

# The value network of an organization of dairy cattle producers in the municipality of Xico, Veracruz, Mexico

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## ABSTRACT

**Objective:** To characterize the producers and the dairy cattle value network in the municipality of Xico, Veracruz, Mexico, through interviews with key actors with the aim of analyzing the problem and identifying areas of opportunity that improve the competitiveness of ranchers.

**Design/methodology/approach:** Interviews were conducted with n=30 ranchers selected by targeted and snowball sampling. Semi-structured interviews were conducted with key actors. The documentary information was reviewed, resulting in the identification of the profile of the producers and the structure of the value network.

**Results:** Dairy producers in Xico are the third generation devoted to this activity. They are small- (83%) and medium-sized (17%) ranchers. They are  $56.0 \pm 12.1$  years old and have  $30.0 \pm 15.1$  years of experience. They have  $55.0 \pm 33.8$  animals and produce  $241 \pm 156.8$  L day<sup>-1</sup>. Fifty-seven percent have mechanical milking and cooling equipment. They sell their product to Nestlé and Liconsá, regional cheese factories, and directly to consumers within the municipality. The producers constantly interact with the Asociación Ganadera Local de Xico (AGLX) for matters related to cattle management and input purchase.

**Limitations/implications:** If the regional activity is to be maintained, the generational replacement must be prepared.

**Findings/Conclusions:** The producers have the experience, calling, resources, and infrastructure to produce and sell milk, mainly to Nestlé and Liconsá. The AGLX is the hub of the network and can promote dairy activity to generate benefits for the actors of the value chain and network.

**Keywords:** Value network, key actors, union organization, productive chain, associativity.

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## INTRODUCTION

Mexico is the fourteenth milk producer worldwide with 12 million L, 6.02% of which were contributed by Veracruz in 2018 (FAOSTAT, 2020). However, the country bought 362 thousand tons of powdered milk and 37 thousand L of fluid milk during the same period, making it the third country with the highest imports (SIAP, 2019). Both the mountainous and coastal regions of central Veracruz have a remarkable dairy production calling, mainly focused on the sale of fluid milk and the production of fresh and matured cheeses.

A strategy to strengthen rural companies in the territories is the application of the value network concept proposed by Nalebuff and Brandenburger (2005), which analyzes the importance and interaction of the network actors: producers–agroindustry, complementors, competitors, clients, and suppliers. The methodology is a way to organize a productive system specialized in a common activity, characterized by the territorial concentration of its economic actors and other institutions, as well as by the development of economic and non-economic links that contribute to the creation of value or wealth, both for its members and for its territory (Muñoz and Santoyo, 2011). The cooperation between the various actors of a value network allows achieving common objectives and moving towards win-win relationships.

Producers and their organization commonly present areas of opportunity: ranchers need to establish an associative figure, such as a local cattle-raiser association (Asociación Ganadera Local: AGL), where the values of reciprocity, solidarity, assertive communication, and trust are strengthened (Cervantes *et al.*, 2013). Associativity could foster strategies that turn problems into objectives (Granados-Sánchez *et al.*, 2016), based on an improvement strategy. In the municipality of Xico, dairy producers have adopted various innovations for the improvement of their production system (Cruz *et al.*, 2016); however, innovations have decreased in the last ten years, as a consequence of unknown factors. Therefore, the producers and the dairy cattle value network were characterized through interviews with key actors; the aim was to analyze the limitations and, consequently, to identify areas of opportunity for the improvement of the ranchers' competitiveness.

## MATERIALS AND METHODS

The study was carried out in the municipality of Xico, located in the Altas Montañas region of Veracruz, at 1,311 masl. The climate, Cf(b), is temperate humid (average annual temperature: 18.8 °C) with rainfall all year (annual rainfall: 1,750 mm).

The research focused on dairy producers who are members of the Asociación Ganadera Local de Xico (AGLX), Veracruz. The productive chain and the value network were characterized using the methodology proposed by Nalebuff and Brandenburger (2005) and adapted by Muñoz and Santoyo (2011). The analysis of key actors provided an overview of the environment. Subsequently, the value network dynamics was developed through the analysis of the role of its members.

Participating ranchers were identified and selected using the snowball technique (Aguilar *et al.*, 2007), based on the AGLX member registry. The information on the network structure was obtained through semi-structured interviews, with open questions addressed to the different actors of the dairy cattle value network.

