Intensive carp production in ponds

T. Feledi, A. Rónyai, I. Csengeri, A. Péteri and G. Gyalog

4th International Freshwater Fishery Conference
Vukovar, Croatia

14.04.2010.

Carp breeding in Central Europe

- Relative **big demand** for carp.
- Most of the aquaculture fish production (in Hungary 87%) is originating from extensive pond systems.
- The growing season is only about **150 days** (the water temperature is above 20 °C) so to reach the market size of carp **2-3 years** are needed.
- Disadvantages of extensive pond farming technology: production losses due to **bird predation**, presence of undesirable fish, **fish poaching, water quality problems.**
- The demand for fish bigger than 2.0 kg have increased.

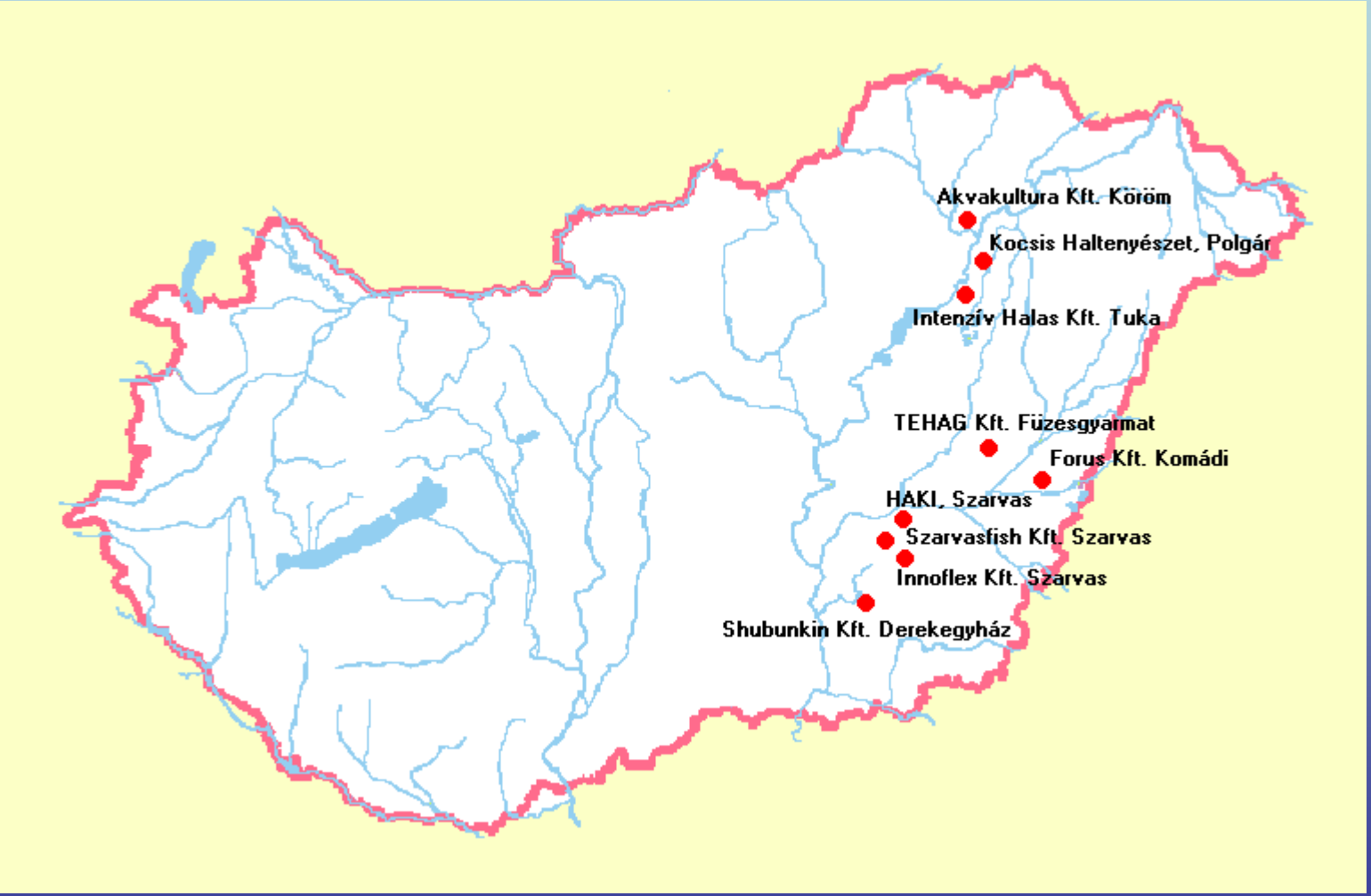
Possibilities of intensification of carp producing technology

1. Out-of season propagation and pre-nursing in an intensive (recirculation) system.
2. Intensive rearing during the first production season in a recirculation system.
3. Rearing in small pond systems fed with artificial diet.

