

THE BASIC DIRECTIONS OF FISH BREEDING INTENSIFICATION IN THE REPUBLIC OF BELARUS

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OSNOVNI PRAVCI INTENZIFIKACIJE GAJENJA RIBA U REPUBLICI BELORUSIJA

Abstract

Svrha ovog rada je da se analiziraju glavni pravci intenzifikacije u gajenju riba za koje se smatra da su glavni izvori tehnologija ušteda. Autor se usredsređuje na usavršenost tehnologije gajenja, opisuje razvoj polikulture i unapređenje gajenja, ishrane i profilakse bolesti riba. Smatra se da je najveća prednost pomenutih pravaca povećanja proizvodnje i smanjenje troškova.

Ključne reči: intenzifikacija, gajenje riba, polikultura, hrana za ribe, smanjenje troškova

INTRODUCTION

It won't be an exaggeration to say that nowadays the agrarian complex of some European countries including Belarus undergoes a kind of slowdown. In order to overcome this negative tendency and reform the agrarian complex a lot of emphasis is placed on the use of energy and resource saving technologies, the main advantage of which is productivity increase and reduction of costs.

Taking into consideration this fact a special attention is paid to the development of aquaculture that is directly connected with intensification of fish breeding. Perfection of breeding and technological process, transfer from monoculture to polyculture, improvement of fish food composition and the process of feeding, increase of the natural productivity of fish food and food additives, prophylactic of diseases are viewed as the basic resource saving technologies promoting fish breeding intensification.

MATERIALS AND METHODS

The research was carried out on the specialized fish farms "Izobeleno", "Vileika", "Volma" where fish productivity is very high and also in the laboratories of the Institute of Fish Industry, Minsk, Belarus.

The material used for research was such species of fish as carp (*Cyprinus carpio*), crucian (*Carassius*), pike (*Esox*) that are traditionally bred and reared in Belarus and also pike perch (*Lusiopeca*), herbivorous fish and sturgeons. Furthermore, in the laboratories of the Institute fish food with vitamin and mineral additives was studied, mixtures with probiotics preventing epizootic diseases in the ponds of fish farms were invented.

RESULTS AND DISCUSSION

As it was indicated earlier a lot of fish for sale is mainly reared on the fish farms of the Republic of Belarus. Nevertheless, carp (*Cyprinus carpio*) and silver crucian (*Carassius*) remain the predominant species to be bred and reared. According to the results of the carried out studies in the process of their growing these two species of fish are considered to be the main consumers of expensive concentrated food and without changing the existing structure of fish production it will be impossible to avoid the growth of costs.

That is why perfection of fish breeding and transfer from monoculture to polyculture as two directions of fish breeding intensification are of primary concern. While growing fish for sale, it's extremely important to switch to cross-breeding, as well as use of hybrids, pure breeds and lines of carp (*Cyprinus carpio*) of Belarusian selection adapted to the local environmental conditions, because finally it allows to get fish of high quality, for example with little scale and absence of visual signs of diseases that has always been in great demand with people. At the Institute of Fish Industry in Minsk, Belarus two new belorussian breeds of carp (*Cyprinus carpio*) ("Lakhvinsky" and "Izobelensky") and a stock of breeds of Amur carp (*Cyprinus carpio*) have been created. Moreover, the scientists of the above mentioned Institute managed to work out a pattern of crossing of carp parental stocks taking into consideration soil and climatic conditions of each farm (T a r a z e v i c h et al. 2007). Combining abilities of the created breeds and their crosses make it possible to raise their survival in winter and summer, to achieve a higher growth rate promoting in general the increase in fish production.

The results of the conducted research show that it is significant to transfer from monoculture of carp (*Cyprinus carpio*) to polyculture of fish with a wide food spectrum using natural food resources of ponds. From this point of view herbivorous fish (grass carp (*Ctenopharynx idella*), silver carp (*Hypophthalmichthys molitrix*), bighead (*Aristichthys*)) eating the food resources of ponds that are not used by other species of fish are considered to be the most preferable (S a b o d a s h, 2006).

The development of the whole polyculture of fish (carp, herbivorous and predatory fish) will allow not only to retain a high fish productivity of ponds, but lead to the decrease in the use of concentrated food by 30 % that finally will reduce cost price and increase profitability of pond fish production.

Speaking about polyculture of fish, it's worth considering some species that are not traditional for belorussian fish breeding. For example, in the laboratories of the Institute the scientists were able to develop new techniques of European catfish (*Silurus glanis*) breeding which allow to obtain up to 60 kg ha⁻¹ of fish products on condition that catfish

(*Silurus glaris*) is reared in polyculture with carp (*Cyprinus carpio*) and herbivorous (D o k u c h a e v a et al. 2003). Besides, the techniques of pike perch (*Lusioperca*) and peled (*Coregonus peled*) pond fish breeding are being developed currently at the Institute. One more species to be introduced into polyculture of Belarus is paddlefish (*Polyodon spathula*) that is the only plankton feeder belonging to sturgeons.

Additionally, due to the combined efforts of Belarusian scientists and manufacturers pond breeding and artificial reproduction of starlet (*Acipenser ruthenus*) was developed, some experiments were carried out and the reservoirs for stocking were chosen in order to create self-replicating stocks. Moreover, breeding of rerbfling (*Leuciscus idus*), blue bream (*Abramis ballerus*), burbot (*Lota*), with the purpose of stocking some fish farms are considered to be of top priority.

While doing research, it has been discovered that a partial use of less expensive fish food especially created in the laboratories of the Institute of Fish Industry also contribute to the reduction of costs (A s t r e n k o v et al. 2008). This especially created fish food differs from the traditional one in lower contents of protein and crude fibre and in higher contents of carbohydrates. The price of this fish food is 20 % lower than the traditional one and it can be used during the second half of the growing period without causing any damage to fish productivity. As a result of the work carried out in 2007-2008 the belorussian scientists were able to create a pattern of feeding fish with some kinds of cheaper food. Despite the fact that in 2008 the prices in Belarus increased rapidly, the created pattern allowed to reduce the cost of fish food and increase the output of fish products.

The presence of vitamin and mineral additives and exogenous enzyme in fish food make its use more effective.

Returning back to the issue of resource saving technologies, it should be mentioned that to include live food into the ration of pond fish is also vital. The scientists of the republic have presented some recommendations on the rational use of food and processing industry wastes (grains, barda, and beet pulp). The rational use of these kinds of wastes makes it possible to increase the natural productivity of ponds by 50 % without causing any damage to the quality of fish products and at the same time to cut costs on mineral fertilizers.

One more important direction of fish breeding intensification is in preventing infectious and invasive diseases. Diseases affect the quality of fish products, lead to the reduction in the growth rate of fish and to its death. New developments of the Institute (antibiotics, probiotics, and anthelmintics) and the techniques of their application have already allowed preventing epizootic diseases on the fish farms. Also in order to increase resistance to the most infectious diseases the research on development of vaccine with the use of natural varieties of bacteria is being carried out in the republic.

CONCLUSIONS

Thus, to sum up it should be underlined once again that the principal directions of fish breeding intensification viewed as resource saving technologies are of crucial importance. The use of hybrids, pure breeds and lines of carp (*Cyprinus carpio*) of Belarusian selection adapted to the local environmental conditions, development of polyculture of herbivorous and predatory fish, introduction of less expensive fish food, development of natural feeding base owing to the use of organic and mineral fertilizers

and finally prevention of infectious and invasive fish diseases bring about the reduction of costs and cost price at least by 20 % and increase productivity.

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