

Traceability in the Global Value Chain of Blueberry between Mexico and China

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ABSTRACT

Objective: To analyze the traceability system required by the Phytosanitary Protocol signed between Mexico and China for the export of fresh blueberries.

Design/Methodology/Approach: The case study approach is used to analyze the Global Value Chain of Blueberry between Mexico and China (GVCBMC). The information is obtained through semi-structured interviews and bibliographical analysis.

Results: The traceability system of blueberry is influenced by the differentiation of attributes of innocuousness and plant health that comply with the regulations established by the Chinese government to allow the influx of fresh blueberry to their market. The traceability system provides and recovers information through the use of codes in labels.

Study Limitations/Implications: The traceability system of the Global Value Chain of a single product destined to a specific market was analyzed, so it cannot be generalized.

Findings/Conclusions: The companies that are part of the Global Value Chain of Blueberry between Mexico and China use the traceability system along with other tools that allow the management of quality, innocuousness, plant health and logistics, to provide information about the product, to make decisions about payments and to comply with regulations.

Keywords: Traceability, blueberry, *Vaccinium*, Global Value Chain.

INTRODUCTION

Governments influence the Global Value Chains (GVC) by establishing tariff and administrative barriers (Ponte & Sturgeon, 2014). The nature and type of barrier will depend on the demands imposed by each country to each product. In China, the main barrier for the entry of fresh blueberry to its market is the signature and compliance with a phytosanitary protocol (Produce Marketing Association, 2016).

In November 2016, the protocol of plant health requirements for the export of fresh blueberry fruits from Mexico to China was signed, which was subscribed between China's General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) and Mexico's Ministry of Agriculture, Livestock Production, Rural Development, Fishery and Food (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación, SAGARPA). The protocol establishes the requirements that must be fulfilled to export fresh Mexican blueberries to the Chinese market (SAGARPA, 2016).



Among the requirements, the following stand out: mandatory registry of plots and refrigerators, control registry of good agricultural practices and integral management of pests, inspections for quarantine pest control, supervision of the use of new and clean packaging, use of clean containers in transport, use of a traceability label, inspections and analysis of samples before the export to issue the phytosanitary certificate, and inspection of the fruit at the moment of arrival to authorized airports (SAGARPA, 2016). The satisfaction of the requirements represents a necessary condition for the company to gain access to the market (Dabbe *et al.*, 2014).

In June 2017, the GVCBMC was established with the first aerial shipment of fresh blueberry from Guadalajara to Shanghai, which consisted of two pallets with 420 boxes, containing a volume of 630 kg of 'Sophia' blueberry developed by the Fall Creek Company exclusively for independent producers of the Berries Paradise trader (Portal Frutícola, 2017).

In 2018, 30 plots were authorized with a total of 779 ha belonging to various producers located in 13 municipalities of the states of Colima, Jalisco, Michoacán and Sinaloa (SENASICA, 2018b). That same year, 12 refrigerators located in the same states belonging to seven trader companies were authorized for the export of fresh blueberry to China: Berries Paradise (four), Driscoll's (three), Hortifrut (one), Exportadora Internacional de Frutas (one), Sun Bell (one), FH Internacional de México (one) and Fuerte Fe (one) (SENASICA, 2018a).

These actors and the activities that they perform determine the complexity and characteristics of the traceability system (Behnke & Jansen, 2019), so their identification and description are required to understand it (Regattieri *et al.*, 2007). The objective of this study is to analyze the traceability system used by the companies that are members of the GVCBMC, and to identify the activities that they perform and the actors that participate in these activities to comply with the plant health protocol signed between Mexico and China for the export of fresh blueberries.

In this regard, the implementation of a traceability system is a challenge, since the different actors in the chain require collaboration between them to implement the activities related to the management of the quality,

innocuousness, plant health and logistics of the product. Thus, a greater collaboration impacts with more certainty on the quality of the product (Charlebois & Haratifar 2015), but at the same time, requires a greater commitment between the different actors of the chain (Wohlrab *et al.*, 2016). Facing such a dilemma, this study establishes in a detailed manner the activities implemented by the GVCBMC that allows for a traceability system to comply with the tracking and origin of the product, differentiation of the product, and easing the flow of information between parts.

