way of purchase, average age of the stock, mortality, (hen/year), technical data (length of feeder, drinker – cm per hen), opportunities for increasing the size of the stock.

Feeding: amount of daily feed totally (kg), components of the daily feed intake (in kg), calculation of feed utilisation.

Other factors of the production: share of own consumption and sell, put working hours (hour/day) and its distribution, purchase price of the birds, age of buildings related to the production, maintenance costs, legal form.

Method of processing the data

The data of the questionnaires were recorded in Microsoft Excel software and organised in groups. Average value and variation of the groups were calculated, and graphs and diagrams were edited.

During the processing of the basic data, correction was not made. In case of the direct costs, it was difficult to define the cost of the own produced feed. The specific production costs of the most frequently used grains in the feed mix (corn, wheat and barley) were taken from the publications of AKII (average).

The direct costs of the egg production contain the feed costs (purchased and own produced feed), purchase cost of the producing stock (average and specific costs – HUF/hen/year), maintenance and disinfection costs (average and specific costs – HUF/hen/year). There was not use calculating depreciation as the age of both the buildings and the machinery was higher than 20 years. Neither was the cost of labour calculated – similarly to the AKII publications on the results of part time egg producers. Based on the production costs of the different units, eight types of model calculations were made. The basis of the different calculations was the variations of purchased or home-grown feed and hens. The first four cases produced their own feed, the other four purchased it. Further differences were in the way of purchasing or growing the laying stock. In the first case, day-old chicken

were bought (140 Ft/hd); in the second case culled hens were bought (200 Ft/hd). In the third case, point-of-lay pullets were bought (857 Ft/hd); and the fourth variation did not calculate with hen cost because of the share of the genders of the own hatched stock.

Method of calculating the annual income per egg

Knowing the annual costs and the egg production per hen, the direct variable costs per egg was calculated. However, the intensity of the production varies seasonally; therefore the egg production per hen was adjusted on the results of SZLAMENICKY (1959), which gave the number of the eggs according to the intensity of each month. The monthly amount of the eggs was multiplied by the published (KSH) consumer price in the towns, which assumes the sell of the product. The receipts were deducted with the direct costs, which gave a break even point of the production, which is similar to that of the AKII calculations. It was possible to compare the results, because the AKII country and regional data of egg producers were published at the same time as the own investigations.

3. RESULTS AND DISCUSSION

According to the results of the marketing surveys, the share of the consumers which has heard of animal welfare law is high. There is a layer of the population currently who are willing to pay for the extra price of such kinds of products. However, to satisfy this demand, firstly the supply should be created and secondly, the product should differentiate by unique marks and the control should be organised. Without these tools, extra income can not be realised. In the end we should not forget of the consumer who is only willing to prefer the controlled quality (regarding to any kinds of quality or ethic point).

An importance order can be seen in case of the external characteristics of the eggs: *first* is damage, *second* is dirtiness, *third* is size and *fourth* is the colour of the shell. As these characteristics (and the price) play an important role in the purchase decisions, it is reasonable to grade the eggs according to this order and sell them after selection.

The interior quality is also important in the context of long lasting marketability. The colour of the yolk can be influenced with food additives while internal blemish such as blood or meat spots and the size of yolk can be the aims of breeding. The height of the thick white can be influenced with the freshness and the conditions of the storage.

According to the surveys conducted, the populations of the towns and the villages buy eggs differently. The majority of the rural population buys egg from other homes (34%) or produces it for themselves (32%), and only in a little extent from markets (16%) or stores (18%). In case of towns, people buy eggs mainly on the market (32%) or from other homes (28%), the share of self supply is lower (18%) and that of the stores are higher (22%). Based on these data, it is reasonable to re-value the role of the small scale production in the egg consumption. The consumers are willing to buy organic egg; the animal welfare is important for them, which is usually interpreted as free range. Packaging and marks on the package – though these are important in the European Union and are going to be so in Hungary after the enlargement – were only put on the third place by the consumers in the current survey.

According to the results of the study, a higher annual egg consumption per capita was found (386 pcs) than the KSH publications show (278 pcs).