Out-of season propagation and pre-nursing in a recirculation system

- Controlled conditions (water temperature and quality, oxygen level, veterinary treatments, etc.).
- Longer producing season: advanced fry by the middle of April.
- Reduced mortality in the first two years (below 400 g).
- Bird predation control (reduced fry losses).
- Control of undesirable fish.
- Disease (especially the KHV) prevention.
- The carps can achieve a body weight of 400 g even more by the end of the first production season.

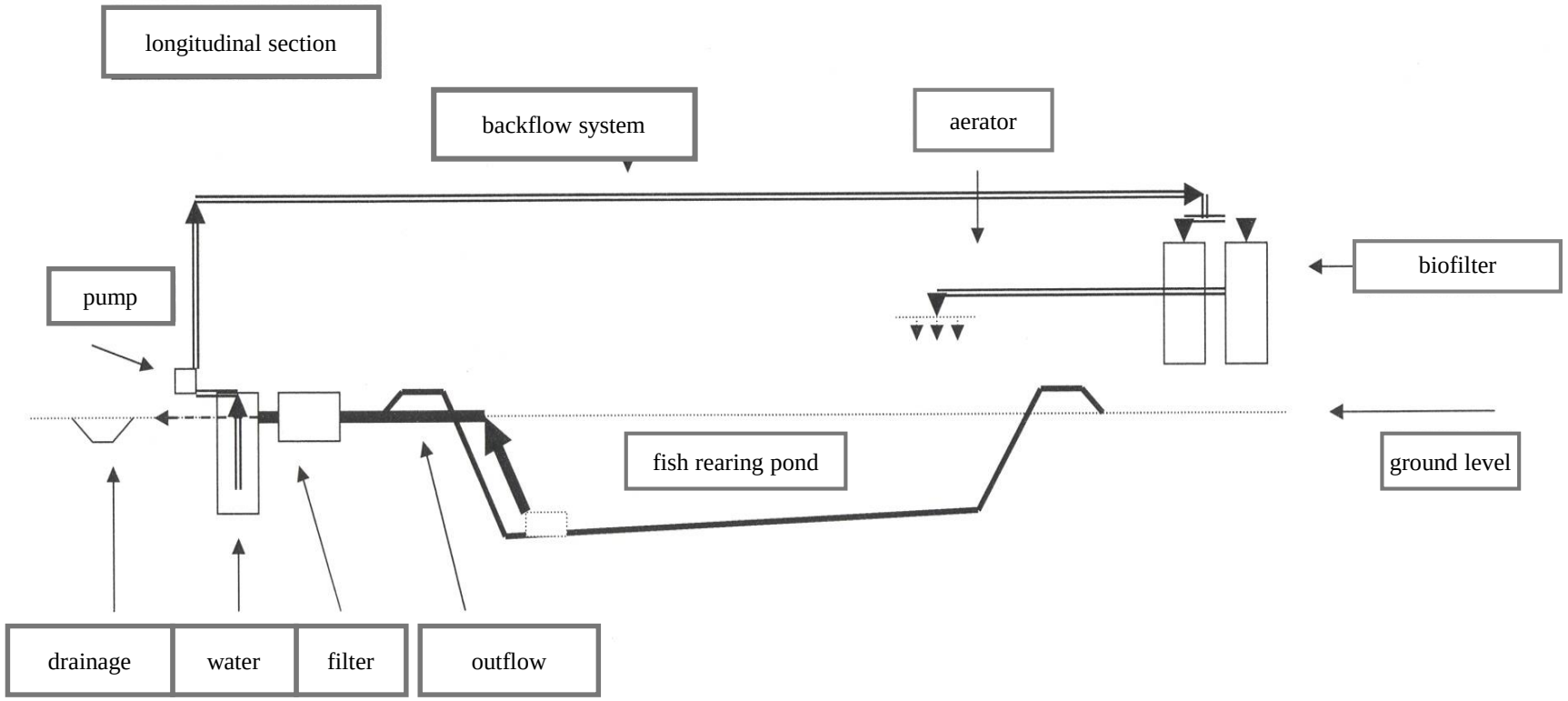
The suitable areas for water heating in Hungary (Source: Bélteky, 1962)



Use of a simple recirculation system

- Adaptation for the local economic conditions.
- 600-1000 m^3 intensive system is enough for production of stocking material for 100 ha extensive farm (based on preliminary results).
- The fingerlings can be produced in winter period and can be immunised against the KHV.
- At a density of 30-40 kg/m^3 the carps can reach a body weight of 400 g even more within one production season.

