

RURAL PIG FARMERS: A CASE STUDY ON WELL-BEING PERCEPTION IN TEPETLÁN, VERACRUZ, MEXICO

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ABSTRACT

Rural pig farming (*Sus domesticus* Erxleben) is a major agricultural activity in Veracruz, Mexico. Given the controversies surrounding pig farming, the perception of well-being was studied along with the impact of this activity in Vicente Guerrero, in Tepetlán, Veracruz, Mexico. Twenty-six pig farms were characterized to understand their dynamics and profiles. Then, seven farmers were selected to conduct a case study on the location. A triangulation was carried out with other family members, local authorities, and a former farmer in the community. The segment interviewed was all female, with an average age of 48 years. Pig farming is the second most important economic activity in households and the main source of income for women. Production systems are traditional, with pared floors; 62.9 % are carried out in a space smaller than 1000 m². On average, each farmer has 21 animals and 53.9 m² of pigsties, and 96.2 % of farmers do not treat the waste generated by this activity. The interviewees relate well-being to the economy and health. The pig farming business does not currently satisfy the economic needs of the farmers. To generate more income, it is required to decrease the cost of pig feed and raise the sale price. Additionally, this activity affects the well-being of other members of the community.

Keywords: Subjective well-being, characterization of farmers, dimensions of well-being.

Citation: Solís-Tejeda MA, Ruíz-Rosado O, Pérez-Hernández P, Díaz-Rivera P, Lango-Reynoso F, Aguilar-Ávila J, Asiain-Hoyos A. 2024. Rural pig farmers: A case study on well-being perception in Tepetlán, Veracruz, Mexico. *Agrociencia*. <https://doi.org/10.47163/agrociencia.v58i7.2821>

Editor in Chief:
Dr. Fernando C. Gómez Merino

Received: May 31, 2022.
Approved: August 29, 2024.
Published in Agrociencia:
October 28, 2024.

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INTRODUCTION

Veracruz is the fifth largest state of pig production (*Sus domesticus* Erxleben) in Mexico (SIAP, 2021). This activity was incentivized in small-scale farmers through state programs such as *Fomento Ganadero* (Livestock Promotion) of the Secretariat of Agriculture, Livestock, Rural Development, Fishing, and Food (SAGARPA) (IICA, 2016). The municipal area of Tepetlán, located in the State's, is a model of backyard

pig farming, carried out with basic infrastructure without waste treatment (Solís-Tejeda *et al.*, 2021a). Pigs are fed on concentrated foods, which represents 70 % of total production costs (Cisneros-Saguilán *et al.*, 2020). This is a challenge to reaching profitability, so alternatives that benefit this activity are required.

The World Health Organization defines personal well-being as the optimal state of mental health that makes people able to materialize their potential, overcoming the stress of everyday life and contributing to their community (WHO, 2018). It is possible to understand well-being as the satiation satiety that people achieve of their basic and complementary needs, as well as the possibility of reaching their aspirations in a particular timeframe (Duarte and Jiménez, 2007).

The Mexican government considers that to achieve well-being for rural families, it is necessary to generate income above the poverty line (DOF, 2020). This is equivalent to the value of the food basket plus the non-food basket, which in December 2021 was \$2 343.5 MXN for rural areas and \$3 542.14 MXN for urban areas per person (CONEVAL, 2022). Individual economic development has a greater influence on well-being than an increase in income for the entire population. Individuals strive for well-being. Income, professional development, and the acquisition of goods are all means of achieving it (Rojas, 2011). Well-being is used as a measure of progress, and it is useful in comparing societies over time and space, as well as defining good and bad aspects. Numerous factors influence well-being, including family, health, income, and employment.

Production and economic activities are important steps toward achieving well-being. Agriculture, has shown to improve the perception of well-being by creating community ties, contributing to environmental care, political influence, and positive aspects related to working the land (Molina-Posada *et al.*, 2019). Pig farming can improve aspects of personal and family well-being, such as financial, physical, and social health. Understanding and measuring these aspects from the farmer's perspective is critical (Santos-Barrios *et al.*, 2017), considering the damage to the social well-being that this activity generates, such as the effects on both human health and the environment due to the residues produced, while promoting systems that guarantee well-being in all dimensions (GreenPeace, 2020).

