

# **PHD THESIS**

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## **DECISION SUPPORT MODELS AND THEIR USAGE POSSIBILITIES ON GRASSLANDS**

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## **1. PRELIMINARIES AND OBJECTIVES OF THE STUDY**

In rural development, an underlined emphasis has to be laid on technologies and land using ways that are environmentally friendly, sustainable and liveable from economic aspect.

In defining the functions of landscape, information on the given area has important role. The data can be classified, analysed with regional informatical methods and tools, and recommendations can be given on the use of the landscape or area.

Besides that grazing livestock production can produce profit, it is well adopted to the agro-ecological conditions of county Somogy.

The objective of the dissertation is to analyse the opportunities of extensive farming in chosen micro region of Somogy; and to give answer whether livestock grazing can be profitable. The following tasks were done:

- By using the regional informatics and fuzzy method, the quality parameters of the analysed area, and the economic and ecological endowments of land use were analysed.
- The economics of beef production was analysed by model calculations.
- Deep interviews were used to analyse the economic parameters of beef production in Somogy, then its SWOT analysis was done.
- Based on questionnaire survey, the farmers' motivation was valuated on land consolidation and the integrating land use.

## 2. MATERIAL AND METHODS

Because of the multilateral assessment of the problem, the data necessary for the analyses was collected from several sources:

Secondary sources:

- Agricultural Research Institute,
- IFCN Beef Report 2005,
- Institute of Topography and Long-distance monitoring,
- Publications of the Hungarian Statistical Office,
- Hungarian Geographic Institute,
- Balaton-Park 2000. Kht.,
- Regulations of the Hungarian Agricultural Ministry,
- Professional literature,

Primary sources:

- Interviews,
- Questionnaires (n=186).

A decision supporting model has been created, which calculates the value of an area by considering its incline influencing the type of use and soil quality. This model defines suitability with no rigid categories but membership functions of fuzzy sets. Thus, the suitability can be analysed not only for certain types of plant production, but also alternative grassland use. The analysis was carried out on a micro-region of county Somogy. The parameters of the fields (incline, quality, soil type) were arranged in database for each settlement. The parameters and also the results of the analysis are related to the fields. As the result of the analysis, recommendations are given for the use of the fields analysed.

The control of the results was based on the critic specific yields and comparing those to the results of project *SCALIS*.

To analyse the costs and returns of beef production, a model running under Microsoft Excel was developed, which is easy to parameter and able to run economic calculations fast. The model estimated the number of cows, which is able to produce a living for at least 1 full-time person in the South, West and Central Transdanubian regions. I have analysed how taking further lands influences the profitability of beef production; and the returns : supports ratio, with different cow numbers. I have analysed the effects of raising ratio, weight gain and farm gate prices on the *break-even point*. Also calculations were made on the financial situation of beef farms, if Hungary had chosen the *Simple Supporting Scheme*.

Deep interviews were made with beef farmers of county Somogy on the operation of the farms, market situation, product structure, and costs, marketing, in order to get better information on the profitability of farming. Also the SWOT analysis of these farms was carried out.

As an increase of the grasslands could be disadvantageous for farmers, I also analysed the structure of land use in the county and the possible ways to change it. I have made deep interviews with people representing the authorities of agriculture. I was interested in their opinion on the actual land use, the market situation of livestock production and their future expectations.

The questionnaires asked the farmers about their opinion on the necessity of integration and the improvement of the scattered field structure (n=186).

## **3. RESULTS**

### **3.1 GRASSLANDS ON THE SAMPLE FIELD**

As I have experienced, neither the statistics nor the real estate records are exact enough to use them for strategic analysis.

Long term planning needs exact figures and assessment of the current situation, which can be done by a model created by the author, considering the soil conditions.

According to my calculations, 1820.5 hectares are suitable for grass production on the sample field. Considering the average grass yield and its specific production costs in the South Transdanubian region, grasslands of this size could keep 624 cows.

### **3.2. ECONOMIC ANALYSES**

Analysing the real farm gate prices it was found that the average prices between 2000 and 20005 were lower than the prices in 2000 considered as the basis year. The only exception was the slaughtering calf price, which increased in real value in 2005.

The model calculations showed that in the South Transdanubian region, higher grassland costs result in that almost 60 percent higher cow number is needed to achieve similar income level that is typical in the other Transdanubian regions.

The results obtained reflects on that the larger part of the production value comes from different subsidies.

