INTENSIVE COMMON CARP FARMING (5-10 T/HA/ YEAR) BASED ON PRACTICAL EXPERIENCES OF G2O, SLOVENIAN FISH FARM

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INTENZIVNI UZGOJ ŠARANA (5-10T/HA/GOD) BAZIRAN NA PRAKTIČNOM ISKUSTVU G20 RIBNJAKA U SLOVENIJI

Abstrakt

Unatoč činjenici, da je šaran odavno prepoznat kao vrsta izuzetno pogodna za uzgojne uvjete, danas se većina svjetske proizvodnje šarana pridobiva ekstenzivnim ili poluintenzivnim uzgojem. Temelji tehnologije intenzivnog uzgoja šarana su postavljeni prije pola stoljeća u Japanu i Izraelu te su pridobivene spoznaje danas opće poznate i dostupne svima. U Evropi vrlo malo ribnjačartsva uzgaja šarana na intenzivan način što uvjetuje pomanjkanju praktičnih iskustava na tom području. Većina velikih uzgajivača šarana ne vjeruje u intenzivan uzgoj šarana zbog negativnih i nepravilnih predrasuda vezanih na ekonomičnost intenzivnog uzgoja, kvalitetu šaranskom mesa pridobivenog u intenzivnim uvjetima, problematiku zdravstvenog stanja šarana u intenzivnom uzgoju, itd.

Na našem obiteljskom ribnjačarstvu (tvrtka G2O d.o.o.) uzgajamo šarana na intenzivan način zadnjih 7 godina te je ta tehnologija dio naše svakidašnje prakse. U prosjeku dostižemo godišnju proizvodnju dvogodišnjeg šarana (prosječne težine od 1,5-3 kg) i jednogodišnjeg mlađa (prosječne težine 100-200 g) skupne biomase u količini od 5-10 t/h. Raspolažemo sa manjih uzgojnim ribnjacima (prosječnih površina od 0,2-0,8 ha) koje punimo jednom godišnje te ih nadopunjavamo samo za nadoknađivanje isparene vode. Prije uzgojne sezone ribnjaci se presušuju tijekom cijele zime.

Sredinom mjeseca travnja nasađujemo uzgojne ribnjake sa jednogodišnjom mlađi u količini 300-600 kg/ha. U lipnju vršimo drugo nasađivanje sa mjesečnjacima šarana u količino od 10 000 – 20 000 kom/ha. Korištenje mješovitog nasada omogućava višu konverziju hrane i izbjegavanje visoke biomase riba u mjesecima, kada je mogućnost pada koncentracije kisika visoka (od sredine lipnja do sredine kolovoza).

Tehnologija intenzivnog uzgoja šarana se u našem slučaju temelji na hranjenju sa extrudiranom hranom (31 % bjelančevina, 9 % masti), prozračivanju vode te stalnom mo-

nitoringu. Hranjenje riba se vrši 3 puta na dan uz pomoć automatskih hranilica u količini od 3 % skupne mase riba. U prosjeku iznosi konverzija hrane 1-1,3. Prozračivanje se vrši uglavnom noću te se koncentracija kisika u vodi održava iznad 3 mg O_2/l vode. Prozračivanjem nastojimo postići osim prozračivanja vode i destratifikaciju ribnjaka te dovođenje kisika u bentos ribnjaka. Na taj način se omogućava iskorištavanje otpadnih produkata metabolizma ribe u ciklusu otpadni produkti – fitoplankton – zooplankton – šaran.

Kvaliteta mesa šarana uzgojenih na intenzivan način je visoka, zbog kvalitetnog režima hranjenja, dobre kvalitete vode te postizanja konzumne veličine u dvogodišnjem uzgoju (prije postizanja spolne zrelosti šarana). Šarani nemaju nikakvog nepoželjnog mirisa te su pogodni za konzumiranje tijekom cijele godine.