This article provides an insight into the perception of well-being generated by backyard pig farming. Given the controversy, it is critical to understand the perception of well-being produced by this activity and how it affects social and family well-being in the community, as demonstrated by the town of Vicente Guerrero in Tepetlán, Veracruz, Mexico. The information analyzed was obtained from the perspective of female pig farmers at a backyard level, family members, and other local participants of the community.

MATERIALS AND METHODS

The study was carried out in the town of Vicente Guerrero, in the municipality of Tepetlán, Veracruz, Mexico (19° 36' 38" N and 96° 48' 26" W, at an altitude of 900 m). This area is highly marginalized, with an index of 52.6. It has 935 inhabitants, of whom

456 are women. The weather is warm-humid, with a mean annual temperature of 19 °C and a mean annual rainfall of 1320 mm (SEFIPLAN, 2021).

Non-probabilistic sampling was used to identify 26 small pig farms. A structured survey was used to characterize them, which included questions about household characteristics as well as production and business systems. The characterization is presented using descriptive statistics. Following that, an exploratory and multiple case study was conducted, in which seven farmers from previously characterized farms, each with defined characteristics such as a backyard and a traditional production system, were interviewed.

To be considered, the subject of study must have had at least four years of experience as a pig farmer, with assets ranging from one to 15 sows, as well as the ability to sell finished animals. A semi-structured questionnaire was developed to interview farmers and prompt new questions. To confirm the information in the case study, a semi-structured questionnaire was applied for the triangulation process including family members, community authorities, and a former male pig farmer.

RESULTS AND DISCUSSION

Farm characterization

Characteristics of the farmers

All farms studied were run by women, who control the pig production system, which coincides with Valencia *et al.* (2007) and demonstrates their ability to direct these systems. Housewives are satisfied with this activity because it provides economic independence from their husbands and the possibility to contribute financially to the household. However, Chávez-Torres (2010) explains that it is common for women to work in small pig farms, despite the fact that their primary responsibility is to their homes.

The average age of these farmers is 48 years, with a minimum age of 30 (Table 1), which is lower than the 55 years reported by Jaramillo-Albuja *et al.* (2018) for backyard

Table 1. Economic activities of families of pig farmers in Tepetlán, Veracruz, Mexico.

Farmer	Age (years)	Economic activity (percentage of the family income)	Education
Martha	31	Pigs (100)	High school, complete
Reyna	62	Hourly employee (50), coffee (10), sugarcane (20), pigs (20)	Second grade
Magdalena	30	Butchery (70), pigs (30)	Bachelor's, incomplete
Elsa	46	Cheese-making (40), cooking (40), pigs (20)	Elementary school, complete
Estela	42	Cooking job (60), milking cows (20), pigs (20)	Elementary school, complete
Araceli	37	State transit job (60), pigs (30), limes (10)	Elementary school, complete
Carmela	53	Hourly employee (50), nixtamal mill (20), pigs (20), sells ice wholesale (10)	Fourth grade

farmers. These farmers have an average of eight years of pig farming experience and a low level of formal education (33.3 % incomplete elementary school, 40.7 % elementary, 14.8 % junior high school, 7.4 % high school, and 3.7 % bachelor's).

Characteristics of the households

The households are composed of two to seven members, with an average of three. All members contribute to production, though the heads of the families direct and run the households. The time dedicated to the activity is 3.5 h d⁻¹ on average, seven days a week.

Production and business system

The farming systems are considered “backyard” activities according to their level of productivity and technology. However, only 38.5 % of farms are located on household land; the remainder are developed within the same town. Moreover, 65.4 % are located in plots smaller than 1000 m², whereas only 15.4 % are larger than one hectare. In terms of ownership, 80.8 % of the land is commonly owned (ejidos), 11.6 % is privately owned, and 7.7 % is rented. The average area to house the animals is 54 ± 27.5 m². On average, the area is divided into six pens, with a minimum of two and a maximum of 13.

