THE ISSUES OF THE RELATIONS OF HUNGARIAN GAME-MEAT PRODUCTION AND SELLING

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Abstract: *Due to the favorable natural features of Hungary, it is possible for hunters to obtain the excellent "raw material", which can be placed on the consumers' table all over the world, after careful processing in Hungarian game-meat production units. The study focuses on the relationship between game-meat processing and shot game sales, with special regard to the development of the sales and possible directions of the development of each shot big game (red deer, fallow deer, roe-deer, mouflon, wild boar). Hungarian game-meat processing and game sales have undergone a major transformation over the past few years and as a result, tests are required to find out what positive or negative changes have occurred in this field. We applied mathematical-statistical methods to analyze the main trends of change and to formulate the main directions of development, regarding the strengths (S), weaknesses (W), opportunities (O) and threats (T) of the market.*
Keywords: *fallow deer, game-meat, mouflon, processing, red deer, roe deer, selling, wild boar*

1. INTRODUCTION

The wild animal, as a renewable natural resource, is constantly changing. Natural and ecological factors such as climate, habitat coverage, and the quantity and quality of food will result in a continuous change in the development of wildlife stocks. These factors can all change the "price" of the game. While in some geographic regions the population of the species is "treasured", which is worth saving, some hundreds of miles away the intensive utilization of the wild animal population is justified (Horváth et al. 2016, Komarek 2008).

One of the main products of hunting is game-meat. While in the ancient times it was a means of subsistence, today it has become a so-called "curiosity" product with significant economic value. Experience shows that game-meat is a "dubious safety", expensive consumer product for the "non-hunting society". This uncertainty exists in consumers even though research repeatedly proved the excellent quality of game-meat compared to the

traditional meat products. The meat of wild animals living in nature has characteristics that are different from the meat of the farm animals (Bíró 2002).

Due to the natural lifestyle, the eating habits and the quality of food of the game species are significantly different from those of the farm animals and can therefore be considered as "organic product", as the "product" is created without the use of antibiotics or hormone preparations. Out of the meats, it is game-meat that contains the most protein (21-25%). Game-meat is fat-free, the fat content ranges from 1 to 6%, depending on the age, gender, and nutritional status of the animal. It is predominantly rich in B vitamins (B1, B2, B6, B12) as well as in vitamin A and vitamin D and in minerals. It has a characteristic dark red color that is due to higher myoglobin and blood content. It is solid, with a tough structure and it is rich in polyunsaturated fatty acids. It has many taste enhancing materials, which provide a typical, pleasing flavour to the meat (Gombos et al. 2012). The pH ranges from 4.8 to 5.6 in the acidic zone. The presence of antibacterial inhibitors allows for longer shelf life, resulting in slower deterioration of meat, and softening during the ripening period, which increases its consumption value. It is well-known that it has a higher number of germs, which is mainly the result of post-shooting therapy (Bíró 2002).

After hunting, the factors influencing the quality of game-meat are the environmental impacts on the body (temperature, contamination, evisceration). The quality requirements differ from the classification of slaughter animals. The quality of pigs and cattle should be determined based on the weight of the carcase and its meat content, and they also affect the purchase price. In case of game animals, the rating is also significantly influenced by the location of the shot (Lőrincz et al. 1973).

Since Hungary joined the European Union, the food hygiene rules concerning the handling of shot wild animals and their sale have been altered by the ministry three times by amending the regulation or by creating a new regulation (Hajas 2013), while the relevant EU law remained unchanged. The food hygiene conditions for game-handling and sale are governed by the current decree of 43/2011. (V.26.) VM. The Regulation does not apply to cases where the game intended for consumption is:

- kept on a farm
- found dead
- was hunted solely for private consumption by the hunter as the final consumer or the hunted game was handed over to the hunter, who has a hunting ticket, by the hunting unit who owned the wild animal, or they sell

it to the final consumer, who takes part in the wildlife management activity as primary producer in the hunting area of hunters.