Intenzivan način uzgoja šarana omogućava: ekonomski visoku iskoristivost uzgojne površine, postizanje konzumne mase šarana u dvogodišnjem uzgoju te visoku kvalitetu mesa šarana.

Ključne reči: *uzgoj šarana, G2O ribnjak, kvalitet mesa*

INTRODUCTION

Despite the fact, that common carp was recognized as species very suitable for farming conditions long time ago, today is most of carp production in Europe gained by extensive and semi extensive way. Fundaments for intensive carp farming was established decades ago (mostly in Japan and Israel) and this knowledge is worldwide available. However, today are very few farms in Europe which produce carp on intensive way so there is present lack of practical experience. Most of big carp farmers in Europe still don't believe in intensive common carp farming regarding cost-benefit, quality of fish meat, health problems, environment issue etc.

On our family fish farm (G2O, d.o.o. company) we produce common carp on intensive way for last 7 years and this technology is our daily practice. In this article I will summarize our experiences with intensive common carp farming in mayor points.

G2O fish farm features and natural conditions

G2O company produce carp in small mud ponds ranging in surface from 0,1 – 0,8 ha with total surface of 2,4 ha. Ponds have dept from 1,2-3 m (average 1,5) and shores are protected from erosio. Each pond has its own inflow and outflow of water and own supply for electricity. Farming season lasts approximately 150 days, from end of April to end of September. During the summer small stream which is source of water for all ponds is usually dry and very often we are not able to recover even evaporation losses. Water temperature in summer can reach 30 ºC and in winter is temperature on inflow water many times lower than 0 ºC. In small hatchery we make artificial spawning for own purposes and in one small pond we keep own brood stock.

Preparing ponds for season

Ponds are dry in period from harvesting (beginning of September) to March (beginning of filling). We don't use any additional disinfection or other treatment for soil. Introduction of wild fishes from stream is prevented with net.

Stocking of the fish

G2O company produces common carp in monoculture or polyculture, according to the needs of the market. First stocking is in the middle of March with one summer old common carp (K1) (average body mass is 50-300 g, 3000 – 7000 pcs/ha, according to average initial size of fish). Second stocking is in the June with common carp fingerling (KF) (average body mass is 1 g, 10 000 – 70 000, according to needs for K1 on market). Before stocking fishes are treated only with salt solution. Pike-perch fingerlings are added for control of natural spawning (~500 pcs/ha). In calculating total biomass of inputted fishes, big attention must be taken for fact, that predicted gain in biomass is in correlation with average initial size of K1 (Tab.1). In another words, same quantity of total biomass of inputted fish can give different yields at the end of the season according to differences in average size of K1.

Table 1. Approximately estimation of growth rate in K1 according to initial size at the beginning of season; based on experiences of G2O company, Slovenia.

Body mass in May (K1)	Body mass in October (K2)	Growth rate
50 g	~ 1,5 kg	30 x
100 g	~ 2 kg	20 x
200 g	~ 3 kg	15 x
400g	~ 4 kg	10 x

Feeding, aeration and monitoring – basic of intensive carp farming

We use good quality extruded floating feeds (~ 31 % protein, ~ 9 % fat). Feeding ratio is (in growing season) approximately 3% of total biomass of fish / day. In general, pendulum feeders are filled 3 times per day. When temperature of water is below 10 ºC we feed only occasionally with sinking food. Food conversion (FC) is ranging from 0,8-1,3 and in mixed population of K1 and K0 (common carp juveniles in first producing season) we noticed higher FC than in single generation population (only K1 or only K0). Quality of water is in tight correlation with quality of feed.