All pens are built with block walls. The roofs are made of metal sheets, except one farm, where the roof is made of wood and nylon. The pens all have concrete floors and polyvinyl chloride (PVC) drainage, except for one, which has a dirt floor and wood shaving bedding. Of the farms studied, 38.5 % have maternity or gestation cages, 23 % have nipple drinkers, and the remainder use concrete water troughs. This description coincides with the scarce infrastructure reported by Santos-Barrios *et al.* (2017) for backyard farmers. However, this study observes a higher level of equipment, obtained through social and productive assistance programs. No farm with a traditional firm-floor system provides treatment for wastewater or the solids produced; 50 % directly discharge wastewater into municipal drainage; 34.6 % dispose of the water on the same land; 11.5 % have a septic tank; and 3.8 % produce no wastewater. These data are consistent with those by Solís-Tejeda *et al.* (2021a).

Pigs are the second most important economic activity for 57.7 % of the households surveyed, and the third for 19.6 %. Nonetheless, in 84.6 % of cases, it is the primary economic activity in which women participate. Out of all farmers, 57.7 % sell live pigs weighing 90 to 110 kg; 15.4 % sell 40-day-old weaned piglets; 19.2 % do both; and only 7.7 % transform the pigs through butcherries. This indicates an opportunity for farmer organizations to benefit from joint sales, thus improving technologies that help reach volumes that satisfy markets, produce more income, and increase well-being (Vargas-Prieto *et al.*, 2019).

Out of the total number of farmers, 7.7 % consider their farm to be consolidated, 46.1 % consider it to be growing, 30.8 % consider it to be stagnant, and 15.4 % consider it to be declining. Farmers have access to providers in town. Providers sell animal feed,

medications, and veterinary services, resulting in a one-component network (Aguilar-Gallegos *et al.*, 2017). The scheme shows that the provider is “P003,” due to a credit policy that benefits the finance of farmers “T” (Figure 1).

The customer network is made up of eight components (Figure 2), and most farmers have only one single client for their products. “AC” clients are middlemen from outside the town. Clients labeled “CA1” and “CA2” are local butchers, and “I” represents diverse, indefinite, and occasional clients. “CA1” is known for being less demanding in terms of quality, whereas the other clients demand the provision of finishing feed to the animals. The farmers identify their incomes and health as key aspects of their family well-being (Figure 3).

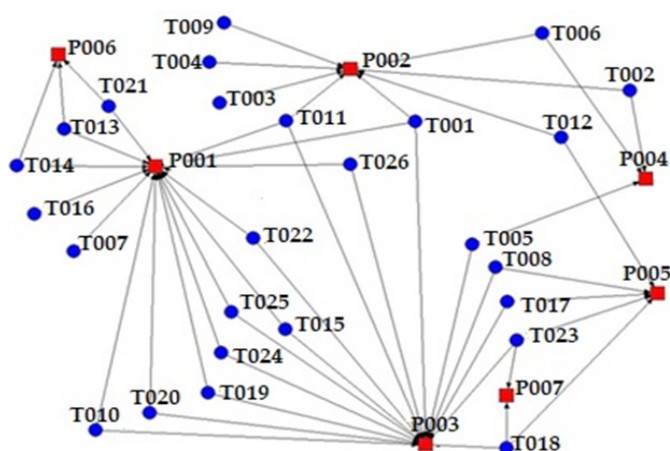


Figure 1. Provider network for pig farms in Tepetlán, Veracruz, Mexico.

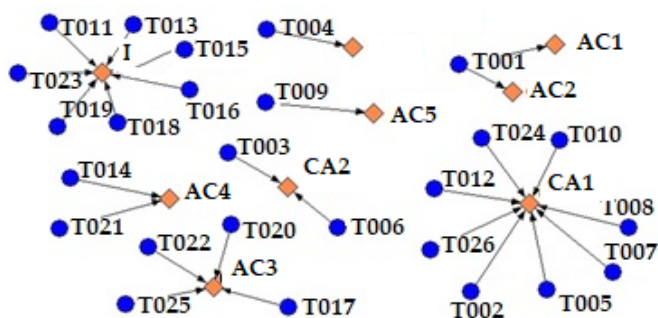


Figure 2. Customer network of the pig farmers surveyed in Tepetlán, Veracruz, Mexico.