The basic parameters of the small scale producers of the region are as follows. The average „farm size” was 28 hens per producer, of which stocks 90% percent fulfil the requirement of free range based on the size of the area per hen. The fact that even a four times (3,92) higher density would still less than the requirement of 2.5m² area per hen gives opportunity to increase the stock size. Also, with increasing the length of the feeder and the drinker the density can be increased.

With suitable integration and providing that further conditions and requirements are satisfied, the opportunity is given for increasing the amount of products produced in alternative ways, for branding, differentiating the products and realising the given advantages in profit.

High differences were found in the specific yields; the average annual egg production was 187 pcs per hen. The highest share of the stocks is laying hens. Mostly day-old or point-of-lay pullets are bought, though half of the hens is own hatched. According to the age of the stocks, the majority (more than three fourth) of the stock has gone through its first production year.

The average feed intake per day was 221gr per hen. This amount is only that part of the feed to which cost belongs. Considering the average production (187 eggs per year) and an average egg weight of 60 grams (assuming 11.22 kgs of egg mass production) together with the feed consumption the feed : egg ration was calculated, which is 7.19 kg feed per one kg egg – in case that only the feedstuffs that have costs are considered. Thus, the feed use was 431. 4 grams per egg (with an average egg weight of 60g). The reasons of the high feed consumption found are partly that these stocks are outdoor kept using hen run, which result in high feed waste. Other reasons of poor feed utilisation are the genotype and the age of the stocks.

After having compared the relating results of the county with the current data, it was found that the feed utilisation of the free range stocks was some three times worse than that of the stocks (with same age and genotype) kept in cage.

The feed mix contained corn in the highest share; it was followed by wheat and barley. Laying mash was only 10 percent in the daily feed; it was primarily fed with chicken bought at day-old-age in the growing period.

In order to carry out economic analysis, it was necessary to calculate the feed cost per hen. Afterwards, the direct variable cost per hen was calculated, considering the differences in the way of feed and bird purchase. Based on the costs calculated in the eight different variations, the direct variable cost per egg can be calculated, also that with the deduction of the price of culled hens.

The specific direct costs of small scale egg producers in the South Transdanubian Region (2002)

Nomination	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Total direct costs (Ft/hen/year)	2 168,6	2 228,6	2 885,6	2 028,6	2 158,6	2 875,6	2 218,6	2 019
Price of cull hens (Ft/hd)	200,0	200,0	200,0	200,0	200,0	200,0	200,0	200,0
Specific direct variable cost I. (Ft/egg)	11,6	11,9	15,4	10,8	11,5	15,4	11,9	10,8
Specific direct variable cost II. (excl. cull hen) (Ft/egg)	10,5	10,8	14,4	9,8	10,5	14,3	10,8	9,7

It should be mentioned that the culled hens of small scale farms are usually also used in the family.

After the calculation of the direct costs, the market receipts were defined. In this task, the publications of the Hungarian Statistical Office were used to get the monthly consumer prices from rural towns. In order to get the monthly receipts, also the specific egg yields were needed (egg/hen/month). The results of SZLAMECKY (1959) were used to define the monthly production of a hen and a typical stock.

In the AKII studies, the standard gross margin is defined as the difference of the market receipts and the direct variable costs. In case of the recent study, the calculated costs belong to this type of the production costs, thus it is reasonable to use the method of AKII.

The monthly results obtained show that in 2002 primarily the conditions of the purchase of laying stock influenced the results (in both variations: the losses in the period between the end of June and August were caused by the purchase of point-of-lay hens).

The standard gross margin was between 180 and 625 Ft per hen per year, and between 1 and 3,5 Ft per egg. Even in the most favourable situation, the annual total gross margin of a small scale egg producer farm of 28 hens is extremely low (17 500 Ft/year).

It was also found that the yields of the small scale units was less influenced by the source of the laying stock (day-old, point-of-lay, culled hen or own hatched and grown). However, the effect of the keeping system (outdoor, natural light) has a determining role. Based on the previous, the small scale production has not got the potential of production, keeping and feeding technology of the top producing laying hybrids, thus they are not able to realise its results. The purchase cost – because of the inefficient use of the birds – reduces the results of the production. From the other side, the small scale production makes advantage from using culled hens and own hatched chicken. It is worth considering the harmonisation of the small scale egg production with breeding traditional Hungarian or dual purpose hens, which is reasonable from the point of producing poultry, special products or maintaining the traditional genotypes.

