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Ph.D. thesis

**EXAMINATION OF COMPETITIVENESS AND PRODUCER'S RISKS OF
THE HUNGARIAN SHEEP SECTOR**

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1. INTRODUCTION AND SCOPE

There were two recent, important changes affected the situation of the Hungarian economy in the last 15 years: the collapse of the political system in 1989, and the closure of the EU accession process in 2004. Both events determined the performance of the Hungarian sheep sector in the economic competitiveness, and will continue to affect it for years to come. Farmers have yet to accept the latter situation and adapt to its economic rules, and they have got the most important tasks in this competition. Hungarian farmers became as entrepreneurs into the EU, where they found themselves in a competition, which has special conditions. Farmers found themselves within new land-, ownership-, and tax conditions, which required conscious entrepreneurial behavior and thinking. And these conditions can not be assured in short run in Hungary (subsidies, processing and trading organizations of producers, milk and meat integrations, co-ops). And these treats become more severe with the effects of the political change of 1989. In this special situation sheep industry and (at farm level) sheep farmers also have to survive, develop, and face to new possibilities, produce competitive products for the present and future markets.

Agricultural production is an open air system. Consequently its exposure is much higher, and results are more uncertain in relation to other economic sectors. So farmers have had to confront the new risk sources and uncertainties created by the emergence of the new market environment in Hungary. Additionally, the preparation for EU accession, with its risk factors, surfaced as a new challenge for the Hungarian farmer. Agriculture is also an open-air system, and is therefore greatly exposed to unfavorable and uncertain physical environmental factors, such as weather and rainfall. Farmers and producers are exposed to the difficulties of the market environment mainly in countries with changing and developing market economies. The need to uncover the sources of risk and uncertainty in agriculture is an inevitable managerial task, and this was especially the case under the unregulated circumstances that emerged after the collapse of Hungarian agriculture that occurred in the 1990s.

Requirement of international comparisons and evaluation of sectoral performance resulted that competitiveness became an important question of the Hungarian agricultural economics. To define the phrase: competitiveness is not simple, because as a phrase it is used in all areas of the economy. Competitiveness has to be analyzed from several aspects, taking into consideration the peculiarities of the examined area, especially in the fields of agriculture and sheep production.

In the first part of the third chapter of my thesis the results of the examination of the competitiveness of the Hungarian sheep sector. The competitiveness factors and data are evaluated within the last 15 years, and based on the technical literature and the statistical data basis of the competitors. The examination was made in relation to EU countries, Romania and Bulgaria.

The other part of the thesis contains the results of a field survey, in which I examined the risk sources and risk management techniques of Hungarian sheep farmers. The basis of field survey was the Bihar-region where can be found the one third of the sheep population and sheep farmers.

MAIN AIMS of the RESEARCH:

1. To **systemize and determine the competitiveness factors of animal production**, as regards the characteristics of agriculture.
2. Applying the systemized factors, **I evaluated the competitiveness of the Hungarian sheep industry** within a sectoral statistical analysis. My aim is to compare data and results of the domestic sheep sector, of that of the EU-25, of Romania and Bulgaria (as the two main competitors).
3. On the basis of personal data collection, **I examined and determined the risk sources and applied risk management techniques** of sheep farmers in the Hajdú-Bihar region.
4. To **prove the hypotheses that certain characteristics of sheep farming** (such as number of sheep population, size of arable and grass land area) **determine:**
 - **types and importance of risk sources,**
 - and the **applied risk management techniques of sheep farmers** (as tools for reducing, managing or avoiding risks).

2. PRELIMINARIES OF THE RESEARCH AND APPLIED METHODS

The main principal of construction was that both fields must have a valid and general scientific background. The two research fields (competitiveness, risk) and the related scientific background required different data and methods of evaluation.

2.1. Data and applied methods of evaluation of competitiveness

Competitiveness is a widely used phrase, but its determination is not a simple task. We cannot find an overall uniform measurement or calculation method for competitiveness. The applied method always depends on the object, level, period, and parameters of measurement utilized. Competitiveness has to be analyzed from several aspects, paying attention to the peculiarities of the examined area, especially in the fields of agriculture and sheep production. In the first chapter of the thesis, I revealed many aspects of measuring the competitiveness in the field of classical and modern, theoretical and practical economics, and also in agriculture. On the basis of the obtained methods, I constructed a factor-system, which contains the special characteristics of animal production. By applying this system, I evaluated the Hungarian sheep industry in relation to similar characteristics of the EU, Romanian and Bulgarian sheep industries. The data used for the evaluation originate from international and domestic statistics, publications and surveys made by professional organizations. The information data were originated from the theoretical and practical economy, annual reports of firms, research reports, and other technical publications.

