THE IMPORTANCE OF THE QUALITY MANAGEMENT IN FISH BREEDING

IMPORTANȚA MANAGEMENTULUI CALITĂȚII ÎN PISCICULTURĂ

LITVIN AURELIA, MORARI ALISA

State Agrarian University of Moldova

The economic transition, that actually takes part in the Republic of Moldova, raised a number of questions for the society, that suppose a radical reorganization both of the people’s behavior and the way of thinking. These problems are oriented to achieve the basic principles of an adequate behavior in the conditions of market economy and towards efficiency and reasoning. In this context, the competitiveness, which is marked by a high quality and productivity level emerges as one of the essential factors that ensures the normal functioning of a market economy, namely of the competitiveness and dynamic balance between products demand and offer, as a motive power of the social progress.

The solution lies in taking over the experience of the countries that - having scarce natural resources and capital endowment – developed their human resources to improve their competitive situation. The Republic of Moldova, in order to finance its economic development, having at disposal revenues only from agricultural and food industries and existing human resources, has to develop these strong points that are vital to ensure the success of its efforts to transform the industrial and agricultural sectors in motive competitive powers of a durable economic growth.

Key words: analytic, monographic, statistic, fish.

Introduction

The economic transition, that actually takes part in the Republic of Moldova, raised a number of questions for the society, that suppose a radical reorganization both of the people’s behavior and the way of thinking. These problems are oriented to achieve the basic principles of an adequate behavior in the conditions of market economy and towards efficiency and reasoning. In this context, the competitiveness, which is marked by a high quality and productivity level emerges as one of the essential factors that ensures the normal functioning of a market economy, namely of the competitiveness and dynamic balance between products demand and offer, as a motive power of the social progress.
Materials and Methods

During the investigation there were used such research methods as: analytic, monographic, statistic as well as other methods and procedures that allowed to reveal the essence of the investigated problem.

Results and Discussions

From ancient times, the fish breeding was a traditional occupation. Although at the beginning it was only a source of food, then in the course of time fish breeding became for ones of us a recreational method, and for others both an interesting and profitable activity.

From the very beginning, anyone who wants to begin a fish breeding activity, has to know some very important facts. First of all, you have to find a land for the lake where a little river or a spring is flowing. Second - a contract from the mayoralty which confirms that you can have a lake on this land, and some documents from the Examination Office (kind of soil, chemical composition of water). Also, you have to conclude some documents at Cadastral Office, Moldova Waters and Fish Breeding Farm.

Unfortunately, in our country people begin from the very end: first of all they dig the lake, then begin to conclude the documents. Or even worse – they come to the Fish Breeding Farm, buy 2 tons of fish and put them into the lake, but the fish haven’t sufficient space and eventually don’t grow. Or – they buy novac (tolstolic, fish that grow till 500 gr in 4 years and that is very cheap on the market.

Dr. Lobcenco gives us a formula that represents the ideal proportion for a lake: 3:4:1:2, namely: 3 cyprinus carpio – 4 aristichthys nobilis – 1 hypophthalmichthys molitrix – 2 ctenopharyngodon idella.

### Table 1

<table>
<thead>
<tr>
<th>Species</th>
<th>Kg/ha</th>
<th>Fish food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypophthalmichthys Molitrix</td>
<td>300</td>
<td>Phytoplankton</td>
</tr>
<tr>
<td>Aristichthys Nobilis</td>
<td>100</td>
<td>Zooplankton</td>
</tr>
<tr>
<td>Cyprinus Carpio</td>
<td>250</td>
<td>Benthos</td>
</tr>
<tr>
<td>Ctenopharyngodon Idella</td>
<td>100</td>
<td>Aquatic vegetation</td>
</tr>
<tr>
<td>Pike perch</td>
<td>100</td>
<td>Small fish</td>
</tr>
</tbody>
</table>
It’s very important to breed also pike perch because it feeds on everything that is small, namely on insignificant fish, and if you have many frogs in the lake it is recommended to breed sheatfish.

The most important thing for fish is to have sufficient air in summer. For this purpose it’s necessary to measure oxygen quantity in water, especially in the morning, and a solution to this problem would be to aerate the lake (in the form of an artesian fountain).

We don’t have to forget about the important role of mineral fertilizers – fish breeding and its development will depend on this factor.

Here’s another advise on this concern. During the mating period, which lasts over two months, the piscicultor makes control catching once in 10 days. The caught fish is weighted all together, then according to the species, and the piscicultor makes observations about fish development (length and weight) and establishes the necessary feeding.

In the fish breeding Complex from Telenești a major percent of fish species is assigned to cyprinus carpio, aristichthys nobilis, ctenopharyngiodon idella, as well as to young fish.

We’ll concentrate on the observance of quality requirements in young carp production and breeding. In order to ensure a better quality and a larger number of fish, we must have good quality reproductive fish.

While choosing reproductive fish one must pay attention to the following requirements:

1. To achieve the maximum growth on surface unit (1 ha) in the shortest period of time. In fish breeding this goal can be achieved by using carp of noble race, which has to possess the feature to use maximum natural food as well as the supplementary one.

