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# Characterization of stakeholders in the value chain and commercialization channels of string cheese in Vega de Alatorre, Veracruz, México

Gómez-Huesca, Ingrid L.<sup>1</sup>; Díaz-Rivera, Pablo<sup>1\*</sup>; Pérez-Hernández, Ponciano<sup>1</sup>; Aguilar-Ávila, Jorge<sup>2</sup> and Vilaboa-Arroniz, Julio<sup>3</sup>

<sup>1</sup>Colegio de Postgraduados, Campus Veracruz, km 88.5 Carretera Xalapa-Veracruz, predio Tepetates, Mpio. Malio F. Altamirano; Veracruz, Ver. C.P. 91700. Mexico. <sup>2</sup>Centro de Investigaciones Económicas Sociales y Tecnológicas de la Agroindustria y la Agricultura Mundial, Carretera Federal México. Texcoco km. 38.5, Universidad Autónoma de Chapingo, C.P. 56235 Texcoco, México.

<sup>3</sup>Universidad Politécnica de Huatusco. Calle 9 Sur, entre Av. 7 y 9 s/n. Col. Centro, Huatusco, Veracruz, México. C.P. 94100.

\*Corresponding Autor: pablod@colpos.mx

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## ABSTRACT

**Purpose:** Characterize Stakeholders in the Value Chain and Commercialization Channels of String Cheese in Vega de Alatorre, Veracruz, México.

**Methodology:** The study was performed in the period June-August 2019, including 61 surveys responded by milk producers and 22 dairy product processors (cheesemakers). Local Agri-food Systems (LAFS) and value chain approaches were applied.

**Results:** The value chain of string cheese in this municipality consists of providers of supplies, dairy cattle breeders, gatherers, cheesemakers, sellers, and final consumers. String cheese is commercialized through 5 channels: (a) products are distributed by cheesemakers to wholesalers and retailers, (b) products are sold in food stores, establishments or restaurants within the region, (c) products are sold to distributors who buy the product directly in the factory, d) direct sale in a grocery or traditional dairy store in the municipality and (e) products are sold at small-scale to final consumers in houses.

**Study Limitations:** Distrust of some stakeholders to provide information for the study, due to the insecurity in the state of Veracruz.

**Conclusion:** Limitations were found in the development and integration of the value chain. The sale of cheese is carried out without sales contracts or cooperation agreements. Prices are set subjectively by the dominant stakeholder, and in order to influence the market price, producers and processors arbitrarily make conditional on the supply or demand for milk and cheese, which creates market failures and inefficiencies.

**Key words:** Local Agri-food Systems, market failures, stakeholders.

## INTRODUCTION

Bovine livestock is one of main sectors in Veracruz, Mexico, with 3.6 million hectares dedicated to this activity and approximately four million heads of livestock, which ranked first in inventory and sixth in milk production with 702 million liters in 2016 (LAFS, 2016). This industry in the state is considered a source of income by most producers (68%), as family enterprise (24%) and to a lesser extent (8%) as a business with corporate vision (Díaz *et al.*, 2011). In the municipality of Vega de Alatorre, dual purpose

system (DP) is aimed at producing weaned calves and milk; the latter is sold both as it is, and also processed by cheesemaking factories that are distributed in the villages of the municipality. To assess DP stockbreeding under an agroecosystemic model, the social component of the activity should be considered, as well as ecological, technological, and productive aspects (Vilaboa *et al.*, 2009). In this municipality, livestock breeding is one of the most important activities of the primary sector, this has allowed the development of milk transformation into cheese. In the 50's, cheesemaking activity began to be carried out in the Emilio Carranza village for self-consumption, and afterwards it scaled up to be sold locally. Cheese is produced both in a traditional manner and semi-industrialized process. Cheesemaking process has evolved in this region. Currently, there are different types of production and cheese is produced in more locations. Production differentiation was registered by production scale, diversity of processed dairy products, type of labor, use and type of supplies, technology used and level of organization (Martínez *et al.*, 2009). Thus, they can be characterized according to the technological level from traditional to semi-industrial. Finished products are string cheese, queso fresco, panela cheese, white cheese, double cream cheese, grated white cheese, and Cotija cheese, in addition to cream, ricotta and buttermilk subproducts. The string cheese is one of the most demanded in the market, and perhaps it is the most consumed cheese in Veracruz (Ramírez y Vélez, 2012). This is an enzymatic coagulation cheese, usually made from whole and raw milk; and it is widely produced at traditional and industrialized level in different regions of the country. Based on the above, the purpose of the study was to characterize different stakeholders of the value chain and commercialization channels of string cheese in Vega de Alatorre, Veracruz, Mexico.