MATERIALS AND METHODS

Qualitative research of a case study with a descriptive approach was carried out (Yin, 1998). To gather information, the guidelines for the export of fresh blueberry fruits from Mexico to China were analyzed, and semi-structure interviews were performed in the blueberry industry to increase the validity and reliability of the study.

Based on the general questions proposed by Charlebois & Haratifar (2015): who (product/economic agent), what (product information), when (time), where (location), how (production practices), and why (cause/reasons) are related with the traceability of fresh blueberry exported to China.

RESULTS AND DISCUSSION

Traceability System

The traceability system can be described as the documented identification of the operations of production, commercialization and distribution that lead blueberry from the Mexican farmland to the table of Chinese consumers (Bertolini *et al.*, 2006). The traceability system used by the GVCBMC (Figure 1) shows the information related to the compliance of the phytosanitary protocol that defines which data should be gathered and recorded from the production to the distribution and how they are associated to standards of innocuousness and plant health, becoming established as a tool to comply with the legislation associated with the requirements of a country (Aung and Chang, 2014).

Production

The traceability system begins with the connection between the producer and the trader. Once the production contract is signed, the producers receive exhaustive training from the trader in form of technical advice (on the sowing, fertilization, irrigation, pruning,

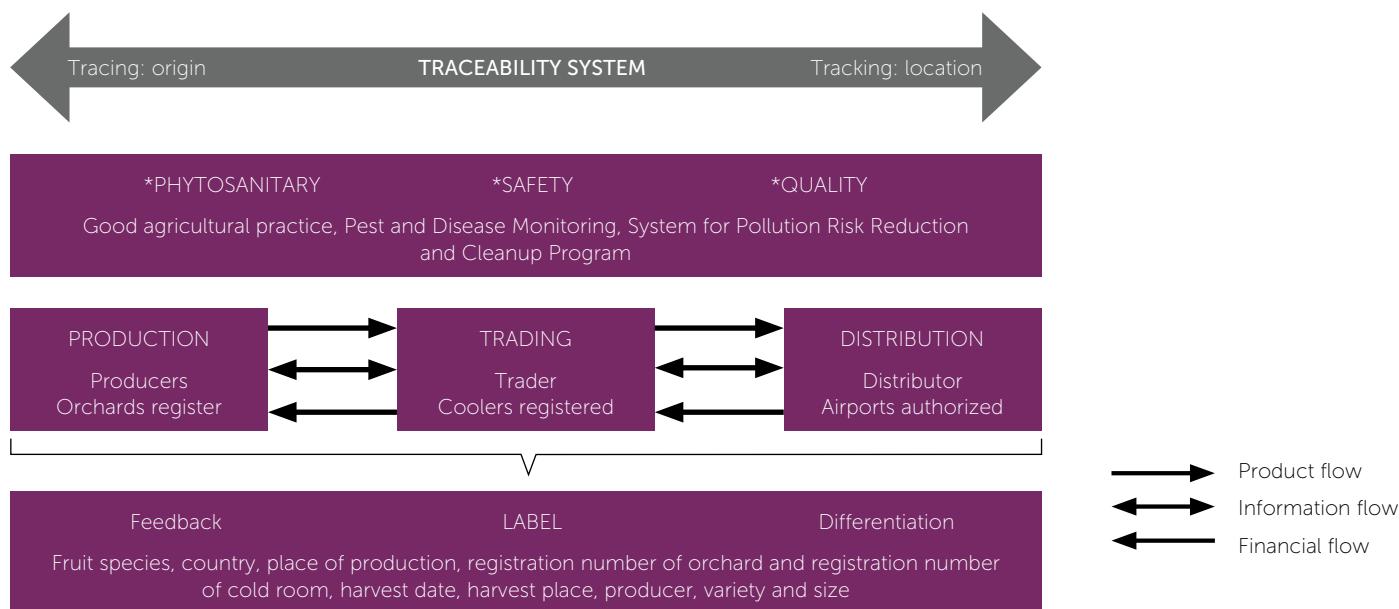


Figure 1. GVCBMC Traceability System. Own elaboration.

harvest, selection, packaging and delivery) and indications about the fruit quality and requirements of innocuousness and plant health that they must fulfill.

