

DOI 10.30612/realizacao.v13i24.21065  
ISSN: 2358-3401

Submitted on January 20, 2026  
Accepted on April 14, 2026  
Published on April 27, 2026

## **EXTENSION PRACTICES IN AQUACULTURE AS A STRATEGY FOR SCIENCE COMMUNICATION IN THE TRAINING OF AQUACULTURE ENGINEERS**

PRÁTICAS EXTENSIONISTAS EM AQUICULTURA COMO ESTRATÉGIA DE  
DIVULGAÇÃO CIENTÍFICA NA FORMAÇÃO DO ENGENHEIRO DE AQUICULTURA

PRÁCTICAS EXTENSIONISTAS EN ACUICULTURA COMO ESTRATEGIA DE  
DIVULGACIÓN CIENTÍFICA EN LA FORMACIÓN DEL INGENIERO EN  
ACUICULTURA

**Daniele Menezes Albuquerque**  
Universidade Federal da Grande Dourados  
ORCID: <https://orcid.org/0000-0002-6952-9901>

**Abstract:** This paper presents an extension experience report developed within the course *Práticas na Aquicultura* of the Aquaculture Engineering undergraduate program at the Federal University of Grande Dourados (UFGD), aiming to integrate teaching, professional practice, and university–community interaction. Extension activities were carried out between August and December and involved undergraduate students, local fish farmers, and a public elementary school community in Dourados, Mato Grosso do Sul, Brazil. The actions included fish farming management, water quality monitoring, fish processing and filleting, and food education initiatives, with emphasis on the preparation and inclusion of fish-based products in school meals. The methodology prioritized hands-on learning, dialogue between academic and local knowledge, and technical feedback to the participants. The results showed positive impacts on

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<sup>1</sup> Autor de correspondência: [danielealbuquerque@ufgd.edu.br](mailto:danielealbuquerque@ufgd.edu.br)

students' professional training, strengthened partnerships between the university and local producers, and high acceptance of fish products among children and adolescents, contributing to food security and the promotion of regional aquaculture. In this sense, the extension activities also functioned as strategies for science communication, translating academic knowledge into accessible practices for farming and school communities.

**Keywords:** University extension; Science communication; Food education; Fish farming; Professional training.

**Resumo:** Este artigo apresenta um relato de experiência extensionista desenvolvido no âmbito da disciplina *Práticas na Aquicultura* do curso de Engenharia de Aquicultura da Universidade Federal da Grande Dourados (UFGD), com o objetivo de integrar ensino, prática profissional e interação universidade–sociedade. As ações extensionistas foram realizadas entre os meses de agosto e dezembro, envolvendo discentes do curso, produtores aquícolas da região de Dourados-MS e a comunidade escolar da rede pública de ensino. As atividades contemplaram manejo produtivo, monitoramento da qualidade da água, processamento e beneficiamento do pescado, com ênfase na filetagem da tilápia-do-Nilo, e ações de educação alimentar, incluindo a elaboração e a inserção de produtos à base de pescado na merenda escolar. A metodologia adotada priorizou a aprendizagem prática, o diálogo de saberes e a devolutiva técnica aos públicos envolvidos. Os resultados evidenciaram impactos positivos na formação profissional dos discentes, no fortalecimento da relação entre universidade e produtores e na aceitação do pescado por crianças e adolescentes, contribuindo para a promoção da segurança alimentar e para a valorização da piscicultura regional. Nesse sentido, as ações extensionistas também se configuraram como estratégias de divulgação científica, ao promover a tradução do conhecimento acadêmico em práticas acessíveis à comunidade produtiva e escolar.

**Palavras-chave:** Extensão universitária; Divulgação científica; Educação alimentar; Piscicultura; Formação profissional.