International and domestic situations of Hungarian sheep sector were evaluated on the base of sectoral statistics. Results of research programs operated by the Seep Production Board and University of Debrecen Centre of Agricultural Sciences were also used as sources of data.

International sources of data: Food and Agricultural Organization of the United Nations (FAO), (European Statistics, EUROSTAT), Office National Interprofessionnel des Viandes (OFIVAL), Meat and Livestock Commission (MLC).

Domestic sources of data: Central Statistic Office (KSH), Agricultural Research Institute (AKI), (KOPINT-DATORG), data and publications of Sheep Production Board, Annual Reports of Hungarian Sheep Breeding Association (MJSZ), publications Ministry of Land and Rural Development (FVM)

There were problems of the different data basis on the level of international examination. FAO, OFIVAL and EUROSTAT data basis did not always show the same information, but FAO data are the most complex and contains the widest range of international information, so it is the best for overall comparisons. Domestic data sources have also differences in population and results of the sheep sector, but it comes from the time of the data collection and publication.

2.2. Data and applied methods of evaluation risk sources and risk management techniques of sheep farmers

The survey and study of the OTKA T-38064 research program was also used as miscellaneous source of revealing risk sources and risk management techniques in the sheep industry. The method was based on a representative national field survey involving 10 % of sheep farmers and 80% of sheep farms in the Hajdú-Bihar Region (and makes 1/3 of the Hungarian Sheep Population).

The list of sheep producers was provided by the Sheep Production Board of Hungary and the producers were asked personally by students of the University.

Survey, parts and edition of the questionnaire

The construction of the questionnaire was based on international literature and examples in the field of risk and risk management in the agriculture. University student personally asked sheep farmers and also helped them to understand the questions.

The research had two main parts

- Filling out of the questionnaires.
- Statistical evaluation and analysis of the questionnaires.

The first part of survey was based on the field survey which gives a personal evaluation of farmers about the conditions and features of sheep farming and also about the risk sources and risk management techniques applied by them. The collected data were based on the 2003 production year.

Sampling method

Farmers were selected according to the number of ewes owned (as a measure of farm size). The questionnaire as a tool of data collection included five main parts, adjusted according to the possible sources of risk, applied risk management techniques and property and personal information about the farmer.

Edition of the questionnaire

Farmers involved in the survey were asked to subjectively evaluate risk factors and risk sources according to their importance. Another task was for them to suggest solutions and techniques to avoid or reduce risk in their production under the given conditions. First, farmers were asked to evaluate 5 general and 32 special most possible risk sources on a 5-scored Linkert-scale. In the third section, they had to choose from 32 listed management techniques which they applied to avoid or decrease risk in sheep farming. The applied techniques were also evaluated according to their importance in a 5-scored Linkert-scale.

Main parts of questionnaire:

- General questions regarding to risk attitude
- Sources of risk
- Risk management techniques
- Personal data of sheep farmer and farm
- Other additional data and opinion

The grouping of risk sources and management techniques was also based on literature (GABRIEL and BECKER (1980), MARTIN and McLEAY (1998)). The fourth section of the questionnaire covered the main information about the person, land, animals, material and financial sources, costs and debt conditions of the farm. **The questionnaire is attached to the thesis (Appendix 1).**

Methods of evaluation and analysis:

General basic statistics

Multivariable methods

- Cluster analysis
- Principal component analysis
- Loglinear analysis

3. MAJOR FINDINGS OF THE DISSERTATION

Analysis of competitiveness factors of animal production is quite a complex task. Calculation and evaluation of simple values such as ewe number or output quantities are essential but not enough. We also have to put indexes and related parameters into consideration, and these data might role as comparative or non-comparative endowments and factors of the given country.

On the course of the examination the competitiveness parameters of Hungarian sheep sector I analyzed the domestic and international statistics. The level of measurement required an overall consideration of sheep production in EU-25 countries and also the of the Easter-European countries. Period of time covered a long term (from the year 1990) to base complex and reliable findings and conclusions. As a result of this examination I constructed a factor matrix which contained all the direct and related parameters of the competitiveness of animal production. It was the tool of analyzing sheep sector with a special regard to its particular characters. The evaluated parameters and comparisons showed those areas of sheep production where Hungary has competitive advantages or disadvantages in relation to other countries. **In Table 1.** I listed the evaluated parameters and factors to complete with related comments.

Natural endowments, land and location of our country provide real good circumstances for the operation of sheep production. Relative parameters such as sheep density of arable and grass lands strengthen the competitiveness of this sector.