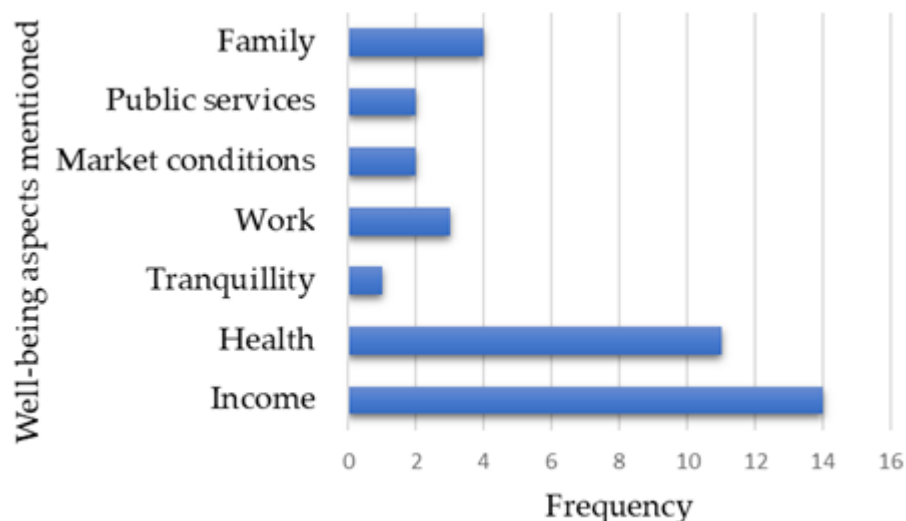


Figure 3. Aspects of family well-being and the frequency with which they were mentioned by farmers in Tepetlán, Veracruz, Mexico.

Case study on the perception of well-being

Interview conducted on farmers

Pig farming was started by 71 % of female producers to boost their family income. "... Here in this town, I think it is one of the important activities, pig farming. Most families have their income like there, their savings, fattening forces them to save, in a way ..." Magdalena. Meanwhile, 14 % started in this activity by family inheritance. "...For as long as I can remember, my mom and dad had one or two for their expenses, and then we just took over the job ..." Martha. When asked what economic activity they performed before raising pigs, 71 % responded that they did housework. "...I have always done housework ..." On the other hand, 28 % had other economic activities as jobs. "...I would work in the mill. I would start working at six in the morning ..." Carmela.

Currently, pigs are not the main source of income (Table 1). Pig farming provides interviewed families with an average yield of \$20 420.00 MXN a year per farm. Surpassing the poverty line requires \$26 444.28 MXN per person to satisfy the basic food and non-food baskets (CONEVAL, 2022). Therefore, other productive activities are needed to contribute to the family expenses.

To identify the perception of well-being, we asked what well-being is, and the answers were: "To earn well and health" (Martha), "...To have a bit more income ..." (Reyna), "...A good income, good quality of life, adequate services, that roads were well..." (Magdalena), "... That we were given some kind of help and health..." (Elsa), "...To be well, to have health and work..." (Estela), "...That we were well, with economic well-being to live better..." (Araceli)

and *"...To have good health to be able to work. Having a market for the pigs..."* (Carmela). Of all the people surveyed, 57 % believe that they are well off and that raising pigs has contributed to this, mainly through the resources obtained from their sale. *"...I have achieved well-being by working with them (the pigs) and investing to save a bit in case I need something. In case I need to, I'd sell the pigs, even if they aren't finished..."* Martha. Out of the total of farmers who do not consider themselves to be well off, 43 % relate it to the drop in pork prices and the increase in prices of balanced foods; this situation causes them to become stressed. *"...A bit more income from the pigs would give me greater well-being because I would no longer be worried about what I'll do, or what I'll have to eat, or if there is anything to eat. Now I feel worried because I sold my pigs and made no profit. I feel depressed..."* Reyna. *"...Well-being becomes hard with the reduction in the price of pork, and then there is too much pork, and selling it gets complicated. Lots of pork is coming in from Puebla. I don't know how they sell it so cheap..."* Carmela.

The rise in the price of corn in the year 2020 persisted in 2021, causing an increase in the price of animal feed, including pig feed. The reaction is a reduction in worldwide production, leading up to a reduction in the grain reserves in the United States, along with the effects of the "La Niña" phenomenon in Brazil and Argentina. On top of this, China has increased its demand for grains. Other factors are the reduction in the supply of crude oil by Saudi Arabia and the COVID-19 (Aguilar-Gómez, 2021). In order to reduce the consumption of balanced foods, it is possible to provide pastures using the pig-to-field production system in one or all of the stages of development of the animal (Carballo-Sánchez *et al.*, 2021). However, the farmers in our study do not know other pig farming technologies.

