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A FISH CAGE DEMONSTRATIVE UNIT IN THE ITAMARATI SETTLEMENT

UNIDADE DEMONSTRATIVA DE TANQUES-REDE NO ASSENTAMENTO
ITAMARATI

UNIDAD DE DEMOSTRACIÓN DE TANQUES DE RED EN EL ASENTAMIENTO
ITAMARATI

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Abstract: Currently, the greatest contribution to aquaculture comes from cultivation in excavated tanks, but net cages have been consolidating in Brazil. This production system has already achieved visibility comparable to any other productive activity, economically viable and based on high technology. The rural settlement Itamarati, located in the municipality of Ponta Porã/MS, and the region presents a still incipient fish farming, as an activity in development. However, it has great aptitude due to the availability of water resources, favorable geographic location and strong grain production. The objective of the work was to present the development of the activity, after the demonstrative unit of cages implantation in the mentioned settlement. The action proposed through the animal production axis of the

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extension project entitled “Rural Development Center – Itamarati”. Three net cages were anchored and 1000 tilapia fingerlings were stocked in each cage. Water quality parameters were monitored fortnightly, fish performance was evaluated monthly. At each visit, producers were instructed on management, water quality and hygiene. The water quality parameters remained within the ideal levels for tilapia cultivation, only the temperature has showed variations. Producers have shown great interest in the production system and new producers intend to adapt this system to their properties. It is concluded that extension projects and activities are of fundamental importance for the rural community formation and development in Itamarati settlement, as well as the supply of new technologies and cultivation systems that can add to the income of producers and guarantee food security.

Keywords: Family aquaculture. Extension. Intensive system. Tilapia culture.

Resumo: Atualmente, a maior contribuição para a aquicultura é proveniente do cultivo em tanques escavados, porém os tanques-rede vêm se consolidando no Brasil. Esse sistema de produção já alcançou visibilidade comparável a qualquer outra atividade produtiva, economicamente viável e baseada em alta tecnologia. O assentamento rural Itamarati, localizado no município de Ponta Porã/MS, e a região apresenta uma piscicultura ainda incipiente, como uma atividade em desenvolvimento. Entretanto, tem grande aptidão devido a disponibilidade de recursos hídricos, localização geográfica favorável e forte produção de grãos. O objetivo do trabalho foi apresentar o desenvolvimento da atividade, após a implantação de uma unidade demonstrativa de tanques-rede no referido assentamento. A ação foi proposta através do eixo produção animal do projeto de extensão intitulado “Centro de Desenvolvimento Rural – Itamarati”. Três tanques-rede foram ancorados e 1000 alevinos de tilápia foram estocados em cada tanque. Os parâmetros de qualidade da água foram monitorados quinzenalmente, o desempenho dos peixes foi avaliado mensalmente. A cada visita, os produtores foram orientados sobre manejo, qualidade da água e higiene. Os parâmetros de qualidade da água mantiveram-se dentro dos níveis ideais para cultivo de tilápia, apenas a temperatura apresentou variações. Os produtores demonstraram grande interesse pelo sistema de produção e novos produtores pretendem adaptar esse sistema às suas propriedades. Conclui-se que os projetos e atividades de extensão são de fundamental importância para a formação e desenvolvimento da comunidade rural do assentamento

Itamarati, bem como o fornecimento de novas tecnologias e sistemas de cultivo que possam agregar na renda dos produtores e garantir a segurança alimentar.

Palavras chave: Aquicultura familiar. Extensão. Sistema intensivo. Tilapicultura.

