



**ENGLISH LANGUAGE ABSTRACTS OF PhD DISSERTATIONS  
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**Evaluative comparison of garlics planted in autumn and in spring**

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Dissertation Adviser: József Iváncsics, CSc, associate professor

The world's garlic production is increasing, while in Hungary there's always less garlic. The Hungarian production has two main growing areas: Makó, Dúsnok and their surroundings. Our aims were to show, that garlic can be grown safely on the area of North-West Hungary, if the rules of growing and pest management are kept and to choose from three French (*Arno*, *Thermidrome*, *Sprint*) and two Hungarian varieties, which can produce the highest crop on the above-mentioned area, considering the factors of weather and plant health. This study took place in Hanságliget, and in Jánossomorja. By the time of planting there are winter and spring varieties. From a morphological view there are softneck varieties (*Allium sativum convar. sativum*) and hardneck garlic (*Allium sativum convar. ophioscordon*). In our experiments were involved four winter (*Sprint*, *Makói őszi*, *Arno*, *Thermidrome*) varieties and a spring variety (*GK Lelexír*). Our experiments were made during four years (2006–2010).

***New scientific findings:***

(1) We convinced with our examinations, the shooting of garlic in Northwest-Hungary was minimum 88% by all varieties. (2) We determined, that the multiplication of leaves in time follows a linear way. (3) The stem and bulb nematode is one of the most important pest of garlic. We convinced, that there is a significant difference between the damage of stem and bulb nematode in different years. We found, that by the case of *Makói őszi* there is a tight power connection between the temperature of soil and infection of nematode ( $R^2 = 0.9091$ ). (4) The rust diseases appear before the harvest. We observed, that there is a significant difference between the infection in each years, which is related to the precipitation and temperature. (5) The cross diameter of garlic is described in standards. All of examined garlic varieties (*GK Lelexír*, *Makói őszi*, *Sprint*, *Arno*, *Thermidrome*) meets with the values of standards. (6) Diallyl-sulfone is an important sulfur compounds of garlic. We determined, that the Hungarian *Makói őszi* has the highest concentration of this compound. (7) By the examination of mineral content of garlic there was found a strict positive correlation between boron–calcium, magnesium–potassium, manganese–potassium, manganese–magnesium and zinc–phosphorus. We found a medium positive correlation between phosphorus–copper. (8) It is important to store garlic as long as possible. From the examined garlic varieties *Arno* and *GK Lelexír* can be stored the longest. So it's convinced, that a variety planted in autumn can show an excellent shelf life.

## Qualitative analysis of Silver carp and African catfish fillet and products

ESZTER MOLNÁR

*Dissertation adviser: László Szathmári, CSc, associate professor*

Nowadays, extraordinary emphatic role is given to healthy and conscious nutrition as this way we can sustain our body's health. Nevertheless, it is important to know more about the composition of our food. The author studied the raw fillet of silver carp (*Hypophthalmichthys molitrix*) as well as the chemical and fatty acid content and preservability time of products made of silver carp originated from pond and natural water samples in three different seasons (spring, summer, autumn). The author studied the chemical content of raw fillet of African catfish (*Clarias gariepinus*) fed for six weeks with three different oil supplements (fish oil, linseed oil, soy oil) in feed.

Goals of analyses demonstrated were to answer the following questions:

What is the chemical composition of silver carp's fillet and how does that vary annually (after overwintering, in the summer and before fish harvesting)?

In which period of year does silver carp contain the most n-3 fatty acid, how does fatty acid content vary after the period of overwintering?

Which products made of silver carp has the highest n-3 fatty acid content and how does chemical and fatty acid content alter in processed products?

What preservability do products of silver carp have?

In what extent can n-3 fatty acid content of African catfish be increased by oil added feeding?