The producers as the ones directly responsible for the crop management, they are obligated to have and follow an integral pest and disease management program, and to maintain a monitoring record of pests of interest to China and present in Mexico, such as: cherry moth (*Cydia packardii*), Putnam scale (*Diaspidiotus ancyclus*), apple mussel scale (*Lepidiotus ulmi*), tarnished plant bug (*Lygus hesoeris*); and of the mechanical (collection and elimination of fruit in trough), chemical (registry of pesticide application), biological (use of parasitoids and predators), and cultural (pruning) control that they carry out in blueberry cultivation.

Among the activities that are recorded by the technical staff authorized by the National Service for Agrifood Health, Innocuousness and Quality (Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria, SENASICA), there are the following: good agricultural practices (GAP), traps, pest monitoring and sampling, application of pesticides authorized by the Federal Commission for the Protection against Sanitary Risks (Comisión Federal para la Protección contra Riesgos Sanitarios, COFEPRIS) and allowed by the General Administration of China's Supervision of Quality, Inspection and Quarantine (AQSIQ). In addition, the producers are subscribed to the program of contamination risk reduction system (CRRS) that allows them to detect and prevent risks of

contamination and to preserve the innocuousness of the blueberry fruit.

The General Direction of Plant Health (Dirección General de Sanidad Vegetal, DGSV) is in charge of performing the verification of these activities, giving a registry number to the plots of producers who comply with the requirements and which are authorized by the Ministry of Agriculture and Rural Development (Secretaría de Agricultura y Desarrollo Rural, SADER) and the AQSIQ for the export of blueberries to China.

Bottling and packaging of blueberry is carried out in the authorized plots in areas that have exterior isolation (anti-aphid mesh, double door or Hawaiian shutters). Blueberries are bottled in "clamshells" of 125 g that are new and clean, and packaged in new and clean carton boxes (12 clamshells per box weighing 1.5 kg), fruit that is free from plant residues, soil and damaged fruits.

Two labels are placed on the fruit sent to the trader. The traceability label from the trader is placed on the clamshells, which are the smallest units that the final consumer purchases and which contain blueberries from a single producer. In general this label contains unique data for each transaction: date and place of harvest, name of producer, name of variety and caliber. The codes help in the accurate and quick identification of the information expressed on the label (Olsen & Borit, 2013).

The second label, of traceability established by the phytosanitary protocol, is placed on the box specifying the fruit species (blueberry), country of origin (Mexico), and place of production (municipality and state), registry number of the plot (PRE03/--state/---municipality/----name of the plot) and registry number of the refrigerator (CFA01/--state/---municipality/----facilities). The data from this label does not change throughout the season since blueberry can only be sent from authorized producers and traders. The information of the traceability label of the protocol is backed by documentation such as: logbooks, notebooks and registries that must be made available to the appropriate authorities every time they are requested.

Finally, the carton boxes (which provide additional information: quantity, weight and size) are sent from the plot to the refrigerator in clean and closed transport, avoiding mixing the product with another one destined to a different market to prevent any type of contamination.

Commercialization

The condition of perishability of blueberry (depending on the variety, 25 days in ‘Sophia’) forces the traders to have conservation means. The traders inscribe one or several refrigerators, depending on their needs. Each refrigerator is equipped to carry fruit at a temperature of 0 °C to 2 °C with a relative humidity of 90% to 95%. In addition, a cleanliness program and a CRRS are applied in each of them, to ensure the safety.