Today those parameters are also positive which had negative effects at the time of the collapse after 1989. These are excess stocks of forages and other feed stuffs, and lack of competitiveness for resources among different sectors of animal production. This situation emerged from those facts that numbers of animals halved in all sectors and land got out of utilization by animal production. Troubles of land use and depending on each industry to another were also emerged as a result of political and economic change. These are also negative factors of competitiveness of the animal production causing the restructuring of the ownership system, increasing the area of rented pastures and arable lands.

In Table 1. I also emphasized those parameters which are special characters of sheep sector in Hungary. These facts were compared to EU-25 average and to same data of Romania and Bulgaria. In relation to the EU average there are some parameters which are quite close to EU average, but in other cases they are far from the average. Facts highlighted by red colors mean the positive, improving factors, blue letters show the negative factors and blacks are

between them. Sometimes it was important to comment certain evaluations, but most of the factors were evaluated at both level.

Sheep population is a basic, but not absolute parameter of production. In Hungary there are all the necessary conditions of keeping 1 200 000-1 300 000 ewes, but the maximum supported heads of ewes can be listed as limited factor of our competitiveness (in relation to the evaluated countries).

Lack of capital sources are positive factor in relation to Romanian and Bulgarian farming conditions but negative at the level of the EU.

Variety as the main factor of effectiveness in the competition is a negative factor at EU level, because our merinos produce far below the EU averages. In the long run it is necessary to improve merinos by crossing for increasing meat and milk production. **Sheep concentration** in Hungary is at about the EU level, but given the low effectiveness it is not positive as a competitiveness factor. In relation to the same parameters of Romanian and Bulgarian sheep farms Hungary has advantages in this comparison of concentration (100 ewes/farm). The optimal concentration which is able to provide an even farm income level would be three times higher, the present average.

Type and rate of production of different products are mostly **determined by variety and population**, but these are the most **important facts in the farm income**. The main **products in generally are sheep meat or lamb**. But there is a big difference of output and relative output in different countries.

Incomes from meat and milk are higher in EU then in Hungary, but the income ration of these products is similar. Even our domestic consumption of sheep meat is quite low, and the export portion is relative high, **Hungary became one the main live sheep exporter of the EU**. Unfortunately **Romania has more numerous sheep population so this country is able to produce and transport more animal to EU market at the moment**. Bulgaria has better conditions and traditions to produce sheep milk products, both countries are reliable competitors for products. Bulgaria is one of the main fresh sheep meat exporters of the EU, while Hungarian meat export is not valuable. There are no appropriate conditions of sheep meat processing in Hungary, which is also a disadvantages factor of competitiveness. And the domestic consumption is also very low (0,2-0,3 kg capita/year) in Hungary which is also not positive factor of our competitiveness.

Milk processing is operated in small scale, and the wool processing is terminated in Hungary. **Milk** is produced in such a small quantity in Hungary that we are not reliable competitors for the mentioned two countries at the market. **Wool** is absolutely an export product, but because of the poor quality the role of this product in the farm income is almost nothing.

Quality of Hungarian sheep products are accepted at foreign markets, but also require an improvement. The reason of that in the last 10 years the quality of sheep products (except milk) were declined. Wool is exported without as a uniform quality without any classification. Development is especially urgent in the field of meat production because we have to introduce and enhance S/EUROP classification of meat. The other problem is that Romanian lamb quality is not worse than the Hungarian, which also means competitive-problems at the market. **Animal health regulations** and administration system are at the EU level.

Producers' teams and associations and integrations have been founded in the last few years, but operation of them is still not appropriate. They have to be developed to become competitive at EU level.

To show the competitiveness in a more demonstrative way I constructed figures to compare the competitiveness factors of the related countries (Romania and Bulgaria). Size and shape of the figures (**Figure 1. and 2.**) mean the relative competitiveness of Hungary, Romania and Bulgaria at the ratio of the EU average.

The involved parameters are relative indexes, calculated from the sheep population, size of arable and grass land area, consumer basis, and output factor like meat and carcass production, sheep density of arable and grass land area, concentration (in case of farm size above 1 ESU).

Table 1.