According to the carried out trials the following *new scientific findings* can be stated:

1. Seasons do not significantly influence crude protein content of silver carp's raw fillet while fillet of fish originating from summer harvesting have greater crude fat content (441.6 g/1000 g dry matter) than that of the ones originating from autumn harvesting (364.3 g/1000 g dry matter) or from summer harvesting (384.1 g/1000 g dry matter).
2. The different pond and natural water habitat does not significantly influence the chemical and fatty acid content of silver carp's raw fillet.
3. Processing of silver carps causes significant decrease in crude protein content. Products made with the fewest additives showed the narrowest n-6/n-3 ratio: smoked fillet (0.43), carp sausage (0.51), carp meatball (0.57) and they have the most advantageous EPA and DHA content.
4. Smoking takes the most favourable effect for preserving silver carp fillets as the result of microbiological analysis smoked products have the longest preservability time (from seven to ten days).
5. Feed supplemented with 6% fish oil is able to significantly increase n-3 fatty acid quantity, EPA and DHA content of African catfish besides to narrow n-6/n-3 ratio of fish during a six weeks' period (from 1.86 to 1.12).
6. On the basis of studies the 6% linseed supplemented feed narrowed the n-6/n-3 ratio of African catfish (1.86 to 1.4) and significantly increased n-3 fatty acids quantity during six weeks. The 6% soy oil supplemented feed was not appropriate for this intention, it did not increase neither n-3 fatty acids, nor n-6/n-3 ratio.

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## **Application of different selection and biotechnical methods for rentable goat breeding**

SZABINA NÉMETH

*Dissertation Adviser: László Gulyás, PhD, associate professor*

The aim of the author's doctoral dissertation was to examine the performance, the breeding methods, the reproduction methods and the biotechnological methods of the most important goat breeds in Hungary. It was found that the milk quantity and somatic cell count are differently influenced by the morphology of the udder and teat in case of the Hungarian domestic goat under same keeping and feeding conditions. The temperament tests proved that with progressing age the temper of goats change, the younger does are more temperamental, than the older individuals. It was proved by the slaughter value tests, that the Boer kids showed the highest daily weight gain in case of the three genotypes (Boer, F1, Hungarian domestic goat). The Hungarian domestic herds' meat quality can be greatly improved by using Boer bucks. The reproduction was found to be significantly higher (by 20–25%) within the breeding season with the artificial insemination of does with buck sperm being fresh or chilled to 2–4 °C than over the breeding season. In Hungary for the first time, the milk and meat economic indices for the objective evaluation of the performance in the goat breeds were developed by the author.

According to the carried out trials the following new scientific findings can be stated:

1. During examination of the Hungarian fallow goat species – kept among identical keeping and foraging circumstances – jointly evaluated udder and udder morphology features influence the yielded amount of milk and number of somatic cells in a different degree (39%,  $P < 0.0001$  and 91%,  $P < 0.0001$ ).
2. Based on the results of temperament examinations among the examined three types (Saanen, alpine, noble Hungarian) the Saanen ones were the most calm. In case of goat species we proved that with the progress of age temper changes; younger mother goats are more temperament than elder ones.
3. Examining the daily weight gain of the three genotypes we can state that the Boer kids (215 g/day) achieved the best result, they were followed by the F1 (176 g/day) and fallow ones (159 g/day). The meat quality of the Hungarian fallow substances can significantly improved with Boer bucks. Already after the first cross-breeding sturdy improvement of meat producing ability was shown. With further increasing of Boer blood rate this result is continuously improvable.
4. During the artificial insemination the deliberated time of semination influences considerably the effectiveness of the applied technology. In case of synchronization of maturing beyond breeding season significant individual differences show up in mother goats becoming pregnant. During the artificial insemination of mother goats with fresh or 2–4 °C cooled buck semen in the breeding season essentially (with 20–25% more) better pregnancy results can be achieved than beyond the breeding season.
5. In our home regarding to goat species I worked out the milk- and meat producing economical indexes usable for objective economical evaluation of breeding facilitating value-measuring features as a pioneer.