The information was obtained from the producers from November 2019 to February 2020, with interviews conducted in their cattle ranches and at the AGLX facilities. The questionnaire comprised two sections: i) producer profile (name, date of birth, name and location of the ranch, education level, contact data, and date of application of the questionnaire); and ii) productive activity dynamics (years of milk production experience, economic importance of the activity, percentage of income, personnel that supports the activity, ranch and cattle herd data, type of production, market or markets, advantages and disadvantages of both the activity and the ranch, and impressions of the associativity).

The surface of the ranch, the size of the herd, the milking cows, the daily production per cow, the income of the ranch, and the educational level of the producer were taken into account to characterize the producers, following the methods proposed by Hernández-Morales *et al.* (2013) and Mariscal-Aguayo *et al.* (2017).

Both qualitative and quantitative processes were used to systematize and analyze the productive chain and value network structure information (Santoyo *et al.*, 2002); these processes allowed the measurement and determination of important phenomena, as is appropriate to the purposes of this study.

## RESULTS AND DISCUSSION

### Characterization of the productive chain

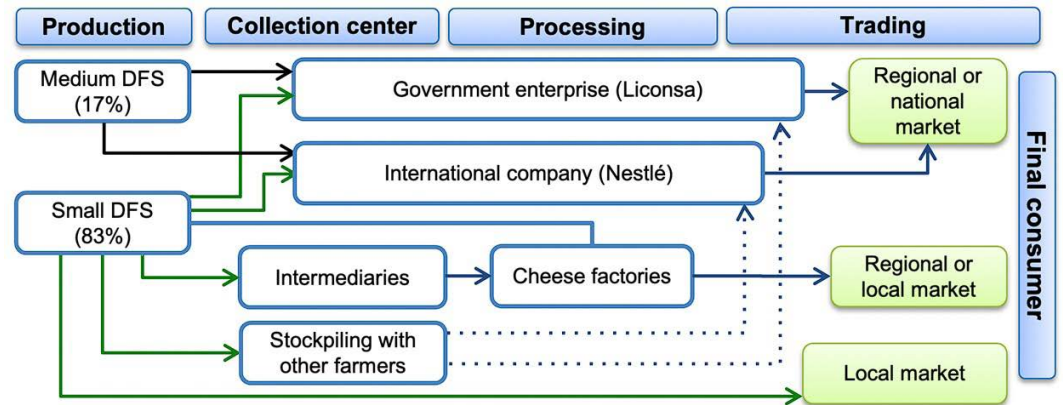
In average, 83% of the Livestock Production Units (UPP) evaluated have an average of  $17.5 \pm 9.4$  milking cows and are classified as small; the other 17% have  $41 \pm 2.1$  and are classified as medium (Table 1). These results match the suggestions of the Fomento a la Lechería Tropical proposal published in the Official Gazette of the State of Veracruz in May 2020, in which small-sized producers have from 1 to 35 cows, medium-sized producers from 36 to 100, and large producers more than 100. Consequently, according to the number of milking cows, the UPP-based classification was used to characterize the dairy cattle production chain of the municipality of Xico, Veracruz—from the raw material generation link to the commercialization stage.

Producers with medium UPP sell their milk to Nestlé, while others divide their delivery between Nestlé and Liconsa (the state company that distributes subsidized milk to the population with socio-economic disadvantages). Meanwhile, producers with small UPP sell their milk to Nestlé or Liconsa, to intermediaries, and to local cheese factories; others sell raw milk directly to local consumers (Figure 1).

Some ranchers have established alliances with other producers who have cooling equipment, to collect their product and later sell it jointly to Nestlé or Liconsa; this phenomenon is consistent with the findings of Cruz *et al.* (2016), who mention that—as

**Table 1.** Classification of dairy cattle Livestock Production Units (UPP) in Xico, Veracruz, Mexico.

Dairy farm size (DFS)	DFS percent	Number of milking cows per DFS	Minimum	Maximum	Herd size (heads)
Small	83	$17.5 \pm 9.4$	6	35	$46.8 \pm 30.2$
Medium	17	$41 \pm 2.1$	38	43	$97.2 \pm 12.9$