Evaluation of the Hungarian Sheep Sector in Relation to the EU-25, Romania and Bulgaria

Factors of Competitiveness	Evaluation of Competitiveness factor		Comments
	In relation of EU-25	In relation of Romania, Bulgaria	
Areal endowments	Above the average	Above the average	Distances of live animal transport
Land – sheep density	Below the average	Below the average	Unexploited pastoral and arable lands
Relation of Crop and Animal Production	Ne.	Ne.	Unfavorable – excess of feeding stuffs
Sectoral integration	Ne.	Ne.	It could reduce costs at farm level
Sources of feeding stuffs	Ne.	Ne.	Excess stocks
Land use	Ne.	Ne.	Different owners of the land and animals, rented lands
Sectoral competition for sources and subsidies	Regulated	Ne.	Regulated support system, unexploited natural sources
Relation of Sectors of Animal Production	New.	New.	No competitions, sufficient feeding stuff stocks
Sheep population	1% of the EU-25	less	Below the sufficient level, limited development
Sources (capital)	Low level	Better position	Lack of capital, limited development
Variety	Not competitive	no.	90% merinos, limited development and efficiency
Concentration	Average	Better position	Not competitive – low profitability
Ownership system	New.	New.	Unfavorable- scattered small stocks with low capital
Purpose of Production	Below the average	New.	Disproportionate- few varieties
Product -structure	Below the average	New.	Disproportionate
Quality	Below the average	About the average	Milk-increased, meat and wool - decreased
Processing level	Below the average	Ne.	Lack of processing of meat, development is limited
Export	Above the average	Better position	The most important factor
Domestic consumptions	Below the average	Below the average	Very low, development is limited
Animal Health, Administration	About the average	Above the average	Sufficient at EU-level, more strict and costly
Producer integration	Below the average	Above the average	Insufficient operation
Professional and	About the average	Ne.	It can be developed
Human factors	About the average	Ne.	Changing
Information	Below the average	Ne.	Transmission and quality can be developed

Source: On the basis of own systemization Ne: not examined

According to the demonstrated results of 2003 Hungary has an advantage of concentration, so sheep density of farms is higher than it is in Romania and Bulgaria (**Figure 1.**). In relation to other indexes Hungary is below the EU averages, but definitely competitive in the live animal export. Romania has better position in the basic sources as area of arable land, animal population, and consumption, Bulgaria has Lower sheep density at grass lands. Shapes of figures show that none of the countries has an overall competitiveness of sheep industry in relation to the EU averages. In Hungary consumption rate causes the irregular figure.

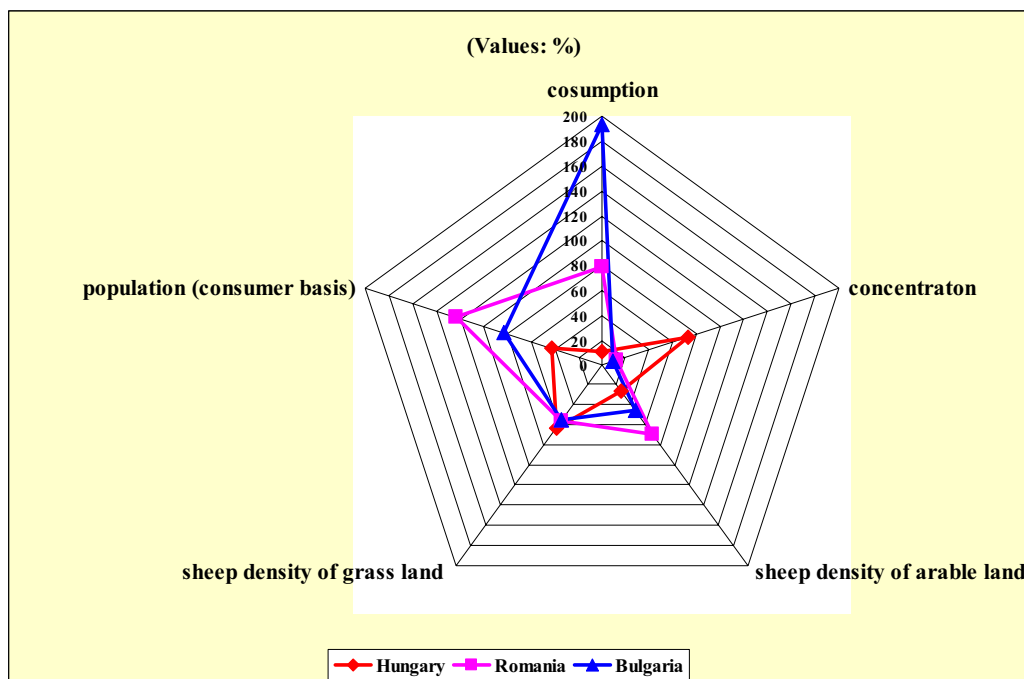


Figure 1.
Competitiveness Factors of sheep production of Hungary, Romania and Bulgaria in the rate of the same data of the EU-15 (2003)

Source: On the basis of FAO 2005.