## **Impact of Hungary's EU membership on the profitability of milk and pork production of the farms in the West-Transdanubian region**

ÉVA POGÁNY

*Dissertation adviser: Antal Tenk, CSc, professor emeritus*

The continuous yield reduction in the two most important production branches of Hungary's animal husbandry (cattle and pig), which started in 1990, could not have been stopped during the years after Hungary's joining the European Union in 2004. During the past 6 years not only the animal stock has greatly reduced, but the quantity of the products and the income of the farmers, too. By the end of the decade especially the situation of the swine branch got into a critical situation. Many farmers give up production and the pig stock fell to the level after World War II. The situation of the milk producers has not improved much yet. Despite the milk support system the majority of the dairy farmers have run their farm with losses.

Based on and utilizing the research results deriving from the pilot farm data and primer field investigations relating to the cost-benefit ratio of domestic milk production and pig fattening in several farms of the West-Transdanubian Region during the 6 years after Hungary joined the European Union (2004–2009) we can conclude the followings:

1. While the number of cow stock was reducing at national and regional level (though in the last 2–3 years it showed an upward tendency), there were farms with higher concentration (more than 600 cows) and larger than the average size (8–9 thousand liters), where the number of stock increased by some 20%. A precondition of this increase – besides high specific yields – is that farms should have enough land to satisfy their demand on animal feed.
2. Among the costs of milk production animal feeding costs represent the highest rate in every farm although at different levels. In the period of investigations we could observe the highest increase at this cost item. Within the cost increase determined by animal feed costs – because of notable differences in labour profitability and rate of housing capacity utilization other cost items (labour, amortisation and overhead costs) considerably decreased the specific costs of milk production. There could be a difference of almost 4 Ft/l in the ratio of cow keeping costs per one liter milk depending on the performance of the cows.
3. The influence of milk cost price and purchase price on the revenues from milk production and the cost-benefit ratio of the branch is fairly moderate ( $R^2 = 0.46$ ). The branch's result (which is actually composed of the milk price and far maids (quota) are greatly differentiated by the milking performance of the cows per year. Correlation calculations revealed that a difference of 25 thousand HUF (3%) per cow could occur in the yearly revenue of the six farms involved and the specific yield had a crucial role ( $R^2 = 0.91$ ), which was significant at 1%. Farm aids represent a growing rate in the incomes.
4. The relatively stable number of sows in the 11 farms of the region closely correlates with the trend of production indicators (natural efficiency of sows, fattening efficiency, production costs etc.) of both farm groups. These indicators are some 10% better than the country's, but they are still 23% lower than those in Denmark.

5. Because of the differences in the costs of sow keeping and output of pork quantity per sow per year in the two farm groups less sow keeping cost of 4 Ft/kg occur in pig fattening production of farms with industrialized practice. This favorable rate will be further improved by the higher level of labor efficiency and higher rate of housing capacity utilization that result in the reduction of specific labor and amortization cost by HUF 40 per kg pigs for slaughter.
6. The income of pig fattening – due to lack of farm aids – is determined by the cost price of production and the purchase price of pigs for slaughter. Since the differences in purchase prices are minor (HUF 1–2) the only determining factor of the income is the cost price regarding the realizable income on one kg meat type pig. Differences per sow in meat output per year are not significant between the farms, but their impact on the cost price can be mathematically described (5% on average).

## **Microwave effect on baker's yeast (*Saccharomyces cerevisiae*)**

ÁGNES SZERENCSEI

*Dissertation Advisers: Tibor Érsek, DSc, professor and Miklós Neményi, CMHAS, professor*

*The objective of the dissertation was to examine the 2,45 GHz frequency microwave irradiation effect on yeast cell (*Saccharomyces cerevisiae*). The study focused first of all on cell membrane, then on water, which is an essential component in all liquid biological media. Due to an unexpected effect of certain microwave irradiation, toxic materials or molecules, which are unable to penetrate under normal physiological conditions, can be transported into the cell. This can cause changes in living organisms. The biological effect appears in case, when there is a response on cellular level in the electromagnetic space.*