All the farmers surveyed wish to continue with the activity. *"...I am motivated to continue because it is something that can be done here, at home. You don't need as much space, and one can get things done in little time ..."* Martha. In addition, 57 % mention that the activity has provided returns in other moments. *"...When they come, when pork goes up in other places, when buyers start coming to this area, prices go up. Now I'm paying \$37.00, but if they come from elsewhere, it forces me to pay more..."* Magdalena's husband and local butcher.

The farmers agree that it is a critical moment for pig production due to the increase in the price of balanced feed and the drop in the price of pork. Hence the question, "What motivates you to continue to raise pigs?" to which 43 % responded that they continue because they like to work with animals, and 28 % explained that the little time they dedicate to the pigs helps them do other productive, recreational, or educational activities.

All interviewees consider that raising pigs is an adequate activity for them. When asked what the activity contributes to their well-being, the following answers were provided: *"...it gives us money..."* (Martha), *"...The pigs give me money to buy myself the things I need..."* (Reyna), *"...It's another source of income, we can't have only one source of income because we are a big family..."* (Magdalena), *"...For us it's like saving, and you know you are fattening them, you tighten your belts on some things, but you know you are going to*

get it back..." (Elsa), *"...They have helped me pay for my kids' school..."* (Estela), *"...My son is in university, and that's where we have taken money from for him to study..."* (Araceli), and *"...That's where I get money from to pay for the services for the house ..."* (Carmela).

Interviews conducted on farmers' families

All the farmers interviewed consider that their families agree with their work raising pigs. Their family members were asked what they like about their relatives' raising pigs. The responses were: *"...However little, money does come in..."* (María, Martha's mother), *"...It's convenient for my wife to have these pigs because she buys whatever she wants and I don't move my money..."* (Enrique, Reyna's husband), *"...I like it because when she has (pigs), I buy them, and the money stays here..."* (Jorge, Magdalena's husband), *"...When we sell, we get money for us, and that's what we use to buy things ..."* (Julia, Elsa's daughter), *"...It doesn't take lots of our time, you just go tend to them and wash them twice a day and you come back ..."* (Juan, Estela's husband), *"...I like animals, but I can't work on them anymore, so I say she goes on ..."* (Clara, Araceli's mother-in-law), and *"...She's busy and helps me with expenses..."* (Federico, Carmela's husband).

The farmers' family members were asked about their perceptions of well-being (Table 2). 71 % believe they do not have a sense of well-being. *"...I think I lack in well-being because one has to work a lot to be well, and if we get sick, it costs a lot of money and we can't leave work; and if we go to the doctor, we waste many hours and have to leave work and make no money..."* Jorge. Only 14 % of the family members surveyed consider pig farming as the only source of their well-being. *"...The pigs do contribute to our well-being, that's what we feed off. That's why I try that my daughter doesn't get discouraged and goes on..."* María.

Table 2. Perception of well-being by the families of pig farmers in Tepetlán, Veracruz, Mexico.

Name	Relationship	Age (years)	Education	Economic activity	Perception of well-being
María	Martha's mother	64	Elementary school, complete	Housewife	<i>"...Health and support from the government..."</i>
Enrique	Reyna's husband	62	First grade	Farmer	<i>"...Earning enough for food and get cured when we get sick ..."</i>
Jorge	Magdalena's husband	41	High school, complete	Butcher	<i>"...Having enough resources to continue working and to be able to eat ..."</i>
Julia	Elsa's daughter	19	High school, complete	Student	<i>"...Having money to eat, feel good, being able to study ..."</i>
Juan	Estela's husband	45	Elementary school, complete	Cow milker	<i>"...Having money for the home expenses, such as food and electricity, for the children ..."</i>
Clara	Araceli's mother-in-law	69	Elementary school, complete	Mole vendor	<i>"...That they can assist you because I can't work anymore. That my family members have jobs ..."</i>
Federico	Carmela's husband	57	Elementary school, complete	Laborer	<i>"...Having opportunities, earn more ..."</i>

Although 86 % consider that pigs contribute to their well-being, it is not the activity that provides them the greatest well-being. *"...Pigs do give us a profit, and it helps. But I feel that we see money more often from cattle. Pigs are like savings ..."* Juan.