## MATERIALS AND METHODS

The study was carried out in the municipality of Vega de Alatorre (20° 02' N and 96° 57' W) at 10 meters above mean sea level. It belongs to Nautla region and has an area of 340.17 km<sup>2</sup>, representing 0.47% of the state's total area. The study consisted in the assessment of the structure and characterization of stakeholders of the value chain of string cheese in accordance

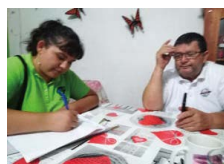
with LAFS model. A survey was performed, and data was collected from primary stakeholders and dairy product processors from June to August 2019. They were interviewed in one-to-one meetings. 61 surveys were responded by dairy cattle farmers and 22 by dairy product processors (cheesemakers). Surveys were intended to assess the value chain of string cheese, as well as to characterize above stakeholders (Figure 1).

## RESULTS AND DISCUSSION

The value chain under study consists of raw material suppliers, dairy cattle breeders, gatherers, cheesemakers, distributors, and final consumers (Figure 2). Cheese production arises from the creation of small traditional and semi-industrialized cheese factories in the municipality that are part of the value generation from the milk-cheese production chain. Cheese is in great demand by local consumers and from nearby municipalities, as well as far places. Among this variety of products sold in the municipality, string cheese is the most demanded; therefore, the one with the highest production in cheese factories; this agrees with Domínguez-López *et al.* (2011), and string cheese is one of the best-selling cheeses in Mexico.

### Raw Material Suppliers

Supply procurement is vital for dairy cattle breeders of the municipality, it is carried out with different providers: 1) Local dairy cattle breeders Association, where medicines and commercial balanced food they need are bought, 2) vet offices located in municipal seat or in Emilio Carranza or Misantla localities, where medicines are bought, 3) transportation of a private company sells balanced feed for cattle and pigs, and corn through the communities of the municipality and 4) some companies with established routes that sell food or corn to small producers, and the total amount is deducted from the payment of the milk delivered.



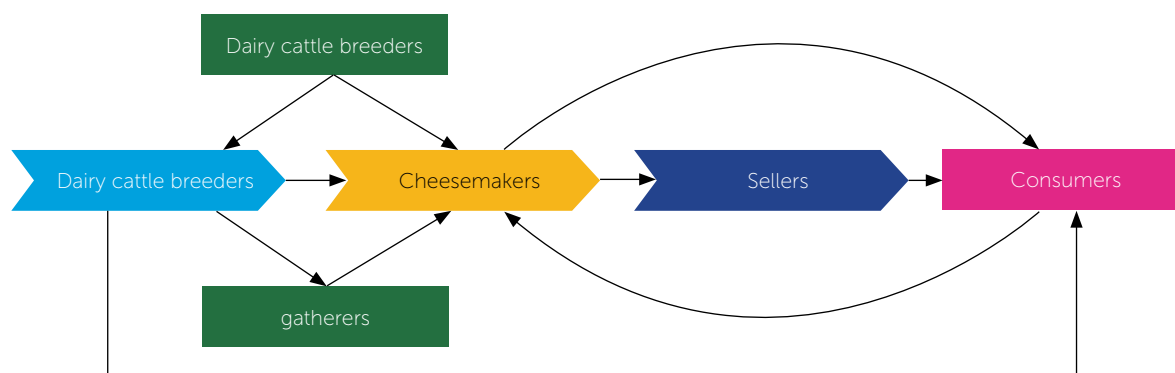
Interviews with key informants to collect data on the number of producers and cheesemakers in the municipality.

A pilot test of the surveys to dairy cattle breeders and cheesemakers was performed.

Surveys responded by dairy cattle breeders and cheesemakers.