The amount of working hours put in production was 5.3 minutes per egg and 2.6 mins per hen. The owners spend in average 27.9 mins with feeding, 19,3 mins with egg collection and 11.4 mins with littering per day. These totally give up 72.8 minutes a day.

As much as 32% of the producers asked in the interview sell their product, mainly on market or from home. A high share of them gives eggs without payment (38%), or for other product (12%). The assumable consumption (based on the authors' consumption records) supplies the annual demand of 2.2 consumers.

The results of the analysis of the economic size were that the EUI was defined for the involved small scale producing units. This was between 0.02 and 0.06 in the eight cases analysed.

Based on the previous, it was found that the annual standard gross margin is less than the upper end of the AKII category for small scale egg production (1 000 000 Ft).

According to the number of the hens, all of the involved producers belong to the small scale category used by the Poultry Board (less than 1000).

Based on the categories of KSH – also only on the level of the egg sector – the producers keep less than 2.6 A.U., therefore they are small farms. It is a size of economy issue, that the producers involved in the investigations are small producers in all official categorical systems. The size of the farms is also determined by the demands of the consumers. DOBOS (2000) reminds that the size of the farms can be defined by the number of consumers whose demand can be satisfied with the production of the given farm. From this aspect, the small egg producers involved in the study can supply the annual demand of 10 to 30 consumers (at different consumption data available from the literature).

4. CONCLUSIONS, RECOMMENDATIONS

The definition and investigation of small scale producers is an important issue of any animal producing sectors. As a great part of the egg production (some half of it) comes from small farms, it is important to gather basic information on county and regional level, of which results can prepare a national census as well. It is worth considering the small scale production of other species (hog, rabbit) as well.

The small scale egg production has in total a determining role on the domestic market. In the case of the egg production, the small farms and their stocks are out of the reach of the EU animal welfare regulations, or these units even over fulfil them.

The results of the consumer interviews showed that 90 percent of the consumers would choose products from animal welfare production (at same price).

It gives more chance for the small production that a great part of the consumers prefers the products of small scale farms (32% of them buys on market, 28.5% from other homes, and 18% produces for themselves). According to the results of the marketing studies, a higher annual egg consumption per capita was found (386 pcs) than the KSH publications show (278 pcs). The difference comes from the differences of sampling, the methods used or even the structure of the settlements.

In order to study and analyse the small scale production, it is suggested to work out a unique analysis plan and to use specific methods.

The specificity of the investigation on egg sector level makes that important which features and parameters show that the farms are small scale units, which indices of the size of economy are significant, which criteria would organise the sample and provide the representativity.

Both in the analysis and in methodical issues it has to be considered that the small scale farms have got different (from the mid and large scale farms) particularities in the production, technical and technological parameters of production, and in parallel, in the share of sell or own consumption. For this reason, in many times it is necessary to apply new or novel indices, too.

The role of the small scale production is significant in long term according to numerous authors. As motivating factors, the followings are listed: supply of own or friends' consumption, use of existing equipment, tradition, use of part time, income, useful spend of time etc.

After getting a better view of the small scale farms, it will be necessary to coordinate and integrate their marketing, common quality management and sell. This is the only way to realise extra income from the peculiarities of the products. The same would help the mid and large farms to increase the computability of the production. It would be useful to integrate those small producers who can produce over their own demands and their products meet the requirements of free range or other alternative technologies. In case that there is not such a category it is worth creating a "Hungaricum" following the example of the French "Label Rouge".

It can be suggested to build up a specific supporting system for the small scale production, which should be bound to registration with taking into consideration the calculability of the whole production. Based on the results obtained, animal welfare payments and other payments of target programs (such as keeping native or denizen animal species, gene banks, rural tourism, NAKP, rural development, etc.) can be available for the small scale production.

The volume of products produced in alternative ways can be increased with the size of the stock (both the regulations and the area of the run make it possible to increase the stock without exceeding the conditions of free range), however, the length of the feeders and drinkers has to be increased.

The hygienic situation of the stocks rises serious questions – this issue needs introducing further investigations.