   It was noticed that when the carp of noble race isn’t supplementary fed, his aptitude to grow rapidly gradually reduces. However, in good environmental conditions, it develops better than wild carp and it grows very well in rare populations.

2. Morphological characteristics, namely growth and profile indices are in direct proportion with feeding.

3. Acclimatization capacity depends on the constitution.

   It is recommended to bring qualitatively guaranteed reproductive fish from big fish breeding farms into the small ones or into those that are at the very beginning. In this case we should choose only the race that is the most convenient for the respective region.

   It isn’t recommended to use too young reproductive fish because their products are too feeble and with a slow development. Another disadvantage of young reproductive fish is that they have a reduced number of spaw and spermatozoons. Also, it isn’t recommended to use too old reproductive fish because they give feeble and sometimes degenerated products. The optimal age for the reproductive fish is from 7 to 8 years.

   Concerning the optimal reproduction age we can mention:
1. The young carp obtained from reproductive fish of different ages isn’t equal.

2. Since the embryonic period there have been stated differences among the products obtained from reproductive fish of different ages.

3. Males’ sperm of carp of different ages differs in the quantity of viable spermatozoons: the maximum quantity is at the younger ones.

4. Reproductive fish from 6 to 8 years give qualitative descendants having superior piscicultural indices.

The selected reproductive fish will be introduced, if it’s possible, in a separate lake. Their isolation decreases the danger of young fish diseases. Lakes’ surface for the reproductive fish is calculated at a minimum of $15 \text{ m}^2$ for each one. It’s recommended that these lakes were situated as near as possible from the feeding source. If we don’t have a special lake for reproductive fish, so they will be placed in lakes with a maximum biogenic capacity and with a large surface. The reproductive fish, especially before the reproduction, will be separated according to their sex in special lakes or even in wintering basins, and after the reproduction, if we don’t have such a kind of lake, they will be released in breeding lakes also according to their sex.

Reproductive fish separation gives the possibility of a reasonable feeding. In general, it has been noticed that too fat reproductive fish become sterile. The vascularization, which is necessary for the ovary activity, is stopped by the deposited fat. Due to this fact, we’ll try to avoid reproductive fish feeding with supplementary food, which contains a high percent of carbon hydrates.

The best results in reproductive fish breeding were obtained while feeding them with natural food. Respecting most of the recommended requirements enable farms to receive a rich production of young fish. Another factor which has an influence on young fish quality is the breeding lake. The breeding lakes have the role to produce the young fish necessary to populate it. The water used in the breeding basins must be pure. Also we must avoid sudden decrease in temperatures during the night. For that purpose it is recommended to cover the basins at night.

In our country, the consumption carp is bred during two summers, more rarely during three. This procedure is the most economic. But the number of years of carp breeding is determined by the market preferences.

The supplementary food, also, has a major importance. While giving out the food we must take into consideration the following:
- if we choose and already use a type of portion we don’t have to change it, because the carp hardly adapts to a new alimentary diet;
- there must be delivered the food quantities that will be consumed in 2-3 hours etc.

Lakes maintenance and improvement are regularly done in order to maintain and increase natural productivity, namely the food resources of fish (biomass).

Maintenance works together with technical and biological improvements in pisciculture consist in creating optimal conditions for useful biomass development, and at the same time to control aquatic organisms which are dangerous for fish.
Among these works we can mention: piscicultural basins’ seepage, ploughing, harrowing, fertilization, amendment, alternation with agriculture etc.

Natural production decrease sometimes under 200 kg/ha is due to the following causes:

- excessive development of the aquatic flora (reed thicket) and of the submerged flora (weeds);
- floating reed islet formation which essentially reduces the surface of water gloss;
- pronounced lakes’ sinking that contributes to the natural production decrease, due to the fact that the productive ground is isolated by an anorganic mass; beside this disadvantage, also the water volume reduces and by consequence also its depth, fact that contributes to the reed rush development;
- lakes and basins inexhaustibility during the winter;
- the decrease of feeding flow which essentially contributes to lakes and farms systematic degradation because of reed islet development and easily flooded surfaces reduction;
- degradation of less deep lakes and basins which get stuck and are covered with a strong flora - reed islet – in a very short period of time, 2-3 years.

We can notice these situations only in neglected lakes.

As to the fish breeding complex from Telenești, its piscicultors fight with these negative factors and eliminate them as well as possible.

Beside the described measures, we can propose for the fish breeding complex from Telenești to pay a special attention to the sanitary and veterinary hygiene in order to improve the production quality.

The application of general sanitary and veterinary rules in pisciculture ensures a reasonable exploitation of a stable and increasing production and an obtainment of a healthy and resistant piscicultural material.

In order to achieve the mentioned goal it’s necessary to respect the preventive measures.

We’ll give below the scheme of the main preventive measures that should be respected in the piscicultural exploations (according to Kanaiev A.I. 1973).

According to the researches of many authors and to the author’s finding it was established that $C_1$ – inbreed (consanguine-related matchings) – from a physiological point of view are inferior to $C_1$ – outbreed (non/related matchings) or crossbred (matchings between races). They have a lower resistance to infectious diseases, especially during the winter, and they have more frequently the swimming vesicle congestion(SVC).