We asked the family members what could be done so pigs could further promote the well-being of their families: *"...To have space to keep breeding and being able to feed them..."* (María), *"...We should be taught how to make the pig feed and get a better price for each pig..."* (Enrique), *"...Having more money for pigpens and fitting more animals in..."* (Jorge), *"...That the feed was cheaper, because it's expensive..."* (Julia), *"...To find a way to be paid more per pig and sell them faster..."* (Juan), *"...Well, we should get support to be able to produce more..."* (Clara), and *"...There's a lack of market opportunities here, pork is poorly paid..."* (Federico).

Neighbors complain to 28 % of the relatives due to smells related to pig farming, which is considered harmful to the health and well-being of the community. This has led to the search for places to move their farming facilities. *"...Almost all of us do this for a living, and that's why there are no problems with neighbors..."* Araceli.

Interview conducted on a former farmer

As part of the case study process triangulation was used with Martín (age 56), a five year former farmer who left pig farming one year ago. He was asked what well-being is. *"...It is that one that is relatively well economically. That you work but also see a profit ..."* Do you think you have well-being? *"...Yes, but a low one; let's say 50 or 60 %; one has to make an effort to have well-being..."* What economic activities do you carry out to obtain well-being? *"...I have always worked with cattle, even before pigs. And that gives me a bit of well-being..."* Why did you decide to produce pigs? *"Sometimes you see that others are producing. And when you see that there is a bit higher price, you do get excited. But there comes a time in which food prices rise and the price of pork drops. We do try hard, but then the price drops and there are no buyers, and the pigs keep eating; that's why we stopped ..."*

Do you consider that cows provide greater well-being than pigs? *"...Yeah, we also feed them, but only one portion, and we go to the sugarcane plantation and bring back the cane tip, and it doesn't incur any costs..."* Would you go back to raising pigs? *"...I would like to, but it would have to be economically a fixed amount to begin. I have pigpens there. The prices of the feed would have to improve because otherwise, why would I work if I won't make a profit..."*

Interview conducted with local authorities

A representative of the health sector, a municipal agent of the area, and the president of a farmers' association with influence on the municipality were interviewed. They were asked about their concept of well-being (Table 3) and some questions about well-being in the community (Table 4). In this regard, Solís-Tejeda *et al.* (2021a) report that 72.2 % of a sample of farms in Vicente Guerrero, Veracruz, Mexico, discharge their wastewater into the drainage system, including untreated feces.

Daniel was asked the following questions: What problems pig farms cause in the area? *"...People complain about the pigpens, the smell, and the flies. I go visit houses, and*

Table 3. Perception of the well-being by authorities in Tepetlán, Veracruz, Mexico.

Name	Age (years)	Job	Perception of well-being
José	49	Municipal agent	<i>"...That the community is better off, that the streets can be fixed, and that we all have the same quality of life in the economy. That there are more jobs ..."</i>
Diego	38	Health promoter	<i>"...To be well physically, emotionally, to have a general stability in life and at work ..."</i>
Deysi	38	President of a farmers' organization	<i>"...To have health, homes, and resources to be well-fed, dressed, and a possibility of thriving ..."</i>

Table 4. Well-being in the community and the effect of pig farming in Vicente Guerrero, Veracruz, Mexico.

Name	What do you consider well-being in the community?	How does pig farming affect the community's well-being?
José	<i>"...What contributes most are sugarcane, coffee, and animals. But more economic activities are needed ..."</i>	<i>"...The problem we have is with those who do it here, in the town. The drainage often gets blocked and they smell bad. But I think it helps the well-being of those who produce it; it's what they live off..."</i>
Diego	<i>"...There's a lack of action promotion, and for people to take action on what they are responsible for. Hard work is being done to change habits to avoid diseases..."</i>	<i>"...There are plenty of pigsties. Some adapted following municipal guidelines, but others are in backyards and cause certain diseases and annoyances to the people who don't do that for a living..."</i>
Deysi	<i>"...We need to work more for our well-being. There is a great demand for infrastructure for farms and equipment to help the farmers earn more and live better. There are currently no support programs for farmers..."</i>	<i>"...Pigs provide them with incomes, however little, because of a lack of investment. Families help each other to buy or improve their homes, and even for parties..."</i>