**Figure 1.** Stages of the survey responded by stakeholders of the value chain of string cheese in Vega de Alatorre, Veracruz, México.



**Figure 2.** Structure of value chain of string cheese in Vega de Alatorre, Veracruz, México.

There are also different providers of raw materials that are necessary to make cheese: (1) the managers or owners of semi-industrialized cheese factories buy and warehouse large volumes of their stock in another state and, in turn, they resell it to small cheese factories, (2) they buy from providers that bring products to the region from other places. For example, every 20 days, one provider of supplies from the city of Xalapa and other from the state of Puebla offer their products to cheese factories. Another example is salt, which is mainly purchased from a provider in Martínez de la Torre who is a wholesaler for cheese stores. The bags for packaging are purchased from a provider in Martínez de la Torre, who delivers bags every 8 days to cheese shops; (3) There is an establishment in the municipal seat that distributes products for cheese industry, which provide services to some cheesemakers in the region.

### Characterization of dairy cattle breeders

90% of the primary producers (dairy cattle breeders) interviewed are men. This number agrees with the results observed in previous studies carried out in the Papaloapan region and central Veracruz state (Vilaboa et al., 2009; Juárez-Barrientos et al., 2015). Their average age is  $54.6 \pm 13.4$  years, and range between 22 and 80 years, and when they were grouped into six ranges, it was found that 32.79% are between 51 and 60 years. These results observed exceed 50 years, which was reported by Orantes-Zebadúa et al. (2014) in DP bovine producers in the Center of Chiapas, and similar to the 56 years reported by Juárez-Barrientos et al. (2015) in PD producers from the Rural Development District 008 of Veracruz (DDR 0008). Education level of 37.70% of the producers is elementary school. On the other hand, some producers any degree of study and others have a postgraduate degree.

The years of experience in the activity was from 3 to 65 years, with an average of  $31.4 \pm 16.3$  years. This number is below the 38 years observed in DDR 008 (Juárez-Barrientos et al., 2015). 23% of people interviewed have another source of income (salaried employee, business, pension or income from real estate) and 77% are engaged in other activities of the primary sector (corn, beans, lime, banana, etc.) 79% dedicate their ranch exclusively to livestock, 18% to livestock and agriculture, and 3% to livestock and forestry. This lack of diversification of activities makes them vulnerable to market changes (Vilaboa et al., 2009).

The size of area of production units is between 5 and 250 ha, with an average of  $39.8 \pm 48.2$  ha, a number similar to that reported for breeders in DDR 008 and higher than 20 ha in José Azueta, Veracruz (Martínez et al., 2012). 57% of the producers have small properties, 30% ejido lands, 10% rented land, and 3% in gratuitous loan agreement. 87% directly manage the farm, 8% a member of his/her family, and 5% a cowboy or manager. 48% of the workforce is family, similar to the 48.4% found in DDR 008 (Juárez-Barrientos et al., 2015). 57% of the producers have the DP production system, 25% milk, 15% breeding stock and 3% meat. 98% have grazing cattle and 2% semi-stabled cattle; 72% of the grazing system is rotational, 15% continuous and 13% alternate. 70% do not keep productive or economic records. 59% of the farmers belong to a Local Livestock Association, mainly due to the benefits of belonging to the association, distributed as follows: 56% Emilio Carranza, 25% Vega de Alatorre, 6% Misantla, 6% Nautla, 6% Colipa and 3% Nautla. There are two livestock associations in the municipality, one is from Emilio Carranza, which has the largest number of members (358 members), and the other from Vega de Alatorre, with 112 members. 41% of the farmers who are not members of one of the above associations does not

have many benefits but prefer to pay for the bills without a discount offered to members of associations. Most of the people who are not members of any association are small producers.