**Resumen:** Este artículo presenta un relato de experiencia extensionista desarrollado en el marco de la asignatura *Prácticas en Acuicultura* del curso de Ingeniería en Acuicultura de la Universidad Federal de Grande Dourados (UFGD), con el objetivo de integrar la enseñanza, la práctica profesional y la interacción universidad–sociedad. Las acciones extensionistas se llevaron a cabo entre los meses de agosto y diciembre, involucrando a estudiantes del curso, productores aquícolas de la región de Dourados-MS y a la comunidad escolar de la red pública de enseñanza. Las actividades incluyeron manejo produtivo, monitoreo de la calidad del agua,

procesamiento y aprovechamiento del pescado, con énfasis en el fileteado de la tilapia del Nilo, así como acciones de educación alimentaria, incluyendo la elaboración y la inclusión de productos a base de pescado en la alimentación escolar. La metodología adoptada priorizó el aprendizaje práctico, el diálogo de saberes y la retroalimentación técnica a los públicos involucrados. Los resultados evidenciaron impactos positivos en la formación profesional de los estudiantes, en el fortalecimiento de la relación entre universidad y productores y en la aceptación del pescado por parte de niños y adolescentes, contribuyendo a la promoción de la seguridad alimentaria y a la valorización de la piscicultura regional. En este sentido, las acciones extensionistas también se configuraron como estrategias de divulgación científica, al promover la traducción del conocimiento académico en prácticas accesibles para la comunidad productiva y escolar.

**Palabras clave:** Extensión universitaria; Divulgación científica; Educación alimentaria; Piscicultura; Formación profesional.

## **INTRODUCTION**

The development of aquaculture in Brazil occurs within a context of socioeconomic and territorial transformations, especially in regions experiencing processes of productive reorganization and expansion of agro-industrial activities, demanding sustainable strategies for the production and use of natural resources (BRITO, 2006; SIQUEIRA, 2018). In this scenario, fish farming stands out as a strategic alternative for the sustainable production of animal-derived foods, contributing to food security and regional development (PEIXE BR, 2025).

The Aquaculture Engineering course at the Federal University of Grande Dourados (UFGD) belongs to the Faculty of Agricultural Sciences and was approved by the Institutional Development Plan (PDI) in 2013 (MEC, 2014). The proposal to create this course was linked to the consolidation of other postgraduate courses to meet the demand for aquaculture production in the Brazilian Midwest region.

Admission to the Aquaculture Engineering course at UFGD is through selection via entrance exam or the Unified Selection System (SiSU), transfer from other national Higher Education Institutions (HEIs), academic mobility, compulsory transfers, and holders of a higher education degree. The course has a workload of 3,900 clock hours or 4,680 50-minute class hours. Sixty places are offered annually, with a single intake at the beginning of the academic year, and the student has a minimum completion time of 4.5 years, or nine semesters, and a maximum of eight years, or 16 semesters. The Aquaculture Engineering course at UFGD adopts a methodology of mandatory in-person classes, in which students receive practical and

theoretical lessons from professors affiliated with the HEI.

The first class began its journey through a university entrance selection process in 2014, graduating in 2019. Currently, the course is recognized by the Ministry of Education and has a grade of 4 in its latest evaluation. The origin of Aquaculture Engineering courses in Brazil was pioneered by the Federal University of Santa Catarina (UFSC), which implemented the proposal in mid-1999. The first Aquaculture Engineering course (UFSC) aimed to train human resources to cultivate aquatic organisms, just as plant production was the focus of the agronomy course, which earned them the nickname "the agronomist of the waters".

To compose the subjects, the commission appointed at that time followed the curriculum structure of similar courses and universities outside of Brazil, such as the Aquaculture Engineering course in Chile (Universidad de Antofagasta and Universidad Católica de Temuco); the Bachelor's degree in Aquaculture from Colombia (Universidad de Córdoba – Facultad de Acuicultura); the Bachelor of Science of Fisheries & Aquaculture from Canada (Malaspina University-College, Nanaimo – BC); the University Diploma in Aquaculture and Mariculture from Italy (Università di Bologna, Università degli studi di Camerino, Università degli studi di Bari); and a proposal presented in *La enseñanza de la Acuicultura Profesional en América Latina y el Caribe con énfasis en la Licenciatura* (UFSC, 2010).

A course similar to the one offered by that institution, but at the high school level, and which served as the basis for registration with the professional council necessary for professional practice in the field, was the Aquaculture Technology course offered by the Federal University of Rio Grande do Norte.

Currently, there are more than eleven Aquaculture Engineering courses spread throughout all regions of Brazil, catering to high school, undergraduate, and postgraduate levels.

The professional field for a Bachelor of Science in Aquaculture Engineering is broad, including activities in fisheries and aquaculture, the sustainable management of aquatic resources, ecology, and environmental sustainability in inland, marine, and estuarine environments, as well as integration into fish processing and manufacturing industries (UFGD, 2018).

