

Project SUCCESS and significance of its results for Polish carp farms economics in the aspect of climate change

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Fig. 1. Carp ponds in "Stawy Milickie" during drought period
Source: www.twojapogoda.pl.

PROJECT SUCCESS - Strategic Use of Competitiveness towards Consolidating the Economic Sustainability of the European Seafood Sector

The aim of the project is strengthening the economic stability of the European fisheries and aquaculture sector by enhancing the competitiveness of fish products in the European Union achieved, among others, by:

- analysis of current and expected obstacles regarding the competitiveness of European fisheries and aquaculture sector;
- identification of the innovation in order to improve efficiency and to reduce production costs;
- exploring potential new markets and marketing tools to increase the revenue of the fisheries sector.

23 partners from 11 European countries perform economic analyses related to consumer preferences, supply chains and sales opportunities for several fish species in different European countries.

In the project, the NMFRI is a partner in two case studies on carp and salmonids (trout) aquaculture, hence within the project, a broader analysis of the aquaculture sector has been carried out in the period 2015-17 with a special focus on the distribution channels of these fish.

Economic issues related to trout and carp aquaculture, the analysis of production systems, distribution chains, and legal aspects of breeding have been developed. In addition, in collaboration with aquaculture representatives, the main directions for the processing and distribution of these fish, types of offered products, production volumes and sales prices for 2013-15 have been identified.

Survey on the economic situation of fishing farms in Poland and Germany (together with a German partner), consumer preferences surveys and non-tariff barriers to trade was conducted. More information about the project: http://cordis.europa.eu/project/rcn/193322_en.html

INTRODUCTION

Climate change, even before the end of the current century, may cause worsen water availability and drought periods (Fig. 1), increase evaporation, decrease in water flow, decrease in water transparency, water quality deterioration due to additional biogas load and pollution. The rise in temperature in both the summer and winter seasons may facilitate production of warm water species. However, this requires a full-time feeding of the stock, in the absence of natural feed also industrial ones [Wolnicki, Sikorska 2017]. Those activities caused the increase of production costs, mostly variable costs.

CARP FARMS IN POLAND

Most of Polish carp ponds are dryable and can be mechanically cultivated. The depth of the ponds is much more important than their shape. It is recommended to build tanks with average depth of 1.5-2.0 m. That depth characterized by greater thermal stability, which is conducive to carp growth. Ponds in most Polish carp farms has the average depth of 0.7-0.8 m [Guziur 2008], however the results obtain in the SUCCESS project shows that the average depth of carp ponds was 1.0-1.2 m.

In carp ponds, water management is based on the principle of retention rather than constant flow of water. This allows for economical water management. Water transfer is used to prepare commercial fish for sale and is used in emergency situations, for example in the case of lower oxygen amount in the water. Water uptake in ponds caused by evaporation or soaking through dikes is therefore made from natural watercourses like rivers and streams and seasonal water sources. The system of supplying carp ponds with water is conditioned by their location, available terrain, and availability of water [Guziur 2008].

CARP FARMS ECONOMICS IN THE ASPECTS OF CLIMATE CHANGE

Economic data collected in the SUCCESS project let to identify cost structure and calculate the ROS – Return of sale (%) indicator in three typical size-type of carp farms: small – FPC-10 (production 0-20 tons), medium – FPC-100 (production 21-200 tons) and big – FPC-200 (production over 200 tons). The structure of the costs and results of ROS were presented in the table 1 whereas the revenues and cost changes caused by long periods of drought in table 2. Table 3 presents the effects of long drought periods in different types of farms. The scale of production determines the share of labour costs and depreciation which cost present the scope of mechanization of production. In small farms the production activity is determined by the labour costs, while in medium and large farms by technical and processing technology advancement (Table 1).

Water is a key production resource in carp farms. The lower level of water during drought periods causes impact on two economic categories: revenues and variable costs (Table 2). The reduction of revenues is due to losses caused by intensive activity of natural carp predators and increased mortality caused by higher production intensity. Assuming unchanging carp sales prices variable costs stay constant in small farms however they increased significantly in medium and big farms because of the need for use of industrial feed. The results shows that in small farms long drought periods will effect of quitting production. In medium farms the profitability of carp production will be significantly reduced and in big farms long drought periods will put pressure on rising of selling prices.

Table 1. The structure of the costs and ROS value in three types of carp farms in Poland

Economic indicators	FPC-10	FPC-100	FPC-200
Fixed costs (%)	22	24	17
Variable costs (%)	35	36	42
share of feed costs in variable costs (%)	41	72	82
Labour costs (%)	31	14	11
Depreciation (%)	12	26	30
ROS - Return of sales (%)	-4.7	12.5	9.5

Source: Mytlewski, Rakowski 2017.

Table 2. The revenues and cost changes caused by long periods of drought in three size-type carp farms

Revenues and costs*	FPC-10	FPC-100	FPC-200
Revenues from carp production	↓	↓	↓
Costs			
Fixed (incl. labour costs and depreciation)	↔	↔	↔
Variable	↔	↑	↑

* Assuming unchanging carp selling prices

Table 3. Effect of long droughts periods in different types of farms

Size-type of carp farm	Effect of long drought periods
FPC-10	At low water level small farms lost most of production because of predators activity and produce mostly for own needs.
FPC-100	At low water level below 0.8 m the farmers have to use industrial feed, what shortens the production period but increases production cost (variable costs) and decreases quality of final product. Diversification of activities in that farms let to retain the revenues during drought periods.
FPC-200	In droughts periods the costs of protection against predators activity increased strongly.

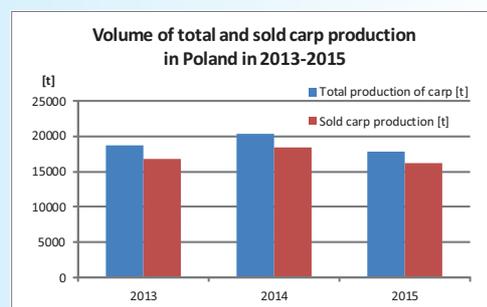


Fig. 2. Volume of total and sold carp production in Poland in 2013-2015
Source: Lirski, Myszkowski 2014, 2015, 2016.

PRODUCTION OF CARP IN POLAND

In 2015 in Poland 1113 carp farms are registered (RRW-22 questionnaires) with a total area of 82371 ha (GUGiK) [Lirski, Myszkowski 2016].

Both volume total production and sold carp production in Poland has decreased in 2015 (Fig. 2) and reached value from 2012. It was caused by water deficits in drainage basins supplying ponds during long drought periods. High temperatures in summer months induce conditions much lower than optimum for fish.

Lower levels of dissolved oxygen in the water and phytoplankton blooms in amounts which are dangerous for fish farming. The reduced water level in carp ponds favours predator pressure (e.g. black cormorant, heron, and otter), increasing the losses in production caused by these animals [Lirski, Myszkowski 2016].

SUMMARY

The occurrence of drought periods resulting in decreased water level in carp ponds are causing severe conditions for fish growth, and consequently, reductions or even stop of fish production. The results of the cost structure survey of three types of farm production size (small, medium and big) indicates that drought periods may have a different effect on the carp farm economics. Small farms, which even with good production conditions have problems with profitability from the fish farming activity in long drought periods will have to shutdown production. In medium farms the solution for drought periods is diversification of sales channels (table 3) which allows to offer the product with higher added value and retain or increase the revenues. Costs of industrial feed in big farms grow so significantly that threaten profitability of carp production.

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