The cattle are mainly Swiss × Cebu cross breed (84%), which is similar with the results observed in studies carried out in the region (Martínez *et al.*, 2012; Orantes-Zebadúa *et al.*, 2014; Juárez-Barrientos *et al.*, 2015). The number of animals per producer ranges from 9 to 292 heads of livestock, with an average of  $59 \pm 60.2$  bovines per producer; Of the total number of bovines, 26% are cows being milked both manually (95%) and 5% with a machine. 98% of the producers do only one milking per day. These results are higher (48.4%) than those registered by DDR 008 (Juárez-Barrientos *et al.*, 2015). The type of breeding used by the majority (93%) of producers is natural breeding, and only 7% use artificial insemination with natural breeding. 74% of the cattle breeders do not receive technical assistance, 25% receive it from independent professionals and only 2% from personnel of government agencies. Most of them (98%) do not have support from government agency programs, and only 3% have loans for their farm. Regarding infrastructure, 85% have rustic milking areas built with only a sheet of metal and wood roof, without walls or floors, which is similar to that described by Martínez *et al.* (2012); the remaining 15% have cement buildings in their milking parlor.

The average production per cow was 5.3 L of milk, a production higher than the 4.4 L observed in DDR 008 (Juárez-Barrientos *et al.*, 2015) and lower than the 6.2 L observed by Martínez *et al.* (2012), with an average of 82 L per day per producer. Martínez *et al.* (2012) reported that the months with the highest milk production are from July to September, which is the rainy season, and decreases in the dry season, from December to May. In turn, during high-production periods, the price of milk drops, and low-production periods, it rises.

90% of the milk obtained is for cheesemakers, 5% for self-consumption and 5% for cheese for sale at home. In 2018, the average milk price was MXN \$5.00, and it varied from MXN \$6.50 in low-production periods to MXN \$4.80 during high-production periods. One of the nonconformities or disadvantages of the farmers is that the price is determined by the cheesemaker at his/her discretion. Most of the cattle breeders sell milk to cheesemakers who pay the best price and if they trust or are friend of the processor. 59% of the farmers deliver

the milk to the ranch; truck drivers hired by the cheese factories pick it up, and the remaining 41% deliver milk directly to the cheese factory because they obtain a better price. Milk is paid in cash and on a weekly basis; the owner of the cheese factory prepares the packs with the resulting quantity of the liters of milk and according to the price set, and delivers them in two ways: (1) to the truck drivers who deliver them to the producers, and (2) directly to the producers who go to the cheese shop to receive their pay. Producers sometimes request a loan or advance on their pay that is either granted or not at a discretion of the cheesemaker. 39% of the farmers deliver milk to the same cheesemaker, and 41% have changed for a better price, due to delays in the payment of milk or due to unjustified discounts. 56% of cattle breeders buy cheese from the cheesemaker who delivers their milk, and 44% buy it elsewhere. As they are family businesses, both in the management of PU and in the transformation of milk, 85% of farmers and processors involve their children in activities, such as going to pay for the milk or administrative issues in the case of the cheese shops.

### Dairy Product Processors

32 traditional and semi-industrialized cheese factories were located. These factories have different sizes to process milk, from 180 to 9500 L per day. 69% of these were surveyed, and the information below was below.

### Socioeconomic Profile of Dairy Product Processors (Cheesemakers)

The participation of women in this phase of the process was 32%, which differs from that observed in Aculco state of Mexico, where 100% are men, and their wife and children are involved in activities related to the cheese factory (Martínez *et al.*, 2009). Regarding age, people from 20 to 70 years old were registered. 32% were between 41 and 50, with an average age of 48 years, which is older than 43 years reported in the municipality of Aculco, State of Mexico (Martínez *et al.*, 2009). The education level of processors was 36% with elementary, 32% with middle, 18% with high school, 9% with a degree and 5% without formal schooling.

Gatherers play an important role within the chain, since they collect milk production from producers who are generally far from cheese factories (Martínez *et al.*, 2009; Espinosa-Ayala *et al.*, 2013). It was observed that the cheesemakers in Vega de Alatorre obtain their milk directly from the producer or through the gatherers, who are classified into: 1) gatherers-producers, who

deliver their own milk and the milk of other producers according to the agreed route with the cheesemaker, (2) independent gatherers, who collect milk from producers with their own means and deliver it to the cheese factory according to the route assigned by the cheesemaker, (3) gatherer-worker, who is in charge of collecting milk with a vehicle of their own cheese factory in the course of the morning, and later they work making cheese, and (4) gatherer-cheese maker: The owner of the cheese factory gathers milk from producers and then, makes cheese.