The practice of the professional activities of an Aquaculture Engineer. It is regulated by Resolution No. 493, of June 30, 2006, of the Federal Council of Engineering, Architecture and Agronomy (CONFEA). According to that resolution, professionals trained in the course will be competent to carry out activities 1 to 18 of Article 1 of Resolution No. 218 of June 29,

1973.

Based on Resolution No. 11 of the National Education Council (CNE) and the Higher Education Chamber (CES), of March 11, 2002, revoked by CNE/CES Resolution No. 2, of April 24, 2019, which establishes the Curricular Guidelines for Undergraduate Courses in Engineering, the profile of A graduate / graduate/professional Aquaculture Engineer is someone with a generalist, humanist, critical and reflective education, capable to understand and translate the needs of individuals, social groups and communities. with regard to to the activities inherent to the exercise professional, us fields specific of performance, namely: utilization and management of the resources natural aquatic; cultivation and Sustainable use of the biological wealth of seas, estuarine environments and inland waters; fish processing; ecology and environmental sustainability.

The inclusion of extension activities in undergraduate curricula aligns with national guidelines that orient university extension as an inseparable dimension of teaching and research, promoting academic training committed to social transformation. Family aquaculture presents high potential for promoting sustainable development, especially when associated with agroecological principles, productive diversification, and the strengthening of local economies—aspects widely discussed in the literature on family farming and sustainable production systems (BUAINAIN, 2006). The curricularization of extension allows students to work in real-world contexts, engaging with different social actors and applying scientific knowledge for the benefit of society (FORPROEX, 2012; BRAZIL, 2018).

In this sense, the role of Aquaculture Engineers in university extension programs goes beyond the technical dimension of production, assuming a strategic role in promoting food security, food and nutritional education, and strengthening public supply policies. Through extension activities developed with schools, producer associations, and public managers, these professionals contribute directly to the inclusion of fish in school meals, whether by improving local production, supporting the organization of the production chain, or developing products suitable for children and young people. By linking production, processing, and food education, university extension becomes a fundamental instrument for increasing fish consumption, promoting healthier eating habits, valuing regional production, and consolidating institutional markets, such as the National School Feeding Program (PNAE), promoting lasting social, economic, and nutritional impacts in the territories where the university is located.

Given this context, this article aims to report and analyze the extension activities developed within the scope of the Aquaculture Practices discipline of the Aquaculture Engineering course at the Federal University of Grande Dourados (UFGD), highlighting how

these practices are configured as strategies for scientific dissemination and integration between teaching, research and extension.

## METHODOLOGY

The extension activities took place between August and December as part of the requirements for completing the "Practices in Aquaculture" course in the Aquaculture Engineering program at the Faculty of Agricultural Sciences of the Federal University of Grande Dourados in the city of Dourados-MS. The implementation of the extension activities also considered principles of environmental sustainability and the regulation of aquaculture activity, aligning with technical and regulatory guidelines aimed at the implementation of environmentally responsible aquaculture enterprises (CARVALHO, 2016). The methodology was applied with 22 students from the Aquaculture Engineering program, and the target audience was small producers in the region.

In the first stage, a presentation activity was conducted to contextualize the methodology that would be applied in carrying out the field actions, instructing those involved on professional conduct in relation to the small producer. Following this, the participants were divided into groups to be informed of which action and location the extension activities would take place. Each group had to notify all participants a week in advance of a detailed itinerary of the action that would take place, with a pre-determined location and time.

Students enrolled in the course were advised to complete their yellow fever vaccinations before starting the activities, considering that the activities would take place in areas with a vaccination recommendation (ACRV) established by the Ministry of Health, and also to get tetanus vaccinations due to the risk of injuries at the locations where the activities would be carried out.

