

SCAN

Supply Chain Analysis for Nutrition

SUPPLEMENTARY TOOL

ST-03

SUPPLY CHAIN MAPPING

Background and instructions

Mapping the supply chain is a useful way to depict all the moving parts within the system. By identifying all the various supply chain actors and the supply chain stages they are active in, it can be easier to identify where barriers and opportunities might exist to improve the accessibility, desirability, and quality of nutritious foods.

A supply chain map provides the assessment team with:

- A general overview of the supply chain within the geographic area for the particular food in question
- An overview of the flow of goods and their volumes across the supply chain of a specific business or broadly across an entire market or geographic area
- A few preliminary ideas on where there might be challenges and opportunities to intervene and improve the supply chain
- A preliminary list of key stakeholders and value chain actors who could be interviewed and provide greater insights

A supply chain map is most useful when created as a flow chart, noting the various types of supply chain actors and how goods, services, or information is flowing between them. This work instruction details how to conduct a mapping of the supply chain and some examples that can be used or modified.

Steps to creating a supply chain map

There are three basic steps described in this section for mapping a supply chain. The level of detail required will depend on the SCAN goals and objectives and not all steps may be necessary. For example, if the supply chain model is only being used to complement other research, it may be sufficient to end after the first step. For SCAN objectives that are more detailed and require a full food accessibility assessment, it may be necessary to continue through steps 2 and 3.

1. Identify key stakeholders along the supply chain stages

The first step to conducting a supply chain map is to list all the possible supply chain actors involved in the food's supply chain. Using Figure 1 below, which outlines common stages in a supply chain, determine who exactly is involved in which stages. Examples of potential actors are outlined in the table below. Be as specific as possible.

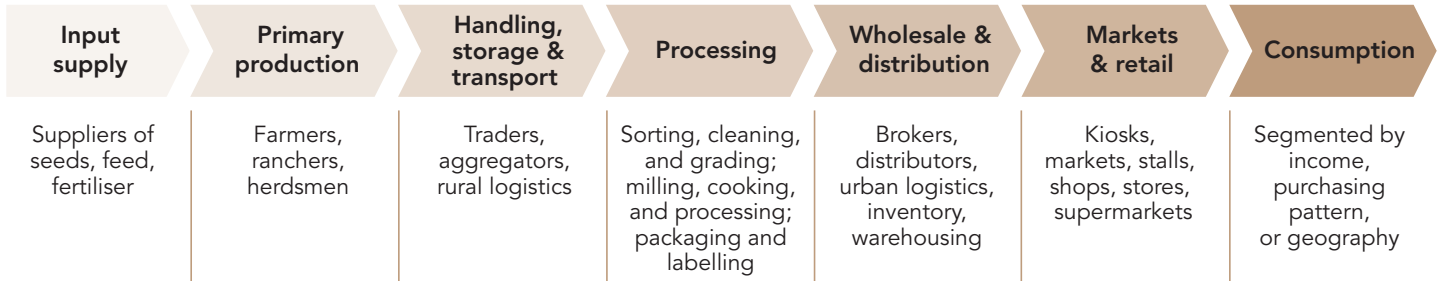


Figure 1: Common supply chain stages with example stakeholders identified

The supply chain being analysed may have more or fewer stages than those listed above. Based on the specific goals and objectives of SCAN, the supply chain can be broader or more focused as necessary.

2. Detail the relationships between the stakeholders

The next step is to create a two-dimensional flow chart or map that shows the relationship between each of the identified supply chain actors. The relationships are noted with lines and arrows connecting the actors to each other. Figures 2-4 show some examples of generic supply chain maps created for the dairy, pulses, and vegetable supply chains, which can be modified as necessary or adapted for other types of foods.