I analysed the effects of calving ratio, weight gain and farm gate prices on the market receipts. The calculation was made for a herd of 100 cows. It

was found that 5 percent increase in the calving ration increases the market receipts with 14 percent; assuming 85 percent rearing ration in average 10 kilograms higher live weight results in 4 to 6 percent higher receipts. Analysing the effect of farm gate prices on the market receipts it was found that 1 HUF increase of the price results in 0.3 percent higher receipts.

The Simple Supporting Scheme can be advantageous for beef production, because grassland subsidies over-compensate the eliminating subsidies.

According to the farmers' opinion, a herd of 50 cows safely produces a living for a family, in an extensive farm with 85 percent calving ratio. This is also proven by my calculations.

### **3.3. LAND CONSOLIDATION AS AN ALTERNATIVE**

The beef farmers' demand is to increase the size of their herds in order to keep farming profitable, which needs bigger grass lands.

In the last five years, land use changed, the number of private land owners grew, which is the result of the subsidies. In Somogy, 58 to 60 percent of the total land is used by private owners and 38 percent by cooperatives and companies.

Both the production and the payment and control of the subsidies would be easier, if as few as possible farmers produced within a subsidies block of fields. It would be necessary to improve the concentration of the fields, which is the aim of the consolidation payment.

It would be necessary to work out a strategy to improve the structure of scattered holdings, which is created for each individual area. Thus, different areas will be treated from different aspects.

If they could, out of the asked farmers (n=186) 71 percent (132 hd) would consolidate their lands by changing their holdings.

According to the farmers, the most important factors in land consolidation are the optimal land size and creating better conditions for the production. It is also important to develop better transportation. Considering agro-ecological endowments and soil prevention are less important. According to their opinion, the least important factors are the environmental aspects.

Large farms (>301 ha) are the most sensitive to the optimal field size and form, and to better conditions for production and farming.

Corn is produced on 87%, crops (barley, wheat) on 71% of the asked farms on fields of very poor soil (10-14 AK), of which profitability is questionable, though the current subsidising system makes it possible.

Due to the increasing market competition, bigger role can be achieved by the voluntary producing and marketing cooperations of farmers. Only the very small farmers are not open, although they would benefit most of the integration. In the highest ration, farmers with fields of 101 to 300 hectares would join the work of voluntary producing and marketing cooperations.

## **4. CONCLUSIONS**

### **4.1. GRASSLANDS ON THE SAMPLE FIELD**

Regional informatics methods are suitable to estimate the possible grassland size.

With only little changes, the model is suitable to plan land use of other areas as well. After recording the parameters (incline, quality, soil type, yields of previous years) typical for the given area, the land use can be estimated.

In my opinion, the currently used parameter for soil quality is not suitable on its own to define the quality of a field in many times. In crop producing lands, an indicator of land quality (D-e-meter) will be introduced; a similar method should be developed in grassland management as well.

The used fuzzy model is suitable to define the possible land use type in certain fields.

With a land use meeting the conditions of the area, the grasslands can be much bigger than now.

### **4.2. BEEF FARMING**

Beef farming is the winner of the EU accession.

In the period after the change of the economic regime, the number of cattle decreased; classic beef farming was rejected. From year 2004, positive changes have begun in the sector.

Direct payments (grassland payments), livestock payments (cows, fattening bulls) and extensification payments improve the profitability of beef farming.

Beef farmers get more money out of subsidies than from product sales. In my opinion, this ratio should be changed. One way to increase market receipts can be to fatten bull calves. Beef fattening is not only subsidised, but higher added value is produced and the feed basis of crop fields can be used.

In case of larger farms, beef farming can be profitable in longer terms as well.

Unfavourable effect of the current support system is that farmers intend to produce crops on poorer fields as well, which in the end can be only sold to intervention. Based on the soil conditions, it would be reasonable to support feed production on poorer quality fields.

The most important task of the government should be a precautionous orientation of the production. Types and amounts of payments influence the decisions of farmers aspiring by long term safety. Thus, they will produce product that are marketable as well as they fulfil other priorities.

It would be reasonable to make more efforts on the economic and ecological balance. In case of acreage subsidies it could mean that payments are bond to land use ways that meet the soil conditions. Thus grasslands would be subsidised in higher level if the land is used for instance as grazing field.

In my opinion, as the reform of the CAP, the farm level supports will make farmers to react these problems more sensitively. As the payments will not belong to the production directly, it will stimulate the farmers to produce more marketable products.