Resumen: Actualmente, la mayor contribución a la acuicultura se debe al cultivo en estanques excavados, sin embargo, las jaulas de red se han ido instalando en Brasil. Este sistema de producción ya ha alcanzado una visibilidad comparable a la de cualquier otra actividad productiva, económicamente viable y basada en alta tecnología. El asentamiento de Itamarati está ubicado en el municipio de Ponta Porã/MS y la piscicultura en la región está en desarrollo porque tiene gran aptitud para la piscicultura, ya que hay una amplia disponibilidad de recursos hídricos, ubicación geográfica favorable y fuerte producción de granos. El objetivo del trabajo fue presentar los avances después de la implantación de una unidad demostrativa de tanques de red en el mencionado asentamiento, acción propuesta en el programa de extensión denominado “Centro de Desenvolvimento Rural – Itamarati”. Se anclaron tres tanques-red y se acumularon 1000 alevines de tilapia en cada tanque, se monitorearon quincenalmente los parámetros de calidad del agua, se evaluó mensualmente el desempeño de los peces, en cada visita se instruyó a los productores sobre manejo, calidad del agua y acicalamiento. Los parámetros de calidad del agua se mantuvieron dentro de los niveles ideales para el cultivo de tilapia, solo la temperatura presenta variaciones. Los productores mostraron gran interés en el sistema de producción y los nuevos productores pretenden adaptar este sistema a sus propiedades. Se concluye que los proyectos y actividades de extensión son de fundamental importancia para la formación y desarrollo de la comunidad rural del Asentamiento Itamarati, así como la provisión de nuevas tecnologías y sistemas de cultivo que puedan sumar a los ingresos de los productores y garantizar la seguridad alimentaria.

Palabras clave: Acuicultura familiar. Extensión. Sistema intensivo. Tilapicultura

INTRODUCTION

Brazilian fish farming had a growth of 4.7% in 2021, the total production was about 841,005 tons of cultivable fish, in addition. The production activity in the same year had moved about R\$ 8 billion, generating 1 million direct jobs and 2 million indirect jobs. The Mato Grosso do Sul state showed a growth of 15.55% in the farmed fish production and is among the 10 largest fish producers in Brazil, occupying the eighth position (PEIXE BR, 2022). It is observed in the current scenario that Brazilian fish farming has been establishing itself in an expressive way, in this sense it is evident that every day there is a need to use new technologies, intensify production and spread new cultivation systems that make it possible to use fish in a more sustainable way.

Currently the fish production in excavated ponds is responsible for the greatest contribution to aquaculture in developing countries, however the production of fish in net-tanks has been increasingly adopted in Brazil. This system has been implemented in locations where conditions are favorable. Fish farmers are getting satisfactory results proving that net cages production has already achieved visibility when is comparable to that of any other productive activity, economically viable and based on high technology (QUEIROZ and ROTTA, 2016).

The net tanks are floating structures of various shapes and sizes, used for fish confinement. They can be composed of screen or net allowing the water free circulation, their installation can be done by means of floats where they follow the water oscillation level in the environment. This system facilitates daily handling and harvesting, as well as protection against predators and competitors (TEIXEIRA et al., 2009).

Fish farming in net tanks is a technological and at the same time versatile production model, as its structure can be built from simple and low-cost materials (CODEVASF, 2019) described that for the manufacture of tank structures and materials such as PVC pipes, welded bars with anti-corrosion paint, aluminum angles, aluminum plate, iron bars, galvanized steel and wood can be used for anchoring, and plastic drums that do not contain toxic substances or plastic tubes can be used as floats. PVC with capped ends, the meshes can be made from flexible materials such as nylon, stainless steel and polyester wire with PVC coating, the materials to be used will vary according to the environment and species to be cultivated.

The fish production in net-tanks is considered an intensive system, as it uses a technology that requires adequate food management, recurrent water quality monitoring and high stocking densities. This production system becomes 70% cheaper compared to excavated nurseries when it comes to initial investment, in addition to enabling the use of existing water resources without the need for soil movement and deforestation (TEIXEIRA et al., 2009).

The Itamarati rural settlement is the largest insize of Latin America with approximately 50,000 hectares and currently houses a population of around 17,000 people. Fish farming in the Itamarati Settlement is still incipient when compared to other local production chains, but the region has great potential, due to the vast water resources availability, favorable geographical location for flow and grains for feed production abundance.