Game-meat may be sold by hunters to companies buying, selling and processing food or directly to the final consumer. The latter option is referred to as a "small volume of sales", subject to the following statutory provisions: "Those hunting entities, for which the number of big game intended for harvest in a hunting year does not exceed 100 big game (...) a year, can sell up to 100 per cent of the big game hunted on the hunting ground, up to a maximum of 100 big game. Those hunting entities, for which the number of big game intended for harvest in a hunting year exceeds 100 animals (...) a year, can sell 100 big game animals hunted on the hunting area during the hunting season and 40 per cent of the big game shot above this number. In case of small game, the quantitative limit is 5000 animals.

The purpose of introducing this legislation was to allow the hunting entities as primary producers to sell the wild animals hunted on their territory under controlled conditions, on the spot. In the case of direct sales, however, under "controlled conditions" there are several obligations for hunters, so it is understandable that they consider it a "simpler way" to sell to a buying and processing company.

Game-meat is examined in two phases: ante and post mortem (Laczay 2013). During an ante investigation, the hunter executing the shoot is obliged to assess the status of the wild animal that is to be shot. Consideration should be given to the behaviour of the animal, and if it is different from the natural, the causes should be considered (e.g. illness). It is important to have accurate visual inspection of the body. Are there any abnormal impurities (e.g. excess faeces) visible on the animal? Is the motion and the body condition typical of healthy wildlife? Answering these questions should be with the utmost certainty, before culling the animal, as there are some external signs even before the shot that determine whether the meat can be consumed. Care should be taken not only on wildlife, but also on the environment, and it is advisable to examine the origin of contaminations (e.g. poisons, chemicals) (Laczay 2013).

Big game (red deer, fallow deer, roe deer, mouflon, wild boar) must be eviscerated immediately after shooting. However, it should not be skinned and chop up on the spot "(Bíró 2002). The process of evisceration and its proper performance are of great importance for the preservation of the consistency of the meat, therefore it should be carried out as quickly as possible. Attention must be paid to the place of shooting and its cleanness. If weather conditions are suitable, the game must be eviscerated on the spot.

At the beginning of the evisceration, the game should be placed in a stable back rest, and the organs must be removed from the tongue to the anus raised from the carcass in full (Gombos et al. 2012). During the operation, care should be taken to minimize the risk of hurting the internal organs, so that the content of the stomach and intestinal tract would not contaminate the valuable meat parts. Blood collected in the abdominal cavity should be removed with a dry material. To prevent the meat from getting stuffy, the abdominal cavity should be supported by wooden rods. After evisceration, all visible dirt must be removed from the outside and inside of the body (Bíró 2002).

In case of small game, the body may be stored for a maximum of 15 days at temperatures between -1 and +4 degrees Celsius without evisceration and skinning. As a first step, the urinary bladder of cotton-tails and hares must be emptied. The further steps of the process are very similar to the evisceration of big game. The internal organs must be removed in one, taking care to avoid contamination and to preserve the quality of the meat. In case of game birds, proper cleaning is essential because there is a high risk of stomach or intestinal injuries due to the size of the body, (Bíró 2002).

"After evisceration, the truncated body of all big game for sale on the market, together with their viscera, must be presented to the qualified game-meat inspector or veterinarian for examination" (Laczay 2013). The examination of the meat should preferably be carried out on the spot. If this is not possible, the body must be transported to the wildlife collection site. The hunter (and eviscerator) is obliged to inform the person performing the meat testing before the shooting and about the facts of the evisceration. If the meat inspector detects a change, he or she must notify the official veterinarian who examines the body and then decides if the meat is suitable for consumption. When the person conducting the test finds the body in order, they will issue the certificate confirming that the game has been tested, the certificate has parts of the usability decision, and that traceability is ensured by recording the big game identification mark (Laczay 2013). In the case of small game, a small game collection certificate will be issued.

The official veterinarian shall carry out a post-mortem inspection at the game-meat processing plant where the following shall be carried out:

- visual inspection of the body and organs
- examination of organs by hand
- residue analysis with sample-taking
- for trichinella-sensitive animals (wild boars), Trichinella test (in case of a positive result the meat must not be sold)

- in case of small game, testing a representative sample of animals of the same species (Laczay 2013).