Due to the elimination of payments, those fields that can not be profitably used for agricultural production will be used for extensive farming or setaside. This is an opportunity for grassland based production (beef, sheep) to develop.

It needs considering whether to keep 100 percent of the cow premium and 40 percent of the connected slaughtering payment; or only 100 percent of the slaughtering premium; or instead, a special bull premium. Looking at the current situation, when large part of the calves are sold on foreign markets before fattening starts, thus the fattening bull payment is given to others, from the aspect of the Hungarian farmers, the previous would be more favourable.

Approximately 122 thousand beef cattle were registered for 177 thousand quotas given to Hungary. Many of those are culled dairy breed. More strict roles and effective stimulation can achieve that only beef cattle farmers would be subsidised.

Due to the acreage payments, after the accession the land rents went up, which is problem for the farmers. In order to ensure competitiveness, it is necessary to ensure the feed producing lands for beef farms. Most of the farmers do not own enough grass lands and feed producing lands, however, significant part of the supports are paid on acreage. Therefore, it would be necessary to make possible the buying or durable rental rights of lands. Without these, the rental fees will increase, which destroys the competitiveness of the farmers.

Increasing herd size necessitates the increase of the size and proportion of grasslands; therefore in the sample area, the cooperation of farmers and land owners is needed.

### **4.3. CONSOLIDATION OF LANDS AS AN ALTERNATIVE**

The government measures to change the situation of scattered holdings have not reached their effect, yet.

Consolidation of lands would contribute a better situation of rural development being a priority for the government as well. Within a block of fields fewer farmers could better focus on the professional job, could produce in better conditions, and could pay more attention to a farming practice meeting the ecological conditions as well.

In order to make farming more profitable, in theory the farmers would not be against the consolidation and voluntary change of lands, although in practice mainly the smallest farmers are not open for this. It is important to give these farmers better information, because they have not experienced the advantages and stimulating power of consolidation, yet.

Before the practical enforce, it is necessary to ensure that aspects of soil conservation and agro-ecology and environmental issues will get enough emphasis according to the endowments of given area.

It is important to supply farmers with information on alternative land using opportunities. This is important from that aspect that setaside fields can be used for drug and herb plant production, but not for feed and crop production.

The agricultural producers of county Somogy bear a very low level of willingness to cooperate. Among the motivating factors, the opportunity for reaching financial stability is strong. The smallest willingness for cooperation is shown by small farmers, although integration would be the most advantageous for them.

In my opinion, integrations of farmers would be the key to maintain small and medium farms or to improve their competitiveness. Its most

important elements can be appropriate information, stimulation and strengthening confidence.

The current number of cooperations is appropriate to supply the tasks in Somogy; however it is necessary to increase their functions.

Achieving successful multifunctional agriculture in the sample area is highly depending on what extent the farmers can give up their farming practice, how big is the chance to break the crop oriented production and how the farmers exploit the local, territorial and landscape endowments.

## **5. NEW AND NOVEL SCIENTIFIC RESULTS**

1. I have developed a regional informatics based decision supporting model that is able to handle uncertainties, which is suitable to estimate the size of possible grasslands or grazing fields in certain areas.
2. I have shown that it would be reasonable to increase the grassland in the sample area that meets the economic and ecological requirements. Based on the conditions of the area, it is realistic objective to increase the grazing livestock herd, which necessitates integration in order to ensure suitable size of grasslands.
3. The model calculations have proven that in the South Transdanubian region, extensive beef farming is profitable, which enables to better exploit the ecological potential. In the sample area, the bigger part of the receipts comes from subsidies; therefore it is important to strengthen the farms until the payments are eliminated in order to maintain their competitiveness.
4. I have shown that the Simple Supporting Scheme will be advantageous for extensive beef farmers, because grassland payments over-compensate the eliminating supplementary payments.
5. A questionnaire survey was used to reveal the motivations of the farmers of county Somogy on land consolidation. It was found that primarily those farming on 50+ hectares are open for it. Different areas need to consider different aspects of consolidation.
6. It was stated that the agricultural producers of county Somogy bear a very low level of willingness to cooperate. Among the motivating factors, the opportunity for reaching financial stability is strong. The smallest willingness for cooperation is shown by small farmers, although integration would be the most advantageous for them.

7. The results of questionnaire survey show that the farmers aspire to produce cropping plants on very poor soil. Its profitability is questionable, though the current subsidising system makes it possible, because farming considering both ecological and economic conditions and keeping plant and animal production in balance is not appropriately supported.