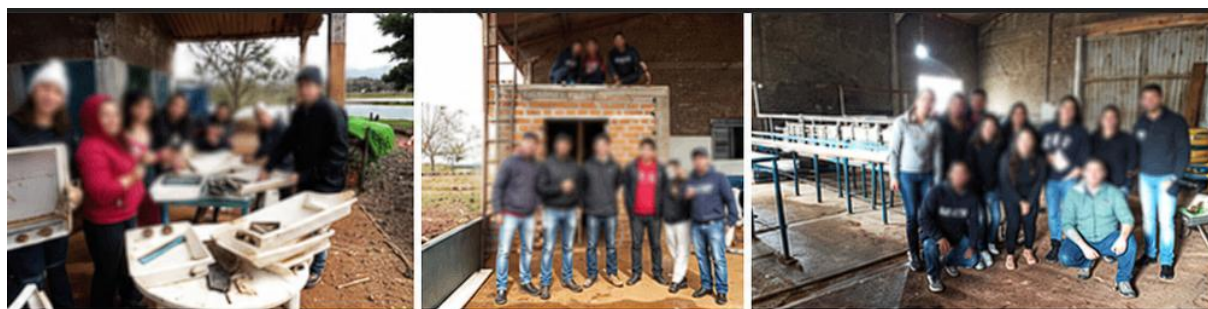
The meetings took place once a week, lasting an average of 6 hours for the complete execution of each activity, totaling 15 meetings. The topics covered were: i) *Laboratory routine during Nile tilapia reproduction* ; ii) *Water management and quality with emphasis on the verification and calibration of aquaculture equipment* ; iii) *Operational management of aquaculture units* ; iv) *Management in hapas and preparation of ponds* ; v) *Soil analysis for the construction of excavated ponds for continental fish farming* ; vi) *Mechanization in fish farming* ; vii) *Smoking of freshwater fish* ; viii) *Processing and beneficiation of Nile tilapia – filleting and glazing* ; ix) *Collection and counting of Nile tilapia eggs* ; x) *Preparation of fish-based products – an approach with a recipe for pacu and tilapia kibbeh* ; xi) *Inclusion of fish meatballs in school meals* ; xii) *Management in elevated tanks* ; xiii) *Blood analysis of teleost*

fish ; xiv) Visit to a fish processing and production unit ; xv) Reproduction of native Brazilian fish ;

The first activity took place at a fish fry production company located in the municipality of Dourados-MS, approximately 40 km from UFGD's Unit II. Seven students participated, giving them the opportunity to learn about the physical and organizational structure of the enterprise, as well as interact directly with the producer in charge. The activity lasted approximately five instructional hours, during which the students continuously observed the laboratory routine of Nile tilapia (*Oreochromis niloticus*) reproduction, the most representative species in Brazilian fish farming.

During the practical experience, the students went through all the stages involved in the production process of fingerlings, from the careful selection of breeders to hormonal induction, egg collection, incubation, and initial larval management. This immersion allowed them to understand the importance of sanitary control, water quality, and the standardization of technical protocols to ensure high survival rates and reproductive performance.

In addition to the biotechnical aspects, the students were able to experience, in practice, the rhythm and daily demands of a commercial fish farm, getting closer to the productive reality and developing skills that would be difficult to acquire solely in a classroom environment (Figure 1).



**Figure 1.** Students from the Aquaculture Engineering course at UFGD during an extension activity at a fish fry production company, observing the Nile tilapia reproduction routine.  
**Source:** Author.

The second activity took place at the “Chácara Olho d'Água” property, located approximately 15 km from UFGD, with the participation of a group of students who were initially received by the producer for a presentation of the production unit. The meeting began with a round table discussion, which allowed for the exchange of experiences between the students and the fish farmer, creating a space for dialogue about the main challenges faced in

the activity. This initial interaction was fundamental to contextualizing the practice and establishing an environment of cooperation between the university and the producer.

Next, the students collected water samples from three production ponds and a spring that supplied the system. Samples were collected at three different times in the afternoon (2 PM, 3 PM, and 4 PM) using sanitized PET bottles to ensure the reliability of the analyses. The parameters evaluated included temperature ( $^{\circ}\text{C}$ ), pH, water transparency, dissolved oxygen (mg/L), electrical conductivity (mS/cm), total dissolved solids, total ammonia, un-ionized ammonia ( $\text{NH}_3$ ), and inorganic phosphorus, obtained through in situ measurements and laboratory analyses performed with photocolormetry equipment and/or the colorimetry method. For transparency measurement, the Secchi disk, a classic instrument in limnology applied to aquaculture, was used.