The Federal University of Grande Dourados - UFGD, through the "Centro de Desenvolvimento Rural - Itamarati" Program, which has been operating since 2017 together with the Ponta Porã City Hall, managed, through an agreement with the Ministry of Agriculture, Livestock and Supply, in 2021, enable the implementation of a net tanks demonstrative unit in the settlement.

Therefore, the objective of the present work was to present the advances in fish farming after the implementation of a net-tanks demonstrative unit in the Itamarati rural settlement, an activity provided by the extension program.

METHODOLOGY

The project was carried out in the Itamarati rural settlement, located in the municipality of Ponta Porã, MS. Initially, three net tanks were installed in a reservoir, located close to the settlement urban center at coordinates, 22°12'57"S 55°34'27"W, FETAGRI group (Figure 01).



Figure 01. Georeferenced location of the net tanks demonstrative unit in the Itamarati rural settlement, Municipality of Ponta Porã, Mato Grosso do Sul.

For implementation, some criteria were adopted such as: water availability, absence of toothpick holders at the bottom of the reservoir, flow, depth, target species, water quality and access facility. The net tanks used comprise a dimension of 2x2x2 m, totaling a volume of 8 m³, which have four floats, a PVC-coated wire mesh, a square support structure in aluminum tubes and an internal feeder (Figure 02).

Bathymetry was carried out 3 m away at each point to obtain the depth profile of the reservoir before the deployment of the demonstration unit. Initially, the producers made concrete docks to carry out the anchoring at a depth of around 14 meters, this procedure being of great importance to prevent the cultivation units from moving and leaving the desired location.

The anchorage took place where the water flow was uniform, allowing a better nutrient cycling and good water quality for the animals. The tanks were transported to the appropriate location with the aid of a 3 m aluminum boat, positioned in a line with a distance of 2 times their length and fixed on a nylon rope with flags at each end (Figure 03).



Figure 02. Structure of the net tanks of the demonstrative unit of the Settlement Itamarati, Ponta Porã, Mato Grosso do Sul.



Figure 03. Arrangement of net tanks in the reservoir of Settlement Itamarati, Ponta Porã, Mato Grosso do Sul.

The species to be cultivated was Nile tilapia. The average of 1000 fingerlings were stocked in each net-tank, variety GIFT and Chitralada was available by a commercial fingerling farm in the city of Dourados, Mato Grosso do Sul. A two-phase production system was adopted, where fingerlings of 0.5 to 1g were placed in pockets or nurseries with a mesh of 5 to 8 mm installed inside the cages (figure 04), when they reached an average weight of 30 to 50 g. They were classified and soon after the pockets were removed and the fish remained in the net tanks until they reached average commercial weight (CODEVASF, 2019).

The extensionist action is ongoing, fortnightly the aquaculture engineering course students at UFGD carry out monitoring of the physical and chemical water reservoir parameters and monthly biometrics in order to analyze the productive performance of farmed fish (Figure 05). To monitor the water quality, samples were taken using multiprocessed devices and colorimetric kits from the Alfakit® brand of dissolved oxygen (mg/L), DO saturation (%), temperature (°C), pH, transparency, turbidity, hardness (mg/L), alkalinity (mg/L), ammonia (mg/L), nitrite (mg/L) and nitrate (mg/L). In addition to supervision and management, the producers had been received training and technical guidance on the cultivation of tilapia for a correct clarification of any doubts that may arise routinely.



Figure 04. Net tank with internal pocket. Itamarati Settlement, Ponta Porã, Mato Grosso do Sul.



Figure 05. UFGD students monitoring the water quality and animals biometrics measures in the net tanks of the Itamarati rural settlement, Ponta Porã, Mato Grosso do Sul.

RESULTS AND DISCUSSION

Several species of fish can be cultivated in cages, including Nile tilapia, due to its rapid growth in an intensive system, its hardiness and its meat with good organoleptic characteristics and fillet without intramuscular spines (BOTARO et al., 2007). Tilapia is the best species for activity beginners. The producer do not find it difficult to obtain fingerlings, the fish is resistant to handling and the tilapia market is rising. For these and other reasons, tilapia is the most net cages cultivated species in the country (KUBITZA, 2007).