**Figure 1.** Schematic representation of the dairy cattle productive chain in Xico, Veracruz, Mexico.

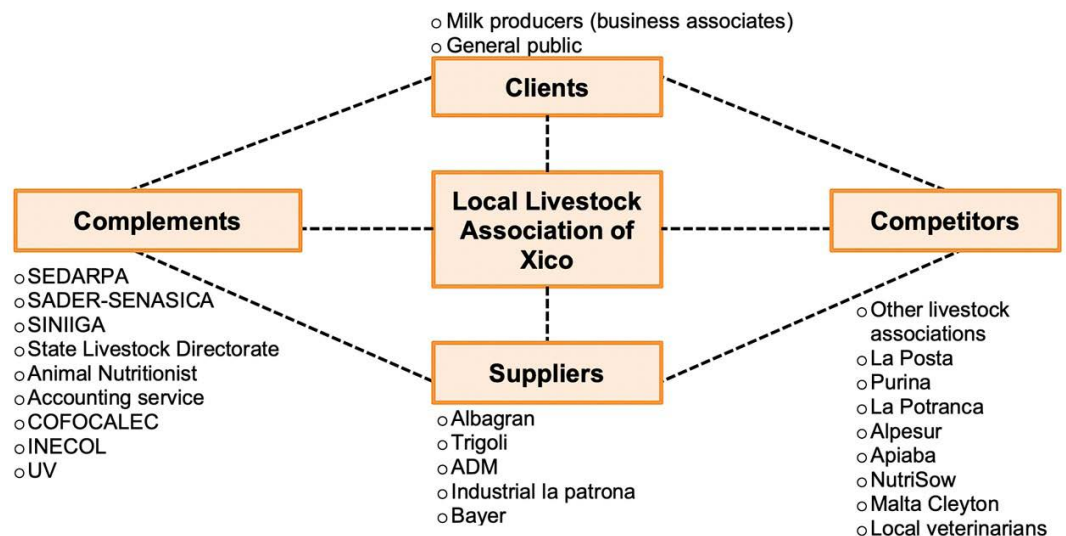
a consequence of the characteristics of their herds (number of heads, surface, grazing management, and milking infrastructure)—, the dairy producers of Xico are classified as technified producers or in the process of technification.

**Dairy cattle value network**

In accordance with the productive chain proposal described in the previous section, emphasis was placed on the analysis of the value network of a producer organization that fulfills the role of anchor company, considering the ranchers as clients, as along with the suppliers, complementors, and competitors, with whom they have an ongoing interaction (Figure 2).

**a) Anchor company**

The AGLX was selected, because the producers constantly interact with it for cattle management, purchase of feed, medicines, vaccines, and overall supplies purposes. As



**Figure 2.** Structure of the value network of the Asociación Ganadera Local de Xico, Veracruz.



of September 2020, the AGLX had 180 members, 50% of which buy some type of input from it. The AGLX was formally registered as an association with 28 founding members in 1947, although its history goes back to 1940. It has two warehouses: the main one is adapted to prepare balanced feed (eight formulations) and the other is used to store forage bales and agricultural machinery. It has equipment, a loading and unloading area, office and sales areas, and a meeting room. As a result of its achievements, the AGLX—which is located in the municipal seat— has achieved regional recognition; these achievements include the participation of several members in the Unión Ganadera Regional del Centro de Veracruz. Therefore, the AGLX carries out strategic activities to promote dairy activity and benefit the actors in the chain, which is consistent with the findings of other authors for similar organizations (Granados-Sánchez *et al.*, 2016; Camacho-Vera *et al.*, 2017a).

#### **b) Clients**

The flow of AGLX products and services focuses on ranchers in Xico's area of influence and its surrounding municipalities. Eighty percent of its clients are members, while 20% of non-members acquires at least one product or service from the association.

#### **c) Suppliers**

The AGLX acquires its products from various companies: Albagran, Trigoli, and ADM supply grain; Industrial Patrona supplies soybean and canola meal; and Bayer and Zoetis supply medicines. Invoices are issued through the portal of the Servicio de Administración Tributaria (SAT) of the Government of Mexico. Livestock mobility procedures (filling out guides) and the placing of identification ear tags follow the federal guidelines established by the Sistema Nacional de Identificación Individual de Ganado (SINIIGA), the Secretaría de Agricultura y Desarrollo Rural (SADER), and the Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (SENASICA). Meanwhile, state guidelines were established by the Secretaría de Desarrollo Agropecuario, Rural y Pesca (SEDARPA), through the Dirección de Ganadería of the State of Veracruz.