After collecting and analyzing the results, the students organized a feedback session with the producer, presenting the values found in an interpreted manner and discussing appropriate management measures for each parameter. This step was crucial for the producer to understand the importance of continuous water quality monitoring as a determining factor for the health and zootechnical performance of the fish. For the students, the experience represented a unique opportunity to apply in practice the knowledge acquired in the classroom about limnology and water quality, reinforcing the integration between theory and productive reality. (Figure 2).



**Figure 2.** Extension activity for water quality management and monitoring on an aquaculture property in the municipality of Dourados-MS.

**Source:** Author.

The third activity was again carried out at Aquaforte Alevinos, where the practical handling and transport of tilapia broodstock was performed. To begin the activities, there was

an initial dialogue explaining the activity and its execution, followed by the division of teams. The students were to review the units in which the broodstock were located, called hapas. A second team was responsible for assembling and installing the hapas, and finally, the ponds were prepared and partially filled for the installation of pipes and hydraulic connections necessary for the flow of water for fish farming. At the end of the activities, a discussion will be held with the producers and students about the results obtained, and we will conclude the practical session with an afternoon coffee break for everyone (Figure 3).



**Figure 3.** Extension activity for the operational management of aquaculture units, involving the installation of hapas and the organization of ponds.

**Source:** Author.

The fourth action consisted of preparing the fillets in the meat laboratory of the Faculty of Agricultural Sciences - UFGD (FCA/UFGD) in order to prepare the material that would be used in other actions:



**Figure 4.** Materials used in the fish processing and filleting activity at the meat laboratory of FCA/UFGD.

**Source:** Author.

An activity was carried out at the Rita Angelina Barbosa Oliveira State School, in the city of Dourados-MS, with fourth-grade elementary school students, cafeteria workers, and the teacher in charge of the class.

The fish were purchased from the company Sul-Mato-Grossense, located on Estrada Porto Cambira (MS 156), Dourados-MS, approximately 40 km from the university. The animals were filleted, and their fillets were ground in a food processor and stored for later weighing at the Meat Laboratory of FCA/UFGD.

The ingredients needed to make the chosen fish-based product, the tilapia fillet meatball recipe (Table 1) taken from the book “Fish in school lunches: educating and training new consumers” by BOSCOLO et al. (2016), were weighed in individual plastic bags, totaling six complete recipes (Figure 4). In addition, the ingredients for the tomato sauce, made with tomatoes and beetroot, were separated.



**Figure 5.** Ingredients used in the preparation of fish meatballs intended for school lunches, organized for the extension activity.

**Source:** Author.

Two documents were prepared to be given to legal guardians for completion prior to the class: a dietary restriction authorization form and an image use authorization form. The purpose of these documents was to identify if any of the children involved had allergies to any of the aforementioned ingredients, as well as to protect their image. Furthermore, a structured questionnaire was developed and administered, completed individually by each student at the end of the extension activity, with the aim of collecting qualitative and quantitative data about the activity. Data collection occurred in person and immediately after the activities concluded,

ensuring the accuracy of the recorded perceptions. The instrument included closed and open-ended questions, covering sociodemographic data of the participants (age and school year), level of acceptance of the fish-based product, sensory perception (taste, texture, and appearance), interest in consuming fish again, understanding of the importance of fish in the diet, and evaluation of the practical activity. This data allowed for the analysis of the impact of the extension activity on promoting fish consumption, nutritional education, and scientific dissemination among the school population, supporting the discussion of the presented results.

**TABLE 1** - Ingredients used in making tilapia fillet meatballs for school lunches.

| Ingredients                  | Amount  |
|------------------------------|---------|
| Nile tilapia fillet          | 750 g   |
| Oatmeal                      | 50 g    |
| Breadcrumbs                  | 50 g    |
| Egg                          | 2 units |
| Crushed textured soy protein | 8 g     |
| Salt                         | 12 g    |
| chopped parsley              | 8 g     |
| Dehydrated onion             | 8 g     |
| Dehydrated garlic            | 8 g     |
| Annatto                      | 2 g     |

The activity began with the presentation of all the students in the course, who then met with the children to promote a dialogue about the importance of fish consumption and to explain the steps involved in carrying out the extension activity. The class was divided into six groups containing 3-4 children and 3 students, with each group responsible for preparing a recipe.

The students were responsible for the safety of each child and the handling of kitchen utensils. It was necessary to bring a food processor to school, as it would be needed during the preparation of the sauce and the equipment was not available at the institute. Personal protective equipment for handling food, such as gloves, aprons, and hairnets, was distributed.