One unit of an intensive fish nursing recirculation system



Applying artificial diet instead of wheat

Materials and methods

- In the frame of Aquamax project a feeding experiment was carried out in four (about 0.15 ha) ponds from the beginning of April to the middle of November in 2007.
- The carps were reared in polyculture with grass carp, Chinese carp hybrid and European catfish (in proportion of 67:22:9:2 %, respectively).
- Fish in two ponds (stocking density 653 ± 40 kg/ha) were fed with only wheat (10.8 ± 0.4 protein and 1.7 ± 0.0 fat content) and the other two pond (stocking density 805 ± 8 kg/ha) were fed with wheat in the beginnings and it was gradually changed within one week to diet Nutreco (34,3 ± 0.1 % protein and 11 ± 1.0 % fat content).
- Cow manure (2.8 ± 0.3 protein and 0.4 ± 0.1 fat content) was added in 5000 kg/ha quantities.




Calculated parameters

- $S = n_t / n_0 * 100$ (Surviving rate) (%)
  where n_0 and n_t – the initial and final number of fish

- $Yield = W_t – W_0$ (kg/ha)
  where W_0 and W_t – the initial and final biomass

- $SGR_{bio} = (\ln W_t – \ln W_0) / t \times 100$ (%/day)
  where t – number of days from stocking till harvesting

- $SGR_{ind} = (\ln w_t – \ln w_0) / t \times 100$ (%/day)
  where w_0 and w_t – the initial and final average weight

- $FCR_{bio} = F / (W_t – W_0)$ (g/g)
  where F – the total amount of feed (wheat + diet) fed during the trial

- $FCR_{ind} = SGR_{bio} / SGR_{ind} * FCR_{bio}$ (g/g)

- $PER = Yield / P_f$ (g/g)
  where P_f - the total amount of protein in feeds (wheat + diet) fed during the trial

- $PPV = (W_t * P_h – W_0 * P_s) / P_f$
  where P_s and P_h – the protein content of fish carcass at the stocking and harvesting

Results

Treatment	Species	Survival (%)	Yield (kg/ha)	SGR $_{bio.}$ (%/day)	FCR $_{bio.}$ (g/g)	SGR $_{ind.}$ (%/day)	FCR $_{ind.}$ (g/g)	PER (g/g)	PPV (%)
wheat + Nutreco	Carp	93 ± 4	1798 ± 315	0.88 ± 0.07	1.50 ± 0.21	0.92 ± 0.09	1.45 ± 0.23	2.41 ± 0.34	
	H.S.B.	97 ± 6	570 ± 99	0.52 ± 0.06		0.53 ± 0.04			
	Grass carp	99 ± 3	147 ± 29	0.42 ± 0.09		0.42 ± 0.09			
	European cf.	84 ± 3	32 ± 1	1.20 ± 0.03		1.33 ± 0.03			
	Total	**94 ± 1**	**2609 ± 322**	**0.71 ± 0.04**	**1.03 ± 0.09**		**0.93 ± 0.08**	**3.49 ± 0.32**	**41.1 ± 6.5**
wheat	Carp	97 ± 1	966 ± 39	0.85 ± 0.04	2.26 ± 0.22	0.86 ± 0.04	2.21 ± 0.22	4.12 ± 0.39	
	H.S.B.	100 ± 2	471 ± 61	0.56 ± 0.07		0.57 ± 0.06			
	Grass carp	92 ± 0	82 ± 5	0.25 ± 0.00		0.30 ± 0.00			
	European cf.	94 ± 13	13 ± 1	0.94 ± 0.06		1.02 ± 0.06			
	Total	**97 ± 0**	**1569 ± 90**	**0.69 ± 0.05**	**1.39 ± 0.16**		**1.27 ± 0.01**	**6.69 ± 0.76**	**62.67 ± 4.61**

H.S.B.= Hybrid of silver carp and bighead

Average cost-income relationships of the experimental ponds (HUF)

	Wheat fed ponds	Nutreco fed ponds
Formulated feed costs	0	331 000
Wheat costs	65 000	22 000
Seed costs	272 000	332 000
Electricity costs	156 000	156 000
Water costs	80 000	80 000
Labour costs	245 000	245 000
Manure costs	6 000	6 000
Total costs (per ha)	**824 000**	**1 172 000**
Total income (per ha)	**862 000**	**1 406 000**
Profit (per ha)	**38 000**	**234 000**

Conclusions

- Based on our results artificial feeding technology has better production parameters than traditional wheat-feeding technology.
- The proximate economical calculations showed that rearing the carps in intensive conditions fed with artificial diets could be more profitable than traditional wheat feeding technology.

Thank you for your attention!