*New scientific findings:*

- 1. The widely used microwave irradiation is permitted and strictly regulated by WHO (*World Health Organization*) and ICNIRP (*International Commission on Non-Ionizing Radiation Protection*) and has a lot of unknown advantageous and hazardous effects. The application of optimized irradiation protocol (2,45 GHz, 37°C, 50W, 0-45 min) could prove a specific biological effect on yeast cultures. The applied constant temperature (nonthermal) irradiation did not inhibit the growth and multiplication of *Saccharomyces cerevisiae* cells.*
- 2. In case of certain molecular size and character, irradiation induces the molecular transport from outside into the inner cellular space of the yeast cell. The applied irradiation protocol seems to be an effective tool for facilitating the uptake of those compounds into cells, which cannot penetrate under normal physiological conditions through the cell membrane. Monitoring the effect in case of *S. cerevisiae*, antibacterial antibiotics with low molecular weight (chloramphenicol, gentamicin, and neomycin) were suitable.*
- 3. The combined biological effect of irradiation and antibacterial antibiotics (non inhibiting the yeast under normal conditions) shows unambiguous growth inhibition. The reason for the newly observed phenomenon might be in case of the lacking previous information the consequence of a transitory, reversible change in plasma membrane permeability upon irradiation. The experimental system seems to be suitable to study the different microwave effects.*
- 4. Irradiating different aqueous media, microwave has effect on the water as well. It was detected by electrolysis, that water as storing media is able to keep changes after irradiation for certain time, even for 48 hours. It has been confirmed, that the reason for that is not the heating, but microwave effect.*
- 5. Comparing the microwave irradiation and the heating on hotplate within the same definite temperature range, the non thermal effect of 2,4 GHz frequency in water media was determined. Beside the thermal effect of microwave there is the non thermal microwave effect. Further research is to be done to clarify and understand the exact molecular mechanism changes caused by radiofrequency irradiation.*

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## **A survey on the usability of radio frequency based individual identification system in case of different types of poultry**

ÁGNES TÓTH

*Dissertation Advisers: Hedvig Fébel, CSc, professor and Jenő Szigeti, CSc, professor*

In case of cow, swine and sheep livestock developed radio frequency based individual identification methods are at our disposal. When it comes to poultry, however, the literature provides insufficient amount of information. Throughout the research, the usability of radio frequency based identification (RFID) in case of different types of poultry (broilers, turkeys, geese, and ducks) was investigated. The goal of the researches was to monitor the effect of RFID based individual tagging on body weight, certain physiological parameters and stress of tagged animals. Observing the possible histological irritation caused by tagging, and monitoring the durability of tagging was also covered during the study.

On the basis of the outcomes of our individual tagging experiments on broiler chickens, turkeys, geese and ducks the following scientific results can be stated.

1. Individual tagging with EM4135 type microchip equipped wing tags did not affect the body weight (measured at the end of fattening), the loss rate, the packed cell volume, and the aspartate aminotransferase, or  $\gamma$ -glutamyltransferase concentration of blood in the case of the examined poultry types (broiler chicken, turkeys, geese, and ducks).
2. The glucose and corticosterone concentration of blood plasma was not affected by RFID tagging in the case of broiler chickens and turkeys.
3. In case of tagged broilers, turkeys and ducks the average concentration of the inflammation indicating factor (C-reactive protein) showed no difference between the experimental and control groups. However, in case of tagged geese the concentration of C-reactive protein was significantly higher than of the average result of untagged individuals.
4. The outcomes of the histological research prove that patagial tagging did not cause local irritation, purulent inflammation – an indicator of toxic effect – cell necrosis, abscess generation or atypical cell sprouting in any of the poultry types.
5. The tag loss rate – an indicator of the durability of individual tagging method – exceeded the results of literature in the case of every poultry types. In order to increase durability of the tagging method – that is to say to be able to provide farm to consumers' table traceability – technological development of the construction of the tag would be needed.