From the aspect of size of economy, it is reasonable to use the coefficient calculated from the annual volume of product on the farm and the consumption per capita:

- If it is lower than 100, the farm is small scale,
- Between 100 and 1000 midsize farm
- Above 1000 it is large farm.

In case of the calculated index, it is reasonable to carry out a test on the consumption of the given animal product, thus the coefficient can be adjusted on the differences of geographic or methodical conditions.

The small scale egg production has numerous positive features as well. It adapts to the market conditions rapidly and is able to produce differentiated products because of the extensive keeping system.

In spite of the low parameters of the production, the owner can obtain a reasonable income (SFH) if he sells his own products. The production can reach higher success if the seasonality of the production is reduced (artificial light). The source of the laying stock is almost at the same importance. Because of the low yields of the small scale production, it is not able to achieve an efficient use of the point-of-lay top hybrid pullets. Purchasing day-old chicken (and growing the cocks in case of mixed sex) can be a good solution, however, both the culled hens and the own hatched stock produce almost with same results.

In Europe, the animal products from extensive farms are accepted and in higher demand. It was found in the study that there is a layer of the consumers who are willing to pay more for such products in Hungary also.

At regional level, the egg production has good opportunities. From one side, the feed basis of the region, from other side, such traditional agricultural companies (like Bóly) can be found here, which rightly took the attention of foreign investors (Mr. Pollmann – county Tolna, 2000).

A picker-packager facility should build up in the region, which can be a logistical centre, and which can guarantee the quality of the eggs produced in the region.

Based on the results of the studies, the following SWOT analysis was created on the small scale egg production of the South Transdanubian region:

SWOT analysis of the small scale egg production

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Rapid adaptation to the market conditions • Fulfil animal welfare issues • Good consumer reception • High share in the consumption • High income (SFH) per egg • Suits other programs • Neither its production nor its sell is bound by regulations • Helps self supply, contribute the family income • Uses existing equipment • Useful spend of time for the farmer 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Low specific yields • Poor genetic background • Over-aged stocks • High use of feed • Seasonal production • Hectic volume and quality of the product • Low farm income (SFH) • High use of labour • Unorganised market
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Coordination – higher price • Increase of stocks • Differentiated products – sorting, grading • Harmonisation with other programs (organic, native, rural development, tourism) • Change in the approach of consumers 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • Animal health problems • Competition with similar small scale producers of neighbouring countries • Stricter regulations in marketing • Demographic changes, urbanisation – rural immigration, urban migration of youth • Change of consumers' approach for worse • Decreasing living standard

5. NEW SCIENTIFIC RESULT FINDINGS

1. The flavour of economic parameters of the small scale egg production have been discovered and defined numerically in the South Transdanubian Region. According to the results, 90 percent of the small scale stocks meet the requirements of free range. The majority of stocks are egg producer genotype hen (82,8%), the production of them are realized in 32%. The results of farming are primarily influenced by the two ways of either purchasing or growing the laying stock.
2. It has been found that in the South Transdanubian Region in the consumers' views on egg, the importance order after the way of production is the aspect of animal welfare preceding the way of packing. The 38% of the consumers in Kaposvar is willing to pay the higher prices for welfare eggs. In annual egg consumption per capita big differences were found from the KSH publications. In this occasion the influences of small scale farms in the consumption can be higher in some sectors, than the estimated country wide quantity, in different economical and geographical parameters.
3. The SWOT analysis results on the small scale production in the South Transdanubian Region discovered the strengths (quick reaction for market changes, animal welfare aspects, self- sufficiency, exploitation of the means of production, useful pastime, gain family income, favourable consumers' views on eggs). They also show the weaknesses (low specific yields, high feed consumption, seasonal production, need at high living-labour, unorganized market), opportunities (with the special production and the coordination of production the income can be increased, possibility to join organic and native animal keeping programs, favourable consumers attitude) and threatens (animal health problems, stricter legal regulations, and price competition, migration).

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11. **Csorbai, A.** – Jankovics, P. - Keszi, A.: A kisüzemi tojástermelés a fogyasztói elvárások tükrében. (Small scale egg production from the aspect of consumer demands) II. Erdei Ferenc Tudományos Konferencia, Kecskemét, 2003. 28-29 August. In: II. Erdei Ferenc Tudományos Konferencia Kiadványa, 2003. 60-64.p