#### **d) Complementors**

The following actors were detected: SADER, SENASICA, SINIIGA, SEDARPA, and the Dirección de Ganadería of the State of Veracruz. According to its legal basis, the association can offer consultancy and provide services. A public accountant provides accounting advice and a nutritionist helps to formulate the balanced feed. Likewise, the staff of the Consejo para el Fomento de la Calidad de la Leche y sus Derivados, A.C. (COFOCALEC) has trained them on issues of milk quality and current standards. The Instituto de Ecología, A.C. (INECOL) has carried out various researches about livestock and the Facultad de Medicina y Veterinaria of the Universidad Veracruzana (UV) has carried out research work and arranged academic visits by students. Fostering the link between producers and complementors in order to establish technology transfer and research dissemination programs is an important step (Ireta-Paredes *et al.*, 2020). Some

medicines and supply providers provide training on the use of their products, but without a calendar or a schedule.

#### e) Competitors

As a consequence of the regional livestock activity itself, several competitors can be identified, including other livestock associations (La Joya, Naolinco, Misantla), the main food and input supply companies—for example, La Posta (Banderilla, Ver.), La Potranca (Banderilla, Ver.), Purina, Alpesur, Apiaba, Malta Cleyton, and NutriSow—and some local establishments that sell veterinarian supplies (known as “veterinarias”), which are located in the municipal seat. This concentration of organizations and commercial companies enables the visualization of the competitors’ strategies, taking into account prices, advertising campaigns, product trends, innovations, and positioning, among other prospects (Barrera *et al.*, 2013).

#### Profile of suppliers (ranchers)

All the producers were men (100%), with an average age of  $56.0 \pm 12.1$  years. With regard to education, 33% have primary education, 7% have high school studies, and 60% have higher education. On average, they have a long experience in milk production ( $30.0 \pm 15.1$  years). They are the third generation ( $3.0 \pm 0.7$ ) that has kept this activity ongoing, with ranches that have an average age of 73 years (range: 11-120 years). The producers tend and manage their herds 6.6 days a week and  $6.9 \text{ h d}^{-1}$  (average of  $47 \text{ h week}^{-1}$ ). These results are similar to those reported by Parra-Cortés and Magaña-Magaña (2019) for the Mexican tropics, which show that the producers have enough experience in this activity which is their calling.

Milk production is the sole economic activity for 30% of the producers, while 70% have other sources of income, whether it is cattle fattening, business activities related to tourism or gastronomy, the sale of raw milk directly to the consumer, their retirement pension, or their salary as a government employee or provider of professional services. The main source of income of 53% of the producers is milk production, while it represents half or less of the total income of 34% of them, which fits in with the findings of Parra-Cortés and Magaña-Magaña (2019). Another aspect that has a bearing on the dairy activity is the pressures to comply with the microbiological and physicochemical quality required by the processing companies and with the infrastructure required to generate a safe product and keep it in a cold chain, which matches the findings of Camacho-Vera *et al.* (2017b) in Coatepec, Veracruz.

In 43% of the UPP, at least one member of the family (children, siblings, grandchildren, nephews) participates in the activities. Sixty-seven percent of the producers believes that a family member will continue with the activity, while the rest consider that the activity will not be continued by a direct family member and that, consequently, the ranch will change direction, be sold or transferred. The same percentage does not have a plan to provide continuity for their activity, which is similar to the information reported by Romero-Padilla *et al.* (2020) and matches the argument of Arenas and Rico (2014), who point out that the continuation of the family business in new generations requires planning.

## CONCLUSIONS

In Xico, Veracruz, Mexico, milk is produced by small- (83%) and medium-sized (17%) producers, who have experience, calling, infrastructure, and specialized dairy cows. The main marketing channels are Nestlé and Liconsa. The activity can be strengthened with the participation of the Asociación Ganadera Local de Xico, if it reconsiders its goals and starts providing benefits to its members and actors in the value network, beyond the sale of supplies and services; the said benefits should include training actions and the harmonization of the supplier development system with anchor companies.

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