Population and output indexes are showed at **Figure 2.** Relative quantity of live sheep production is given in heads and also in weight, because in Hungary and in the neighbor countries lambs (low weighted) are the main products, but in the northern EU countries farmers produce bigger lambs for market. Given the relative values at Figure 2, it is evitable that Romania exported twice as much lamb to the EU as Hungary did, and unfortunately Bulgaria also has good opposition at the export of fresh carcass and also live animals. But given the relative export capacity of each country, it is known that Hungary exported 80% of the total meat production. It would advisable to improve our fresh meat export and output

figures because Romania and Bulgaria is going to join to the EU-25 in 2007 and get better position as competitors.

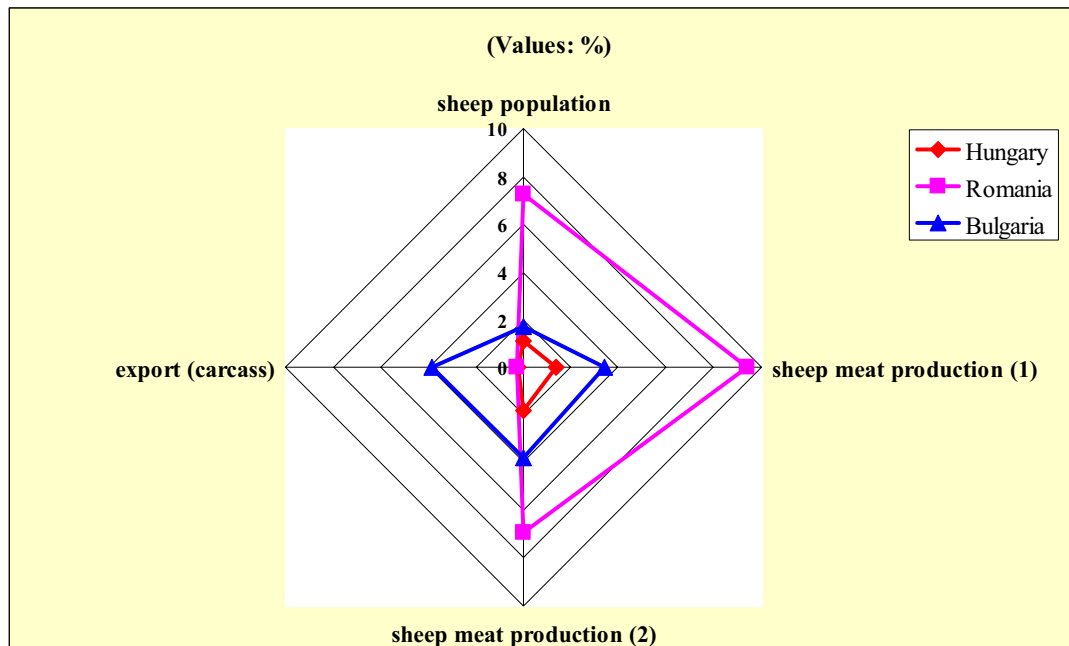


Figure 2.
Sheep population, sheep meat production and meat export of Hungary, Romania and Bulgaria in the rate of the same data of the EU-15 (2003)

Source: On the basis of FAO 2005.

(1) calculated on the basis of weight, (2) calculated on the basis of head

3. 1. Role of Risk in Agricultural Production

It is acknowledged that risk and uncertainty play an important role in agriculture worldwide. Farmers and producers are exposed to the difficulties of the market environment mainly in countries with changing and developing market economies. The need to uncover the sources of risk and uncertainty in agriculture is an inevitable managerial task, and this was especially the case under the unregulated circumstances that emerged after the collapse of Hungarian agriculture that occurred in the 1990s. Farmers found themselves within new land-, ownership-, and tax conditions which required conscious entrepreneurial behavior and thinking. Consequently, farmers have had to confront new risk sources and uncertainties given by the new and special market environment in Hungary.

3. 2. Statistical Results of Risk Sources

The grouping of risk sources and management techniques was also based on literature (**GABRIEL and BECKER (1980), MARTIN and McLEAY (1998)**), but specialties of the Hungarian sheep sector were also involved. Risk sources were evaluated on a 5-stepped Linkert-scale by the farmers. In sheep farming may emanate from a number of sources. These include mainly production (or technological) risk, financial risk, price risk and human risk as well. It was covered by the **8 question group by 33 questions**. (See: Appendix 1. of the thesis).

On the base of the importance of the different risk sources, there were created a rank. Within the whole sample (512 sheep farmers) fee most important risk factor was the quantity of rainfall and product prices with 4,2 average especially lamb prices with 3,9. Lamb is the most important income source (95%). Production risk is the variability inherent in the production process itself. This type of risk impacts on profit and yields. On the other hand, the price of purchased inputs (feeding stuffs, transportation and veterinary services) were also important risk factor with 3.9 average. The combined risk from both of these sources is termed business risk, and tends to be reflected in variability in the net operating income (or net cash flow) of the farm business. Theft was also important with its 3.5 value and reasons are evident because in Hungary security and safeguarding have relatively high costs.