### Transformation Volume

90% of the cheese factories only gather milk, and the remaining 10% their raw material is mixed, as they have their own gathering and production from their dairy herds. Mixed production is lower in the municipality of Vega de Alatorre compared to that observed in Aculco, where 41.2% of the producers have milking herds and their production is combined with external collection to supplement the daily volume required of the company (Martínez et al., 2009). The varieties of products made in the cheese factories are one to ten different products. 54% of cheesemakers make string cheese, a product preferred by buyers, which agrees with that reported by Martínez et al. (2009), who found in Aculco, state of Mexico, that of the 37 existing cheese factories, 33 made string cheese, which represents 66% of the total cheese production. The cheese conversion is 9.2 L per kilo of string cheese, 8.1 L for fresh cheese, and 8.9 L for other cheeses such as panela and white cheese. Regarding workforce, 59% is hired, 18% a family member and 23% mixed (hired and family members), which depends on the size and volume of the cheese factory. The number of workers ranges from 1 to 15 people.

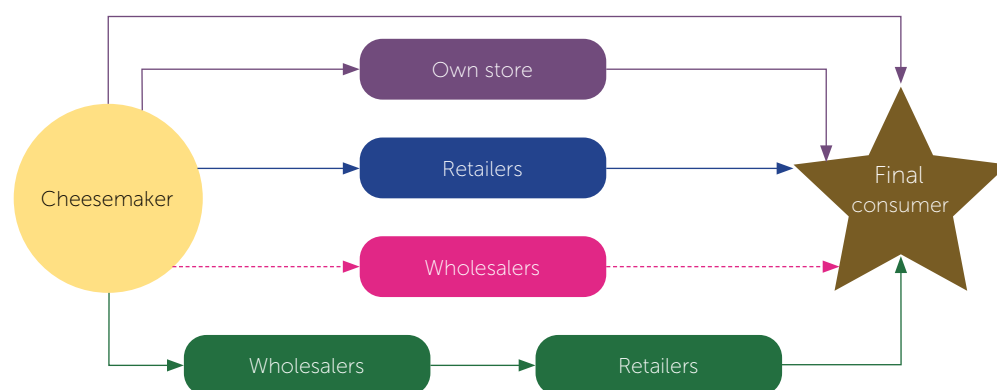
### Commercialization

String cheese commercialization is performed via 3 different channels: (1) the cheesemaker carries production to Poza Rica, Veracruz, where products are sold both to wholesalers and retailers, depending on the purchased volume; the price for wholesalers is MXN \$75.00, and MXN \$80.00 per kilogram of cheese. Since it is a good

place for selling cheese products, some of them have bought stands in the local market or in the city, which allows a direct sale to the consumer, (2) products are sold in food stores, establishments or restaurants within the region. This is similar to the selling model of manchego in Cuenca, Spain (Trejo et al., 2011), who reported 4 ways of cheese commercialization (traditional own stores, other traditional stores, retailers, and exporting wholesalers); (3) products sold to intermediaries who come to the factory to buy the product to resell it in other cities of the state and the country such as Reynosa, Monterrey, Mexico City, Tuxpan, Veracruz, Tamaulipas, etc., (4) direct sale in a grocery or traditional dairy store in the municipality. These are managed by themselves. They also sell products beside highways or other places within the village (5) products are sold at small-scale to final consumers in houses. When products are sold to intermediaries, the transaction is made only informally, since no purchase agreements are entered into, which agrees with the findings reported by et al. (2009) regarding that purchase is based on agreements secured by good faith and honor of the parties and no formal agreements are entered into (Figure 3).

### CONCLUSIONS

String cheese is the product with the highest level of production and commercialization in Vega de Alatorre. The structure of stakeholders of the value chain is semi-integrated, since there is alliance in some stakeholders horizontally, vertically but not in all, since mistrust was detected in several of the links that interact with each other. The value chain of string cheese consisting of providers of supplies, consisting of providers of supplies, dairy cattle breeders, gatherers, cheesemakers, sellers, and final consumers. It has five commercializing channels. There are market failures that limit the integration of the



**Figure 3** Commercialization channels of value chain of string cheese in Vega de Alatorre, Veracruz, Mexico.



value chain, such as the determination of the price of milk by cheese makers and the price of cheese by traders. This has an impact on other links in the chain.

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