In order to obtain a healthier material, avoiding the consanguinity phenomenon, the farms will have two separate family lines of reproductive fish, or they will bring reproductive fish from other farms, proceeding to their crossbreeding.
<table>
<thead>
<tr>
<th>Improved piscicultural measures</th>
<th>Improving measures</th>
<th>Sanitary and veterinary measures</th>
<th>Preventive measures of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Selection and choice of reproductive fish according to their genetic and zootechnical criteria</td>
<td>Drainage channels and basins’ ground arrangement and maintenance</td>
<td>Avoiding the introduction of pathogenic agents</td>
<td>Preventive treatments in spring and autumn for the populations</td>
</tr>
<tr>
<td>Preventive measures in the reproductive campaign</td>
<td>Main channel rectification and ground levelling</td>
<td>Preventive disinfection of the ground, fishing tools and equipment</td>
<td>Preventive anti-parasitic measures for the transportation</td>
</tr>
<tr>
<td>The respect of zootechnical norms at populations</td>
<td>The ploughing of basins’ ground in autumn</td>
<td>Diagnosis of the bred fish material</td>
<td>Preventive measures during the breeding – in summer</td>
</tr>
<tr>
<td>The fertilization of lakes with natural, mineral and green fertilizers</td>
<td>The cultivation of lakes’ ground with agricultural crops</td>
<td>Preventive isolation and destruction of sick fish</td>
<td>Preventive measures for the fish from wintering basins</td>
</tr>
<tr>
<td>The application of polyculture using carnivorous fish</td>
<td>The control of excessive aquatic plants</td>
<td>To empty the lake during the summer and to maintain the ground as ploughed field</td>
<td>The treatment of the fish from lakes according to their needs</td>
</tr>
<tr>
<td></td>
<td>To empty the lake during the summer and to maintain the ground as ploughed field</td>
<td>Ground harrowing to eliminate the algae</td>
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</tbody>
</table>
In order to avoid that fish are being taking ill, we must give the greatest preventive importance to the reproduction campaign period, when there are the most optimal conditions for fish infestation with parasitic, bacterial deseases etc.

Beside the preventive measures of reproduction lakes and reproductive fish dezinfaction, the best results are obtained using hypophysis injections, artificial fecundation and spaun incubation using special equipment. Thus we avoid different infestations that take place during the contact between larvae and reproductive fish.

The populations must be done in proportion with the natural production of piscicultural basins. When the populations are too large, it was stated that for $C_0$ the natural food must be in a proportion of 25-30 % in comparison with the supplementary one, and for $C_1$, $C_2$, of 15-20 %, and the reproductive fish will be bred only using natural food. When this food is too reduced it will be completed with supplementary food in a quantity of 30 % compared to the biomass.

An important factor, in the general system of preventive measures against pathogenic agents, is the reasonable fertilization of the piscicultural basins.

The organic fertilizers will be introduced in such a way to avoid that water becomes acid, because oxygen decrease in water contributes to the development of such fish disease as branchimycosis, infectious dropsy etc. If water $O_2$ is excessive, 15-20 mg $O_2$/l, the organic fertilizers won’t be introduced.

To avoid sanitary and veterinary problems it’s necessary to make the analysis of lakes water taking into consideration the physico-chemical indices.

The agro-improving measures are of a major importance for the sanitary and veterinary hygiene in the piscicultural sector. The neglect of these measures leads to physico-chemical and biological changes, as vegetative invasion, sinking, acidity, sulphuric hydrogen, methane, carbon dioxide and other nocive elements formation. The process of intensive denitrification contributes to the natural production decrease and deseases emergence.

It’s compulsory to make the sanitary and veterinary control of the material that will serve to populate and repopulate the piscicultural basins. It will be taken special measures to avoid the penetration of fish and pests carrying parasites and pathogenic agents. For this purpose we use special equipment placed at the feeding openings.

The piscicultural lakes that are going to be populated with $C_1$, $C_2$, and $C$, and that have piscicultural population of no value, will be treated with calcium hypochlorite.

Conclusions

A defining characteristic of the development and improvement of the economic units activity at the present time is represented by the special stress that must be put on the continuous improvement of the production quality. Every year, the quality becomes a basic strategy in further development of the enterprises. It takes into consideration society’s requirements materialized in reglementations and other restrictions which refer to human life and health protection and the protection
of the environment. As a result we can say that each function of the enterprise must try to accomplish these operational objectives. By quality control we understand to ensure the least deviation of the quality level from the established standards. During the development of the quality improvement process, the losses caused by quality problems should be removed.

The improvement of the products quality at The Fish Breeding Complex from Teleneşti can be accomplished on the basis of:

1. quality of products conception;
2. quality of the raw material and supplied materials;
3. psychic microclimate;
4. the fact that the employees must know seven elements:
   - What to do?
   - Who will do?
   - How to do?
   - Where to do?
   - When to do?
   - With what to do?
   - Why to do?

The approach of affair’s quality in general supposes to speak about the proper sense of the notions taken in the figurative sense.

Bibliography