Based on the test results the meat can be classified as follows:

- suitable for human consumption: it is justified by putting an animal-health-mark on it
- unsuitable for human consumption

After completing the meat examination, the certificate or small game collection certificate will be withdrawn (Laczay 2003)

The test must be carried out on the hunting area within 48 hours of the killing (in case of small quantities of meat intended for sale or delivery to a local consumer or directly to a catering establishment). If the meat is suitable for consumption, the veterinarian carrying out the examination completes the meat delivery certificate.

In the game processing plant, the carcasses first go into the receiving pre-cooler. From the receiving pre-cooler, carcasses can move in two directions: to the processor, or to the storage place. Pre-cooled carcasses are frozen at -30 degrees Celsius until they are -12 degrees Celsius then they are stored in storage chambers (Bíró 2002). The first step of processing is melting under controlled conditions, as it is the critical point of production. Inadequate procedures may involve a high degree of micro-proliferation (Bíró 2002). Melted carcasses are placed in the skinning chamber and after the hair is removed, they get on the processing path where the cutting process begins.

There is one point where small game processing essentially differs from poultry processing. A significant part of game birds comes from farms. Killing is not done by cutting, it happens by striking, choking or clubbed. The purpose of this procedure is to avoid excessive bleeding, thus preserving the "wild nature" of the meat. The next steps (skinning, plucking, eviscerating) are the same as those of poultry processors (Bíró 2002).

If the food hygiene rules of wild game management and sale are observed, then the raw meat and the products made from the meat of Hungarian game species will remain a much sought-after commodity on European markets (Kőhalmi et al. 1996). Unfortunately, Hungarian game-meat consumption is currently 0.4 kg/person per year (0.7-1 kg/year in the European Union), which cannot be relied on long-term commercial levels. With this value, considering other countries, we are among the last in Europe. The positive qualities of wild game-meat are recognized, however, due to the established habits and sometimes the very high consumer prices, domestic sales are 10% in Hungary, while export sales are 90% (Abonyiné Palotás J. et al. 2004, Komarek 2004, 2005, Süli-Zakar I. et al. 2012).

The product range, i.e. the finished product, moves on the widest possible scale according to the customers' needs and current market demands. The meat may be completely boned or remain treated as a bony product, in a pre-cooled or fresh state. These processes naturally affect production costs and influence output. "Due to the method and the circumstances of the killing, and a smaller proportion of recoverable body-parts of the output of the deer is 55-70%, while that of the boar is 30-50%". (Balsay 2013).

2. MATERIALS AND METHODS OF RESEARCH

For the analysis we used the statistical data available from the Hungarian National Wildlife Management Database (OVA) as a data source. The data provided the indicators that enabled a comparative analysis of the Hungarian game-meat sales over a period of time and the presentation of the main trends in the changes that took place. The analysis covers the period from 2006 to 2016 and focuses on big game (red deer, fallow deer, roe deer, mouflon, wild boar) that play a significant role in Hungarian game-meat sales.

In recent years, significant changes took place in Hungarian game-meat sales. These changes make it necessary to carry out tests and analyses that provide answers to the question whether positive or negative changes have taken place in game-meat sales as well as the significance and role of which wild animal species have increased or decreased in recent years in this field. To answer these assumptions, we applied mathematical-statistical methods for our analysis.

3. RESULTS AND DISCUSSION

The sale of the shot wild animals has increased since the mid-1990s. The potential of sales has been clearly in the export market, and still there is today. In 1996, the volume of sales was 2500 tons, and by 2002 it almost reached 7000 tons. From 2002 to 2005 (10-15% per year) the amount of game-meat on the market was continuously reduced. The cheap game-meat from overseas farms appeared. The decreasing demand clearly led to a decrease in prices, which, of course, influenced purchase prices as well. Berger and Csányi, based on the data from the National Wildlife Management Database, investigating the period from 2005 to 2014, found that the game sales and the resulting income increased from 16% to 26% over a decade, and are slowly reaching the income deriving from fee hunting. (Berger et al. 2015).