Aeration is important because of oxygenation and destratification of water that's why we use two types of aerators: splash aerators and ventury (»jet«) aerators. Usually we use 3-4 aerators/ha in combination of 1-2 ventury aerators and 2-3 splash aerators. Ventury aerators are in use from end of May because of destratification of water and »manuring« pond with mud by turbulences produced by them action. With use of venturi aerators we noticed uplift in zooplankton production and reduction of monocell algal blooming. Splash aerators are in use from end of July; they are more potent in oxygenation. Aerators work only during the night (regulated by timer) with exception of cloudy days (when they work constantly). Maximum electricity consumption is 2,5kw/h/ha. During the night oxygen is above 3,5 mg/l, very rarely lower than 3mg/l (even pike perch is surviving season). Despite high density of fishes and excessive feeding during the summer, excessive aeration enables fast transformation of waste products in phytoplankton – zooplankton – fish chain resulting in good environment for fish,

good health condition and high food conversion.

During all the season on G2O company fish farm is present constant monitoring. Fish farm is located next to the living house, so family practically lives on pond. Monitoring has crucial importance, because small mistakes can make big losses.

Why to produce 2 generations of common carp in the same pond?

In our case we noticed that in critical period (from middle of July to middle of August) is important to keep total biomass of fish below 4 t/ha. After this period feeding can be more excessive because of lower risk for oxygen depletion. However, growth rate of K1 in last two months of season will be not so dynamic any more. On the other hand, introduction of KF in July will have minor impact on total biomass at this moment and in August will be biomass of K0 still low. In this period K0 eats mostly plankton and debris (incompletely digested food) of bigger carp. After middle of August, K0 is big enough to eat floating feed and they start to increase their body mass very rapidly. So, with this system we avoid risk for losses in critical period and we increase total biomass very rapidly after critical period. With this system we get maximal yield/ha with low risk and best feed conversion (Fig. 1).

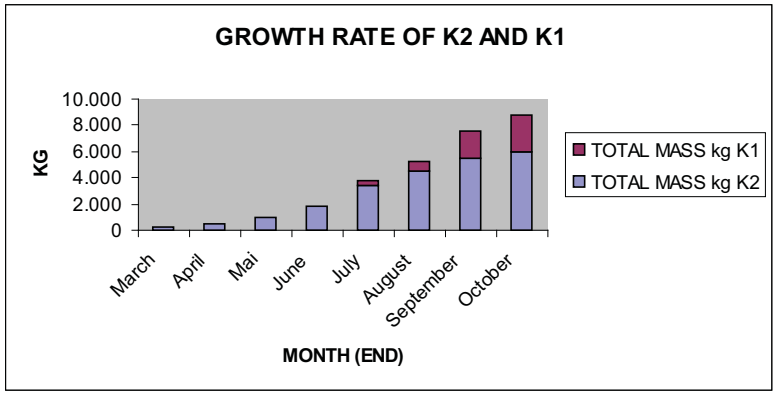

Figure 1. Growth rate of K1 and K2 during the season; based on experiences of G2O company, Slovenia

Quality of carp meat produced in intensive system

Our carp has excellent quality of meet and can be eaten during all the year. It has no smell on mud, because of high quality feed and good environment. Because carp reach market size in 2 seasons, it is still sexually immature which results in high growth and low fat content.

Economical view of intensive carp farming

We found intensive carp farming as economically efficient system with maximally cost of production of 1,3 euro/kg (our work is excluded). In our region cost of K2 carp are 2,5 euro/kg and K1 carp is 4 euro/kg.

Table 2. Approximately input and output per ha/year for intensive common carp farming; based on experiences of G2O company, Slovenia.

• **Input/ha/year**	• **Output/ha/year**
• ~300 kg of K1 (~100g)	• 4-6 t of K2 (1,3-2 kg)
• ~10 000 – 30 000 of KF	• 1-3 t of K1 (~120 g)
• ~8-13 t of food	• 5-10 t of carp /ha/year
• ~ 3240 kwh	
• work	
• water concession	

CONCLUSIONS

Based on own practical experiences, we can conclude that common carp is suitable species for intensive production (5-10 t/ha/year) which gives good results in terms of quality of fish and economical view. Technology of intensive common carp farming is simple and it is based on good diet, excessive aeration and constant monitoring. It can improve production on many present fish farms, but intensity of production should be adapted to each fish farm regarding individual factors.