The least important risk soure were the prices and contracts of milk production in sheep farming with 1,8 value. Only 2% of sheep farmers produced milk within the sample. Producers' assessment of production risks was not quite uniform regarding the different production conditions. They made a differentiation according to the quality and the quantity of their pasture and production area, size and type of the flock of their sheep. Financial risk is essentially the risk being unable to meet prior claims with the cash generated by the farm, and is determined by the dispersion of net cash flows, the level of debt, and other pools of financial resources (2,2 average). The components of financial risk used to be the most severe in the evaluations given by the producers. The traditional view of risk, which divided sources of risk into production, price and financial risks allow the impact of each of these sources of risk on the farm operation. This can be clearly traced by observing the influence on yield, output prices and input costs, and residual cash flows to the owners' equity.

3. 3. Statistical Results of Applying Risk Management Techniques

From question group 9 sheep farmers have to evaluate risk management techniques. They had to use selective answers (yes/no) and then, if the answer was yes they had to use the Linkert-scale again. Risk management techniques, which can reduce risk, may incorporate production, marketing and financial responses. Production response includes selecting enterprises, fields or animals, which are known to have a low yield capacity. Enterprise diversification may also be an appropriate way to reduce risk. Modification of technical and technological practices may serve also as a tool to reduce risk on the sheep farm.

The most widely applied techniques were the cooperation between farmers and joining to an integration applied by 74,4% of the farmers. The second most popular technique was keeping of feeding stuff reserves with the rate of 73,3%. Collection of information and monitoring were also important and widely applied techniques above 60%. Above 50% were applied the diversification and other money reserves. Forward contracting or hedging on the future markets allow products, and in some cases inputs, to be priced before delivery was not that popular such as debt management and keeping debt low with their low rates of 16,3 and 16,1.

The low results of debt management and off-farm investment shows that most farmers are poor; have no equities and capital to resort debt or other investments. Irrigation and not producing to full capacity also cannot be widely applied by Hungary in sheep production, where the average rate of lambing is 0.9 and irrigation is an extra cost. Therefore, farmers try to utilize all the sources they have at as low a cost as possible.

Some results were below the average, but above 3 value: such as short term flexibility (3,4), more variety or technology (3,3) other investments (3,3) and producing not to full capacity.

Although the wide range of risk-reducing strategies may be possible in principle, the number of strategies, which are actually available to an individual farmer, is likely to be much more limited in practice. Some types of strategy may not be appropriate for a farm of a particular size or production-type, type of ownership structure, or may not be available in a particular region. As a result of the survey I have found that sheep farmers try to apply risk management techniques as it is possible under the given conditions of them. Economies of scales and lack of capital are difficulties to carry it out.

To compare the use and importance of application of the risk management techniques it is clear that the lowest values have techniques related to the debt management, but it is also known that these are the most effective risk reduction methods in generally.

Joining to a production integration was highlighted as a risk management technique but the effectiveness was quite low 3,5. It means that producers know the positive role of this technique, but it is still not as effective as it could be.

Feed reserves are important in the animal production and also in sheep production, especially in winter time. Prices of feeding stuff have an important effect on the costs of sheep production.

Market and information and monitoring were also important for sheep farmers in spite of that it not a guarantee for the safe and profitable management and production.

Spreading of selling time is also a paradox fact, because is widely known that it could be the best method of providing a safe and continuous income for the farm, but it was not so popular techniques of risk management for the farmers in general.

Security and safeguarding was important as cost, and also as effective risk management techniques of risk management in sheep farming especially in Hungary. 40% of asked farmer have applied this method in spite of that they kept their animals around the family house.

3. 4. Statistical Results of Applying Risk Management Techniques

By applying these methods, I have proved that the main factors of sheep farming, such as ewe number or the size of arable land and pasture, have an influence on the revealed risk sources and the applied risk management techniques. According to risk aversion and the evaluation of risk sources, there are three different Risk Groups of sheep farmers. The Groups are referred to as A, B, C. Different and important characteristics of the Groups are listed in **Table 2**. The Groups have different flock and land/pasture sizes, which characterize them as small, medium and large from the point of view of sheep production.

Table 2.