According to Pechtol (2013, 2016), between 70% and 80% of the shot wild animals gun goes, through food businessmen or directly, to game processors. Some purchasers distinguish between I and II. Class products (broken down into game species), the purchase price of which is different. Carcasses that were shot without hurting the spine and the thigh belong to Class I, while carcasses with injured spinal columns and thigh contaminated with faeces or other substances. Naturally the eviscerated weight is considered in both categories (Pechtol 2013, 2014).

Based on veterinary tests, the classification of processing and sales are also determined. There are basically three categories to be distinguished:

- unconditionally available in hair-and-skin
- cut-up due to shooting or handling faults, the damaged parts must be removed
- unsuitable for processing – confiscation (Balsay 2013).

In terms of sales volume between 2006 and 2016, wild boars and red deer were the best, but the sales of all examined game-meat showed an increasing tendency.

Sales of wild boar meat increased by 86.3% compared to the base year of 2006 (Figure 1). Sales peaked in 2012 (5.7 million kg).

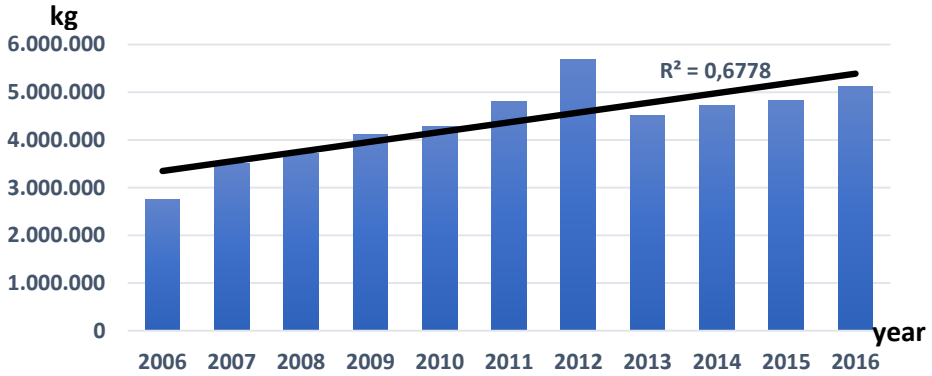

Figure 1. Hungarian wild boar meat sales (2006-2016)
Source: Author's calculations, based on OVA data

The second most-liked game-meat among the shot big game is the red deer meat. Its sale in the research period (2006-2016) increased by 71.3% for the final year compared to the base year (Figure 2).

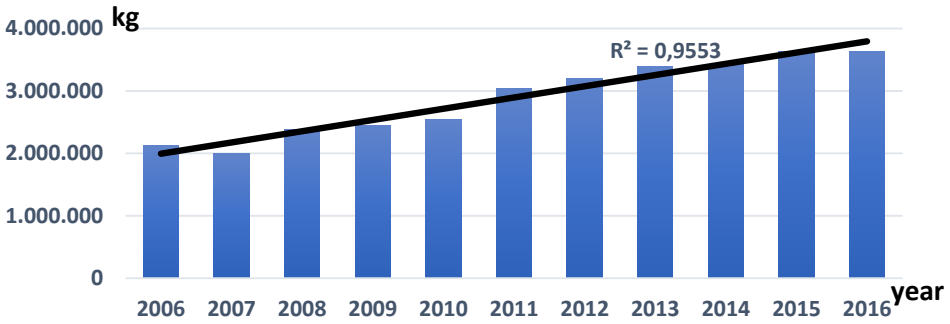

Figure 2. Hungarian red deer meat sales (2006-2016)
Source: Author's calculations, based on OVA data

The solvent demand for roe deer meat also showed an increasing tendency in the examined period (Figure 3). Its sale increased by 53.6% for the final year (2016) compared to the base year (2006).