that's what people comment. But there haven't been any diseases..." What to do to avoid pigs from harming the community's well-being? *"...Most people have pigpens. It's good because those families get incomes. It's bad because it affects other families that don't do that, and that's why they think it's bad. It should be more regulated, so that they are better-kept and avoid troubles for others..."* Does it affect the consumption of pork in the area? *"... There are many people who are diabetic and hypertense and with other diseases, and so they shouldn't be eating pork. Our promotion activities include teaching them about healthy eating and following up on their doctors' recommendations..."*

José was asked: What is your opinion on the pig farming in the area? *"...It's fine, it's a source from which everyone helps each other. The problem is that we have many who have pigpens in the town. We should consider moving them out..."* What actions have you considered to improve the town's well-being in the face of the increase in pig farms?

"...Our biggest problem is that there are two huge pig farms, and two cheese factories as well. Everyone is willing to take the pig farms out of the town, but those people who have cheese factories, which are big farms, are the ones with the most money, and they do nothing to take them out. And now those with little money say, they should take them out, and then me..."

Solís-Tejeda *et al.* (2021b) explain that backyard pig farming is important for rural development, although it must be carried out sustainably. The increase of small-scale farms in rural areas rises the risk of soil, water, and air degradation. Nevertheless, there are affordable alternatives that can be adopted, such as the treatment of wastewater through constructed wetlands and the use of deep bedding made with inexpensive materials from the region (Solís-Tejeda *et al.*, 2022) and pig farming in the field (Oyhantçabal *et al.*, 2011), which is necessary to evaluate as alternatives to the problem of this study.

Deysi was asked: What actions have you taken to improve the well-being of unionized members of your organization in Vicente Guerrero? *"...For seven years now, we began providing metal sheets for rooves. We have projects for women in bakeries and tortilla shops. But what we people have asked for the most have been pigpens and equipment for pig farms. In this town, up to 15 projects of this type have been delivered per year, until the current government came in, and there is no more possibility of helping ..."* What must be done for the pig farms to provide more well-being? *"...Not leaving pig farmers on their own. Counseling is urgent; there is no support for extension workers. Pigpens need to be improved and enlarged. An impactful project is necessary to transform the pork industry; I am always told that sales are hard..."*

Do you consider that the increase in the number of pig farms in Vicente Guerrero affects the town's inhabitants? *"...I suppose so. Many people are moving their farms to the outskirts of the town, but it's an important source of income. Pork moves the local economy; it brings money into the town, and food is produced. And while there is no work in the countryside, it's always a good option..."*

Opportunities to improve the well-being of pig farmers

The present study reflects the need to co-innovate in the current backyard pig farming systems. In these processes, the main actor must be integrated, and the co-innovations suggested must be evaluated according to the financial, technical, environmental, and social impact, as well as their contribution to the well-being of the farmers' families. It is suggested to evaluate the implementation of systems with constructed wetlands, deep beddings, and pigs in the fields, as per the particular characteristics of the farmers. For this, the productive area, the current infrastructure, and the resources of the region must be considered, among other aspects. It is necessary to create productive programs in favor of well-being, supported economically and environmentally, that promote a shift in the production methods of small-scale farmers.

CONCLUSIONS

Women participation in the family's economy plays a decisive and undervalued role. Backyard pig farmers' well-being is closely related to the success of their economic activities, sometimes with a negative impact when expected returns are not met and when they do not have the health required to perform their economic activities. Backyard pig farming is an activity that provides economic resources to acquire goods and services. It allows the farmer getting money in a short time, acting as a savings fund. However, it cannot provide all the necessary resources to achieve well-being, as it is only a supplement to the family's economy.

Backyard pig farming has become a challenge for the people of Vicente Guerrero, affecting the well-being of non-farmers. Pig farms cause discomfort due to their waste. There are verifiable impacts, such as the clogging of the community's drainage system. To increase the well-being of families, it is necessary to increase profitability in local pig farming. Key options include reducing costs and increasing sale prices, as well as continuous training. As a strategy for the first case, pig farmers consider learning how to make their feed locally.

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