Average Values of Risk Group Characteristics				
Characteristic of Clusters	A	B	C	Total
Ewe number	94	53	146	91
Age of the farmer (year)	49,8	51,3	51,5	50,5
Arable land (ha, average)	13,9	9,3	81,6	24,3
Rented arable land (ha, average)	4,5	2,1	70,1	15,2
Pasture (ha, average)	14,1	7,4	71,6	22,2
Rented pasture (ha, average)	6,6	3,4	62,5	15,4

Source: Own construction

The listed parameters directly take into effect the risk aversion of sheep farmers. So these parameters determine the importance of risk sources for farmers and the applied risk management techniques of them. The evaluation results are shown in **Table 3. and 4.**

The larger economic size (Group C), and smaller defenselessness of these farms resulted different risk sources and importance for farmers. The applied risk management techniques also varied by farm size. Those risks are highlighted, which are in direct connection with profitability and hardly influenced by farmers. Such as epidemics, weather conditions, natural disasters, regulation tools, input and output price, and those risks which are in relation to the person of manager. Farmers in this group are used wider scale of risk management techniques to reduce risk during their production. In relation to the owners of so-called small and medium size farms, decision makers in Group C are used less but more effective and expensive techniques of risks. These techniques are irrigation, debt management, and expanding selling period, diversification as other investments, short term flexibility.

For the medium size farms (Group A) the main risks are: changes in costs and prices, lack of contracting, theft, risks regarding to the manager such as accidents, illness and generally weather conditions. In the field of risk management they highlighted the information management and monitoring in all fields of production: (weather, pest and diseases, prices). In addition to these, they try to decrease risks by applying property and life insurances. Joining to an integration or producer's group is a new practice in the field of risk reduction. Diversification means producing more crops, which is a good risk management technique to reduce costs of feeding stuffs, and also serves as an alternative income source.

Farms in Group B has the smallest flock and land size. The basic risk sources for these are rainfall quantity and distribution, but prices of lamb and inputs costs were also important for them. These factors are the reasons of deficit and wastage. Lack of rainfall is the main reason of lower production yields and higher feed prices, less profitability. An interesting result is that these farmers apply the most risk management techniques and these were different than in the techniques applied by the other two groups. They favorite methods were keeping feed and cash reserves, pre-contracting, other off-farm jobs of family members.

Table 3.

Importance of Risk Sources in the Certain Risk Groups			
Risk Sources	Risk Groups		
	A	B	C
	Average	Average	Average
Rainfall during the year - 8,1	4,63	4,32	5,00
Other weather conditions - 8,2	3,71	3,37	4,33
Natural disasters: fire, flood- 8,3	2,39	2,33	4,17
Epidemics - 8,4	3,37	3,11	4,83
Changes in product prices - 8,5	4,49	4,28	4,83
Changes in lamb prices - 8,6	4,71	4,26	5,00
Changes in sheep milk prices - 8,7	2,21	2,15	2,67
Changes in wool prices - 8,8	3,37	3,53	3,67
Missing sheep milk selling contracts - 8,9	4,14	3,25	3,00
Missing lamb selling contracts - 8,10	2,14	2,08	3,20
Missing wool selling contracts - 8,11	3,38	2,76	1,80
Missing breeding animal selling contracts - 8,12	3,61	2,83	1,80
Breaking of contracts 8,13	2,68	2,30	2,83
Unethical merchandise -8,14	3,55	3,31	3,67
Changes in input costs - 8,15	4,14	4,02	4,17
Changing of interest rates - 8,16	2,33	2,25	3,50
Changes international policy and economy - 8,17	3,51	3,28	4,67
Changes in Hungary's economic situation - 8,18	3,71	3,59	4,50
Changes in Hungarian Agricultural Policy – 8,19	3,92	3,63	4,50
Changes in local body law and regulations - 8,20	3,21	2,96	3,50
Environmental regulations - 8,21	3,21	2,89	3,67
Operation of Production Boards - 8,22	2,95	2,54	3,50
Changes in land prices and rent costs - 8,23	3,00	2,54	3,67
Accidents or health problems 8,24	4,18	3,36	4,50
Changing in family situation - 8,25	2,68	2,50	2,33
Changing of labor costs -8,26	2,97	2,16	3,67
Theft -8,27	4,34	3,34	3,83
Changes in production technology- 8,28	3,08	2,41	3,33
Breeding policy, hanging of animal breeds - 8,29	3,29	2,60	3,67
Animal reproduction problems - 8,30	3,66	3,11	3,83
Animal heath problems - 8,31	3,68	3,20	4,67
Operation of organizations in the sheep sector - 8,32	2,79	2,47	3,83
Lack of integration of producers - 8,33	2,50	2,52	3,33

Source: Own construction

Table 4.