## **6. RECOMMENDATIONS**

- To estimate possible size of grasslands, we bear modern tools that are able to do this. It would be necessary to make cheaper and more available those satellite photos and long distance data, which can be used to control the current situation and fundament strategic plans.
- Development plans, agricultural environment programs and regulations define that in different areas what type of production is reasonable. The current payment system supports those farmers who meet the current recommendations, however the single acreage payment does not encourage farming practices meeting the economic and ecological conditions. Changing this would be encouraging to rational use of land.
- It would be necessary and reasonable to create an information system for grassland production as well, which helps defining the stocking density and period, knowing the grass yields and endowments of area. Thus, a really good farming practice could be ensured.

- The overall objectives of agricultural and rural development and village development should be connected to the economic and ecological planning. Then, it is necessary to acknowledge that small farms are not liveable on their own, their support is not reasonable. Profitable farming demands the consolidation of lands beyond spontaneous concentration of fields. It is reasonable to better stimulate spreading voluntary integrations.

## 7. PUBLICATIONS IN THE FIELD OF THE DISSERTATION

### UNIVERSITY BOOK (1)

**Honfi V.:** Jegyzet a térinformatika tantárgyhoz. Kaposvár, Kaposvári Egyetem, 2004. (CD)

### PUBLICATIONS IN HUNGARIAN (3)

**Honfi V.:** A földhasználat optimalizálása fuzzy alapú modell segítségével.  
*In: Acta Agraria Kaposvariensis.* (megjelenés alatt)

**Honfi V.:** A térinformatika lehetőségei a minőségi élelmiszer termelésben.  
*In: Acta Agraria Kaposvariensis.* 2002. 6. 3. 177-184. p.

Barna R. – **Honfi V.:** Somogy megye vadgazdálkodásának elemzése térinformatikai módszerekkel. *In: Acta Agraria Kaposváriensis.* 2002. 6. 3. 163-176. p.

### PUBLICATIONS IN FOREIGN LANGUAGES (1)

**V. Honfi** – R. P. Micsinai: Study of certain queries related to redistribution of landed property in Somogy County. *In: Acta Scientiarum Socialium.* 2006. (megjelenés alatt)

### PRESENTATIONS IN FOREIGN LANGUAGES (2)

**V. Honfi** – R. P. Micsinai: Optimization of Land Usage with the Support of Fuzzy Based Model. *In: Summer University on Information Technology in Agriculture and Rural Development. Debrecen, 21-22. August 2006.*

R. P. Micsinai - **V. Honfi:** Analyzing data of rural development with GIS methods on the settlements of Somogy County. *In: Summer University on Information Technology in Agriculture and Rural Development. Debrecen, 21-22. August 2006.*

## PRESENTATIONS IN HUNGARIAN(7)

**Honfi V.:** Modell az optimális területhasználat megítélésére. *V. Alkalmazott Informatika Konferencia*. Kaposvár, 2006. máj. 26.

Micsinai R. P. – **Honfi V.:** Vidékfejlesztési adatok elemzése térinformatikai módszerekkel Somogy megye településein. *V. Alkalmazott Informatika Konferencia*. Kaposvár, 2006. máj. 26.

Barabás T. – **Honfi V.:** Kistelepülések digitális térkép kialakításának lehetősége. *V. Alkalmazott Informatika Konferencia*. Kaposvár, 2006. máj. 26.

**Honfi V.:** Egy működő kistérségi információs rendszer és mintaterület fejlesztési irányai. *E-agrárium & E-vidék –Agrárinformatikai Nyári Egyetem és Fórum*. Gödöllő, 2004. aug. 27.

**Honfi V.:** Tér adatok, térképek on-line elérése és készítése az Internetről. *1. Gazdaságinformatikai konferencia*. Győr, 2003. nov. 11.

**Honfi V.:** Tér adatok, térképek on-line elérése és készítése az Internetről. *Főiskolai matematika-, fizika-, és informatika oktatók 27. Országos Konferenciája*. Székesfehérvár, 2003. aug. 27-29.

**Honfi V.:** A térinformatika lehetőségei a minőségi élelmiszer termelésben. *Térinformatika szerepe az agrárstruktúra átalakításában és a vidékfejlesztésben konferencia*. Kaposvár, 2002. máj. 30.

## OTHER (1)

**Honfi V.:** Térinformatika és tanúsított élelmiszer. *In Somogyi Műszaki Szemle*. 2004. ISSN 0133-6509 p. 21.