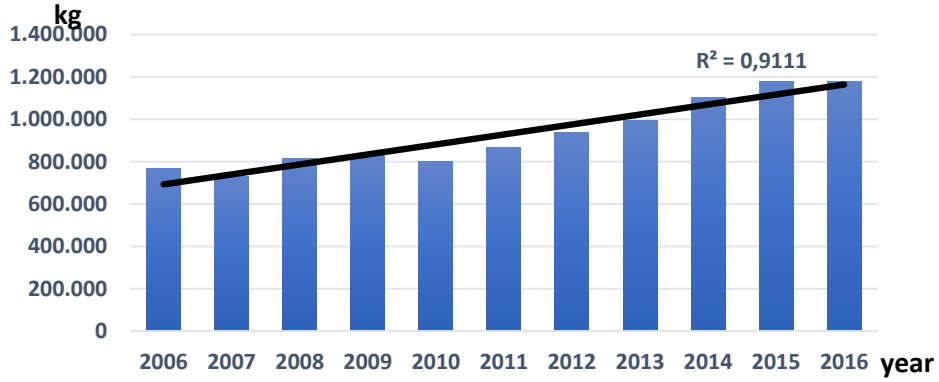

Figure 3. Hungarian roe deer meat sales (2006-2016)
Source: Author's calculations, based on OVA data

The sales volume of fallow deer was less than that of the previous ones in the examined period, however it had an increasing tendency. From the 2006 base year to the year of 2016 the selling increased by 86.6%.

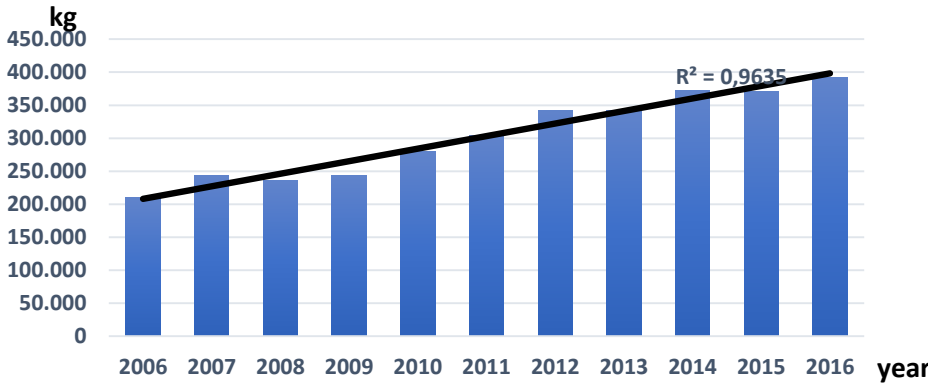

Figure 4. Hungarian fallow deer meat sales (2006-2016)
Source: Author's calculations, based on OVA data

Out of the shot game, the sale of the mouflon was somewhat hectic in the examined period between 2006 and 2016, although its tendency was also increasing. Compared to the values in 2006, its sale increased by 47.1% for the year of 2016. The selling peak was in 2015 (63.098 kg).

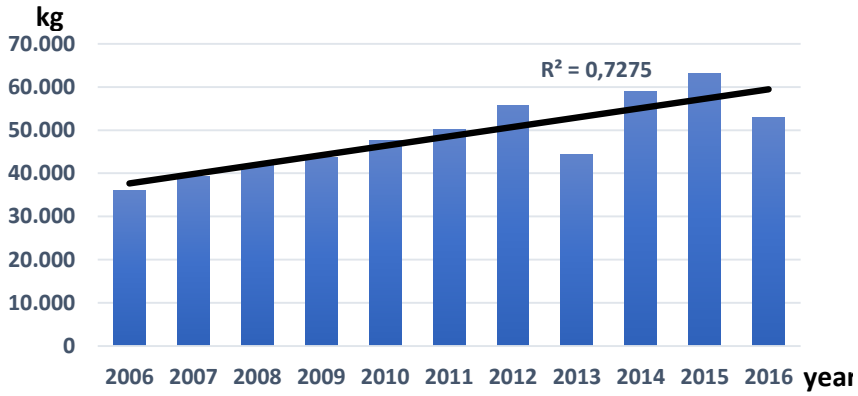

Figure 5. Hungarian mouflon meat sales (2006-2016)
Source: Author's calculations, based on OVA data

Export plays the decisive role in the sales of the Hungarian shot big game. There is a significant demand for the Hungarian game-meat mainly in European markets. Among the European countries, Germany, Austria, the Czech Republic, the Netherlands and Italy are particularly important in this field.