In each refrigerator an exclusive space is allotted for the management and storage of blueberries that have China as destination, which is separate from the space assigned to shipping to other markets. This space has an exclusive inspection table with material required to carry out the flotation test, which consists in taking a sample of the fruit, macerating it, placing it in a plastic bag with water and sugar, and observing if there are floating larvae.

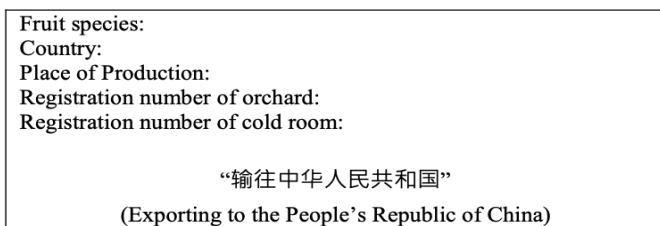


Figure 2. GVCBMC Traceability Label. Source: (SAGARPA, 2016).

Once compliance of the activities established by the phytosanitary protocol is shown, a registry number is given to those refrigerators authorized for the export and logbooks are kept with information about verification visits, audits or monitoring from SENASICA or AQSIC, which can be performed any moment.

When it is authorized and operating, the person responsible for each refrigerator records the date of reception, the registry number of the plot, the product, and the number of boxes received. The traceability label of the product (Figure 2) placed on the packaging eases the management of operations by the trader since it allows the identification of the product from among all the blueberry packages that it receives with different attributes.

With this label, blueberry destined for China is separated, tracked, and placed in the authorized place. The traceability label also makes payment to the producer simpler, since price fixing is in function of the added value in terms of quality, innocuousness and plant health (Tang *et al.*, 2015).

Every shipping is inspected by personnel authorized by SENASICA (third phytosanitary specialist or authorized phytosanitary officer). The staff performs a phytosanitary inspection of 2% of the total boxes that make up the shipping through destructive and non-destructive tests to detect pests. If the sample is free of pests, and complies with the Maximum Residual Limit of Pesticides allowed by China, the shipping is approved, and the International Phytosanitary Certificate is issued. Contrary case, the corrective actions are indicated and the plot is excluded from exports until they are performed and it is verified that they are in place.

Authorized blueberry is palletized and pre-cooled at a temperature of 0 °C, and then each pallet is covered with a mesh and the traceability label of the phytosanitary protocol is placed, with the legend indicating that the product will be exported to China. The characteristics of the pallet in terms of dimensions and weight allow satisfying the logistical needs that ease the aerial transport and mobility of the product. The pallets are transported to the Guadalajara airport in closed, refrigerated and clean vehicles, equipped with devices that measure the variations in temperature and light during transport.

Distribution

The second link is formed between the trader and the distributor, through supply programs established each season. The trader tends to send blueberry to the distributor from different authorized producers to reach the volume requested for each shipping. The traceability label helps in the commercial part, since if the distributor likes or dislikes the blueberry from a producer in particular, it can be identified through the codes expressed on the label (Golan et al., 2004).

In addition, the traceability label allows the trader to receive information from the distributor on the condition of the blueberry from each producer in its attributes of quality, innocuousness and plant health (Karlsen et al., 2013). In this stage, traceability helps the payment and continuous improvement systems.

CONCLUSIONS

The companies that make up the Global Value Chain of Blueberry between Mexico and China use the traceability system as a tool that supports the management of quality, innocuousness, plant health and logistics. The traceability system allows tracking the origin and monitoring the fresh blueberry produced in Mexico, easing its physical flow; the differentiation of the product and market, easing the flow of capital when making payments to the producers; and the feedback from companies, easing the flow of information between actors. In addition, the traceability system gathers all the relevant information of the activities performed and not performed as indicated in the phytosanitary protocol, and presents them through a traceability label that reflects the conditions of origin, manipulation and storage of blueberry; and which complies with the information and the guidelines requested by the destination market.

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