Applied Risk Management Techniques in the Certain Risk Groups

Applied Risk Management Techniques	Risk Groups		
	A	B	C
Producing more crop variety - 9,1	1,414	0,843	0,838
More crop variety, breed, or dual-purpose animals 10,1	1,019	0,923	1,063
Maintaining feed reserves - 11,1	1,017	1,114	0,883
Not producing to full capacity - 12,1	0,877	0,980	1,164
Short term flexibility - 13,1	1,039	0,755	1,275
Weather forecasting - 14,1	1,261	1,068	0,742
Monitoring of pest, diseases, crops, prices -15,1	1,432	0,885	0,789
Market forecasting - 16,1	1,157	1,338	0,646
Irrigation of crops and grassland - 17,1	0,696	1,032	1,392
Expanding selling period- 18,1	0,922	0,784	1,384
Forward contracting - 19,1	0,722	1,544	0,897
Up-to-date market information - 20,1	1,136	1,372	0,642
Cash reserves - 21,1	0,997	1,163	0,863
Other agricultural investments-22,1	0,806	1,087	1,141
Off-farm jobs of family members - 23,1	0,801	1,178	1,061
Assistance of family members - 24,1	0,841	1,376	0,865
Other off-farm investments in other industries.-25,1	0,848	1,176	1,002
Debt management, monitoring - 26,1	0,802	0,687	1,815
Keeping debt low. - 27,1	1,314	0,428	1,779
Long-term flexibility -28,1	0,888	1,081	1,042
Capital management-29,1	0,928	0,999	1,079
Insurances - 30,1	1,120	0,894	0,998
Security, safeguarding. - 31,1	1,352	0,860	0,860
Joining to an integration - 32,1	1,128	1,222	0,725

Source: Own construction

4. NEW SCIENTIFIC FINDINGS

1. As it was outlined in the aims of the research, **I summarized and systemized the main factors determining the competitiveness of animal production.** The special characters of animal production were highlighted in the evaluation.

2. According to the systemized factors **I evaluated the competitiveness of Hungarian sheep sector.** Where it was possible the evaluation contains numeric values, in other cases I used commented facts. There were two levels of evaluation, because parameters of Hungarian sheep production compared to similar data of the EU-25 countries and Romania and Bulgaria as our main competitors in the sheep market. (Results are showed in Table 1.)

I realized that: the comparison to the EU is not relevant in every field of measurement because there are too big differences at this level. But there are tendencies and conclusions of this examination. Natural endowments of Hungary are good enough to operate sheep sector such as for the main sheep producers in the EU. But given the present situation of the Hungarian sheep industry the real competitors are the Romanian and Bulgarian sheep farmers. They have similar products and conditions for sheep industry. Our advantages are concentration of sheep population and present value of live sheep export.

3. By **executing a representative field survey I evaluated risk aversion and risk management techniques of sheep farmers in Hajdú-Bihar County** (by the assistance of 516 sheep farmers).

I realized and proved that the main and most important production parameters determine the sources of risks and there importance and the applied risk management techniques. The most important risk sources (the overall sample) is those risks which can not be influenced by the farmers, such as weather conditions, (rainfall), changes of lamb and cost prices. The most widely used risk management techniques were the joining to any integration, maintaining feed reserves and information management.

4. By applying the multivariable statistical methods I realized that **factors determining the size of sheep farms** (ewe number, size arable land and pasture), **are also define the type and importance of risk sources and risk management techniques applied by the sheep farmers.** Farmers' estimation of risk sources and the applied risk management techniques can be marked and explained by characters and the parameters of Risk Groups.

5. At sectoral level sheep farmers are operating under the same conditions, but at farm level they have different circumstances and production results. I realized that basically sheep farmers meet the same sources of risk, but the evaluation of these risks is different depending on the farming conditions. Consequently, sheep producers are applying different kind and number of risk management techniques to reduce or avoid risks. Regulated market economies provide a kind of security for agricultural producers, but at the same time farmers have limited tools to manage risk. According to the results of my research and evaluation it can be suggested to apply a size-specified development of sheep farms.

5. THE PRACTICAL USE OF THE RESULTS

As a result of the evaluation of the competitiveness I compared the Hungarian sheep industry to those countries which are considered as competitors at the EU sheep product market. I justified that Hungary has two main competitors: Romania and Bulgaria as newly joining countries. They have good, and sometimes better conditions to produce and export sheep meat and sheep milk. By realizing and proving these facts it is confirmed that there are a greater requirement to improve and develop this sector, in the short run. Another reason is the relatively high export value of Hungarian sheep meat production within the animal production.

By the evaluation of the field survey it was proved that sheep farmers are clearly recognize risk sources of their production. The estimation of importance of these risks is different as also the applied risk management practices. It varies according to the farm size, characteristics and farming background. Farmers can be classified according to their risk aversion. By providing information and training for sheep farmers and paying attention to their risk managerial skills and farm size a specified development of this sector could be realized.

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