4. CONCLUSIONS

During the last few years, Hungarian game-meat, due to its high quality, has been highly sought after in the Western European game-meat market. This market could take up the total Hungarian game-meat quantity, and based on some estimates, it may even be multiplied. However, overseas competitors should be considered as well. The largest competition in the field of sales is the non-wild farm-game-meat on the European market, which is regularly come from North America, New Zealand and Australian farms, in most cases at a lower price. This can primarily cause problems with the sale of deer and wild boar meat. The unpredictable quantity of game-meat coming from overseas to Western Europe, and sometimes its significant dumping, may have a significant negative impact on prices, which unfortunately cannot be avoided.

The growth and possible collapse in the sales market are also affected by animal health considerations and illnesses. The illnesses (such as BSE) in domestic animals (e.g. pigs and cattle) sometimes have a stimulating effect on the viable demand for game-meat. In this case, there may be an increase in the volume of need for game-meat. It can also have a beneficial, positive impact on prices.

Among our export markets, there is Germany, Austria, Italy, the Benelux countries (mainly the Netherlands), Scandinavia, Switzerland and France. Out of these, Germany has a decisive role. 65-70% of Hungarian game-meat is sold to German markets. A significant part of customers belongs to wholesale networks.

Hungarian game has a lot of competition abroad but still has remained competitive due to its reliability, packaging and high-quality parameters. The competitive advantage and the main value of Hungarian game-meat is in the conditions of keeping. In Hungarian forests, wild animals grow naturally, and therefore they can be considered organic. Unfortunately, however, the previous parameters becoming less and less enforceable in prices.

The domestic demand for game-meat in the Hungarian market is far below the Western European level. While in Western Europe the per capita consumption of game-meat is 0.7-1 kg/person/year, in Hungary it is only 0.4 kg/person/year. In the longer term, the need for game-meat may increase with increasing domestic solvent demand and changing consumption patterns. Consequently, it can also be beneficial for the volume of domestic sales of companies.

Overall, it can be concluded that the sales of the examined shot wild animal (red deer, fallow deer, roe deer, mouflon, wild boar) showed a growing tendency during the examined period. The largest increase was in case of the wild boar, the lowest in the case of the mouflon. This is an encouraging sign that the solvent demand for Hungarian game-meat and the domestic and foreign sales opportunities will continue to grow in the future.

The assessment of the situation and market opportunities of the Hungarian game-meat industry is supported by the SWOT analysis bellow (Table 1). By means of this, internal and external factors have been identified which may have a positive or negative impact on the game-meat market and through that on the sale of game-meat.

Table 1. The SWOT-analysis of Hungarian wild game-meat sale

INTRNAL FACTORS	
STRENGTHS (S)	**WEAKNESSES (W)**
good environmental sources	high transportations costs
excellent quality	high production costs
products with good reputation	lack of marketing
long professional past, experience	low output rate, much loss
stable market	
strict animal health control	
EXTRNAL FACTORS	
OPPORTUNITIES (O)	**THREATS (T)**
increase in marketing activity	strong competition overseas
finding new markets	purchase difficulties – foreign traders
increasing health-conscious eating habits	saturating market
new product specifications	accumulating supplies
finding application possibilities	the benefits of game animals kept on farms
	the unpredictability of the market
	the diseases of wild animals

The excellent quality of Hungarian game-meat is recognized all over the world; this value must be appreciated, and the production of premium-quality products must be increased. The wild animal, as a renewable source

of energy, can be a widely utilized Hungarian product, which is a profitable product in the long term.

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