However, in intensive systems, water quality can become a limiting factor for the production development, since when there is a high number of confined animals, according to El-Sayed (2006), water quality is subject to continuous changes. Thus its management becomes a determining factor in aquaculture. Therefore, understanding the water quality main parameters and their interrelationships with the animals growth and health of fundamental importance for the success of the production.

The minimum and maximum water quality parameters values analyzed during cultivation were, respectively: temperature, 19.5 and 25.2 °C; dissolved oxygen, 7.09 and 8.51 mg/l; saturation, 86.30 and 98.70%; pH, 6.3 and 7.2; alkalinity, 30 and 44 mg/l; hardness, 43 and 46 mg/l; toxic ammonia, nitrite and nitrate remained at zero, the average total length of the fish was 21 cm and the average weight was 200 g. The physical and chemical cultivation water parameters are in accordance with the values suggested by El-Sayed, (2006), only the temperature was below the ideal range, which is between 25°C and 30°C (CODEVASF, 2019).

During cultivation, the other parameters remained stable and the animals continued to eat normally, however, it was possible to observe a decrease in fish growth due to temperatures, that was below of the animal's thermal comfort, this event was also observed by LEONARDO et al. (2011) when evaluating the reservoir water quality with tilapia farming in net cages, in the south of São Paulo. The authors observed that temperatures below 20°C induce animals start to assimilate the energy provided only for the organism maintenance and not for growth.

As observed in the technical visits, the producers are not facing major difficulties during the productive handling of Nile tilapia in this production system. However, the main obstacles encountered were the lack of an engine on the boat to travel to the demonstration

unit and periods of low temperatures in the reservoir, therefore, on wind intense days, the producers displacement to carry out feeding management and animals monitoring was compromised and, due to the low temperatures, the fish decreased their metabolism and, as a result, there was a delay in the animals development. However, there were no mortalities in the cultivation and the physical-chemical parameters of the water remained stable, only the temperature showed significant variations, thus it can be seen that the project has been taking place satisfactorily considering the first contact of the producers with this system of cultivation.

This production system is a novelty in the Itamarati rural settlement. Through extensionist actions, support and agreement from the Municipality of Ponta Porã, the necessary incentive was obtained for the installation of the demonstration unit, with two producers benefiting and interested in adopting such a system. In this context, the cultivation units will initially contribute to training and incentives, so that producers can sustainably and feasibly produce a healthy and easily commercialized protein.

In this way, university extension becomes a highly prestigious tool with regard to the exchange of knowledge and social development. It is of paramount importance to encourage and bring academics closer to the communities demands and difficulties that they routinely face, this makes technologies available are allocated more efficient and assertive.

The university extension inserts professors, technicians and students in the reality of the university's extramural territory. An insertion that must be permanent, since it takes the university out of isolation and allows it to exchange experiences and experiences, as well as constantly revise its values. (DA SILVA, 2020, p.28)

The project also has contributed positively to the students involved training, the possibility of putting into practice all the knowledge acquired at the university favors the construction and formation of a good professional for the job market. However, extension projects have been strengthening family farming in the Itamarati rural settlement and adding new production alternatives.

At each visit, the producer's commitment to learn a new activity is noticeable, in addition to the observational inference of their great adaptability and acceptance in relation to tilapia production in the proposed cultivation system. The producers involved reported that

this type of system facilitates handling, allows better animals observation and, as the tanks are closed, there is no predation of fish by birds and others, a very common problem found in excavated ponds production. Thus, new producers have been showing interest in adapting this system to existing reservoirs on their properties.

FINAL CONSIDERATIONS

Fish farming in net tanks can be an excellent alternative to be adopted in properties that have ponds, dams and reservoirs. In addition to efficiently taking advantage of available water resources and enabling diversification in the income of producers. Therefore, it is concluded that the extension projects and activities are of fundamental importance for the qualification and development of the rural community of the Itamarati settlement, as well as the availability of new technologies and cultivation systems to aggregate the producer's income and guarantee the food security.

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