The preparation of the meatballs was carried out using a tray, in which all the ingredients were mixed until the combination was homogeneous, with each recipe yielding 38 units. The meatballs were fried in soybean oil by two students from the course with the help of the cafeteria staff and then combined with tomato sauce (Figure 6) made from 5 kg of tomatoes, 1 kg of beetroot, 1 kg of chopped onion, 1 head of garlic and about 1 tablespoon of olive oil. In

total, 230 meatballs were served to the children who carried out the activity, along with the university students, teachers and cafeteria staff who assisted in the practice.



**Figure 7.** Final product (fish meatballs in sauce) prepared during an extension activity to include fish in school meals.

**Source:** Author.

In total, 19 students aged 11-14 years old participated, along with 16 students from the Aquaculture Engineering course between the 6th and 10th semesters, three cafeteria workers, the teacher responsible for the class, and the school coordinator.

Beyond its technical and operational aspects, the methodology adopted was based on the principles of university extension, understood as an educational, cultural, and scientific process that promotes transformative interaction between the university and society. The actions were planned in a participatory manner, prioritizing the exchange of knowledge, active listening to aquaculture producers and the school community, as well as technical feedback on the activities carried out, in accordance with the National Policy for University Extension (FORPROEX, 2012). In this sense, the students acted as mediators of knowledge, articulating theoretical content learned in the classroom with real demands of the territory, strengthening their critical, civic, and professional training. This approach allowed the practices developed to go beyond mere demonstration, becoming extension experiences integrated into the formative process of the Aquaculture Engineering course.

## RESULTS AND DISCUSSION

The results presented below stem from a set of integrated extension activities, in which practical teaching was combined with direct interaction with aquaculture producers and the school community. From the perspective of university extension, the activities allowed the

application of technical and scientific knowledge in real-world contexts, promoting the exchange of knowledge, the professional training of students, and concrete social impacts. Thus, the results are discussed not only in technical terms, but also from their pedagogical, formative, and social implications, reinforcing the role of the university as an agent of local transformation and development.

In the results of the first activity, carried out at a fish fry production company in Dourados-MS, it was possible to identify several indicators of perception on the part of the students and the partner producer. From an academic point of view, the students highlighted the practical understanding of the Nile tilapia reproduction stages, reinforcing the relationship between theory and practice, as well as the exposure to professional reality by experiencing, for five hours, the complete routine of a commercial fish farm. This contact generated greater self-confidence to work in laboratory and production environments, in addition to arousing enthusiasm regarding future professional activity.

From a production perspective, the producer highlighted the value of the university-business partnership, recognizing the relevance of UFGD as a space for training and technological dissemination. The exchange of knowledge was also emphasized, as while academics absorbed management techniques, the producer engaged in dialogue with professors and students about adjustments and innovations applicable to their own reality.

In the pedagogical and outreach axis, the indicators highlighted the integration between theory and practice, strengthening the retention of content learned in the classroom. Furthermore, students perceived the importance of awareness regarding biosecurity, especially in relation to vaccination, hygiene, and water quality, as determining factors for productive success. Finally, the activity contributed to the formation of the students' professional identity, broadening their understanding of the role of the aquaculture engineer, and increasing their motivation, since the practical experience reinforced the relevance of their chosen career.

In the second activity, carried out at “Chácara Olho d'Água”, the perception indicators revealed significant gains for both the students and the producer involved. From an academic point of view, the students highlighted the practical applicability of the theoretical content of limnology and water management, perceiving in practice the importance of monitoring physicochemical parameters for maintaining the health and growth of the fish. The adoption of appropriate management practices and technical guidance to producers contribute to the reduction of environmental impacts associated with aquaculture, reinforcing the importance of sustainable production systems compatible with the conservation of aquatic ecosystems (REBOUÇAS; GOMES, 2016; BARBIERI et al., 2014). Furthermore, the activity reinforced

critical observation skills, as students were able to compare different collection times and identify variations in parameters throughout the day.

Another relevant indicator was the familiarization with field techniques, such as the use of the Secchi disk and the calibration of measuring equipment, which contributed to greater technical autonomy among the students. There was also a perception of the need for systematization and data recording as essential tools for the diagnosis and planning of aquaculture production.

From a production standpoint, the fish farmer reported that the activity raised his awareness of the importance of regular water monitoring, going beyond empirical observation to adopt technical parameters in decision-making. The dialogue with students and professors was perceived as a space for exchanging knowledge and resulted in practical recommendations for farm management, such as adjusting water renewal and paying attention to ammonia levels.

Regarding fish processing and beneficiation activities, especially Nile tilapia filleting, the results showed significant progress in understanding the production chain beyond the cultivation stage. Performing filleting at the Meat Laboratory of FCA-UFGD allowed students to experience fundamental stages of processing, such as good hygiene practices, product yield, maximum yield of raw materials, and adding value to the fish. This experience contributed to broadening the students' perception of the importance of processing as a strategic link between production and consumption.

From an extension perspective, these activities took on a structuring character by providing the necessary technical basis for subsequent actions in food education and the inclusion of fish in school meals, highlighting the link between production, processing, and consumption. By associating the technical mastery of processing with its application in social contexts, extension practices contributed to the expansion of fish consumption and the strengthening of the local production chain, especially when integrated with educational and scientific dissemination actions, as highlighted by Boscolo et al. (2016).

The outreach activity developed at the Rita Angelina Barbosa Oliveira State School represented one of the most significant results of the project, both in pedagogical and social terms. The inclusion of fish meatballs in the school meals allowed for direct interaction between the university, the school, and the community, promoting food education, nutritional security, and encouraging fish consumption among children and adolescents. The active participation of elementary school students in preparing the recipe fostered playful learning and piqued interest in the product, reducing cultural resistance often associated with fish consumption.

The results of this initiative demonstrated high acceptance of the product by students,

teachers, and cafeteria workers, in addition to strengthening the school's role as a space for developing healthy eating habits. From an extension perspective, the activity fulfilled its role by translating technical and scientific knowledge into concrete social practice, contributing to the formation of new fish consumers and to the appreciation of regional fish farming. Studies indicate that the increase in fish consumption is directly related to consumer awareness and the adoption of educational strategies that highlight the nutritional and environmental benefits of this food, as well as its impact on reducing the negative effects associated with the excessive consumption of other animal proteins (KNOCHE, 2016). Furthermore, the initiative reinforced the role of the aquaculture engineer as a professional capable of intervening in public policies on school meals and food security.

The inclusion of fish-based products in school meals directly aligns with the guidelines of the National School Feeding Program (PNAE), which encourages the provision of healthy, regional, and nutritionally adequate foods in the school environment (BRASIL, 2015). Studies indicate that the introduction of fish into school meals contributes to the formation of healthier eating habits and to the expansion of fish consumption from childhood (BOSCOLO et al., 2016).

In an integrated manner, the results demonstrate that the extension activities carried out went beyond a merely demonstrative character, promoting educational, productive, and social impacts. For the students, the activities contributed to the consolidation of their professional identity, broadening their understanding of the role of the aquaculture engineer as a technical agent, educator, and social transformer. For the producers and the school community, the actions provided access to technical knowledge, sustainable practices, and healthy food alternatives, reinforcing the importance of university extension as an instrument for local development and social inclusion.

Finally, in the pedagogical and extension axis, the action contributed to strengthening the integration of theory and practice, allowing students to see themselves as future professionals capable of guiding rural producers based on technical data. The formation of professional identity was also highlighted, as students began to perceive the aquaculture engineer as an essential agent in technical guidance and the sustainability of production systems.

## **CONCLUSIONS**

The outreach activities developed within the Aquaculture Practices course highlighted the role of university extension as a cornerstone of professional training in the Aquaculture

Engineering program at UFGD. The integration between teaching, practice, and social interaction brought the university closer to aquaculture producers and the school community, promoting the exchange of knowledge and the application of technical and scientific knowledge in real-world contexts.

The activities contributed to strengthening productive sustainability, to the critical training of students, and to the dissemination of practices related to the handling, processing, and value-added fish processing. Also noteworthy is the inclusion of fish-based products in school meals, which generated a direct social impact by encouraging healthier eating habits and valuing regional fish farming.

It is concluded that the curriculum structure of extension activities strengthens the connection between the university and society, reaffirming UFGD's social commitment to sustainable development, food security, and the training of professionals capable of acting as technical and transformative agents in the territories where they are located.

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