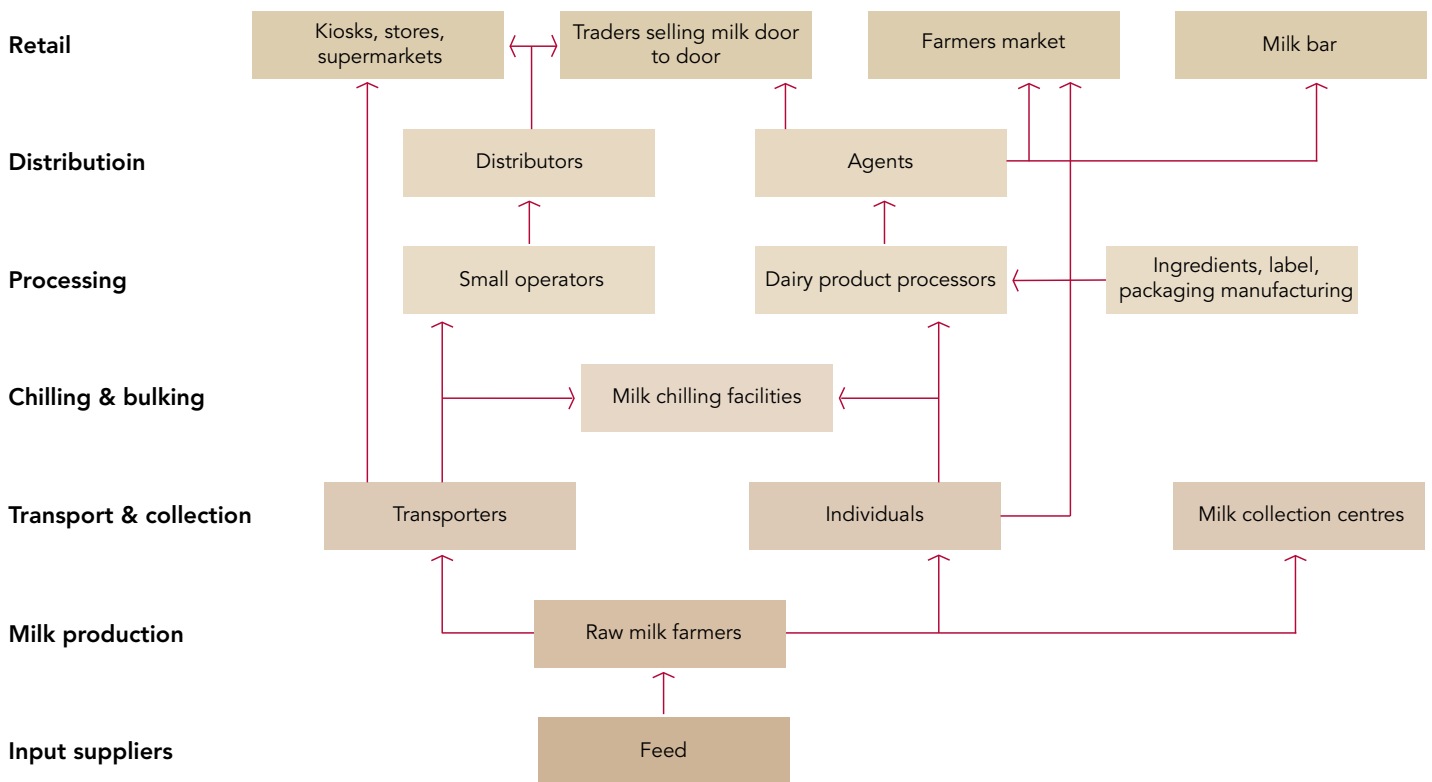


Figure 2: Sample supply chain map for dairy

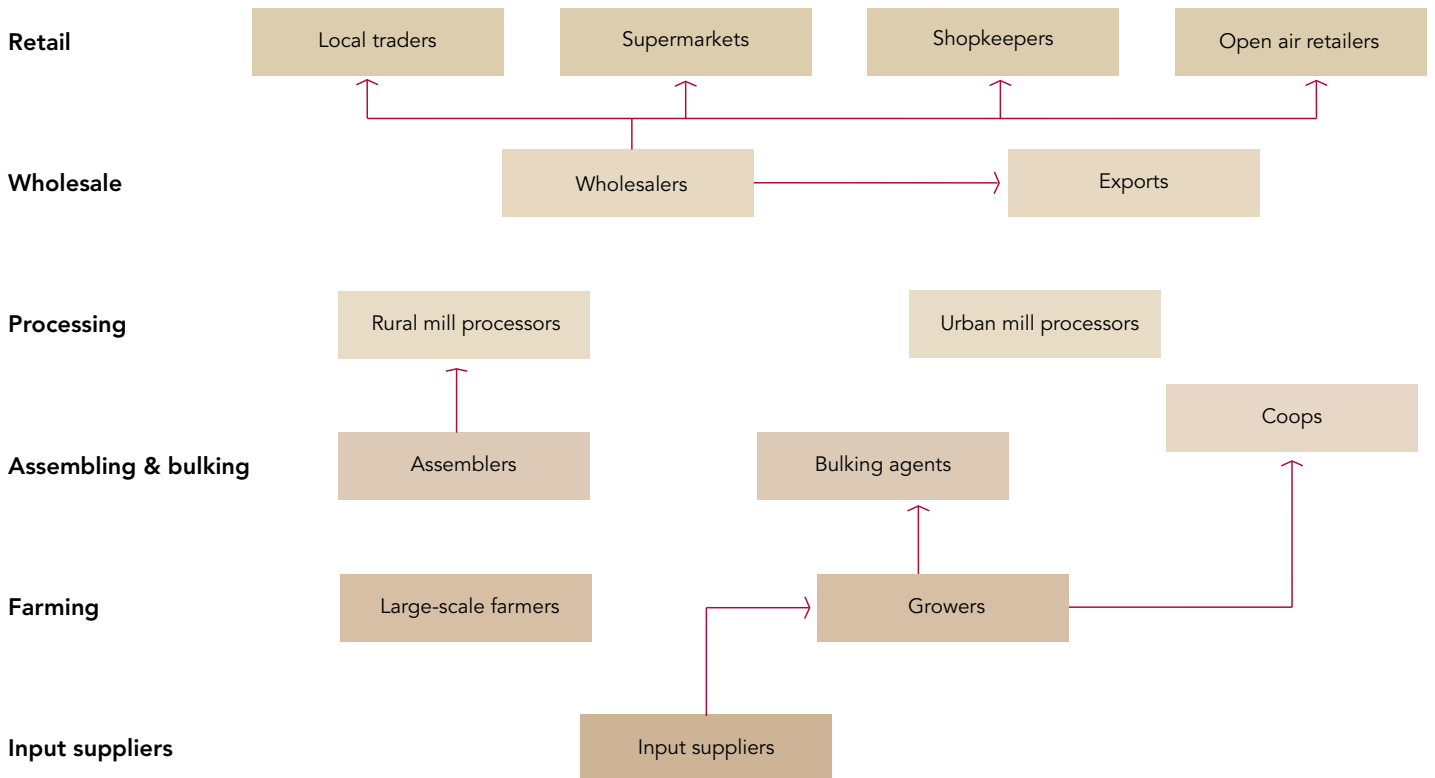


Figure 3: Sample supply chain map for pulses

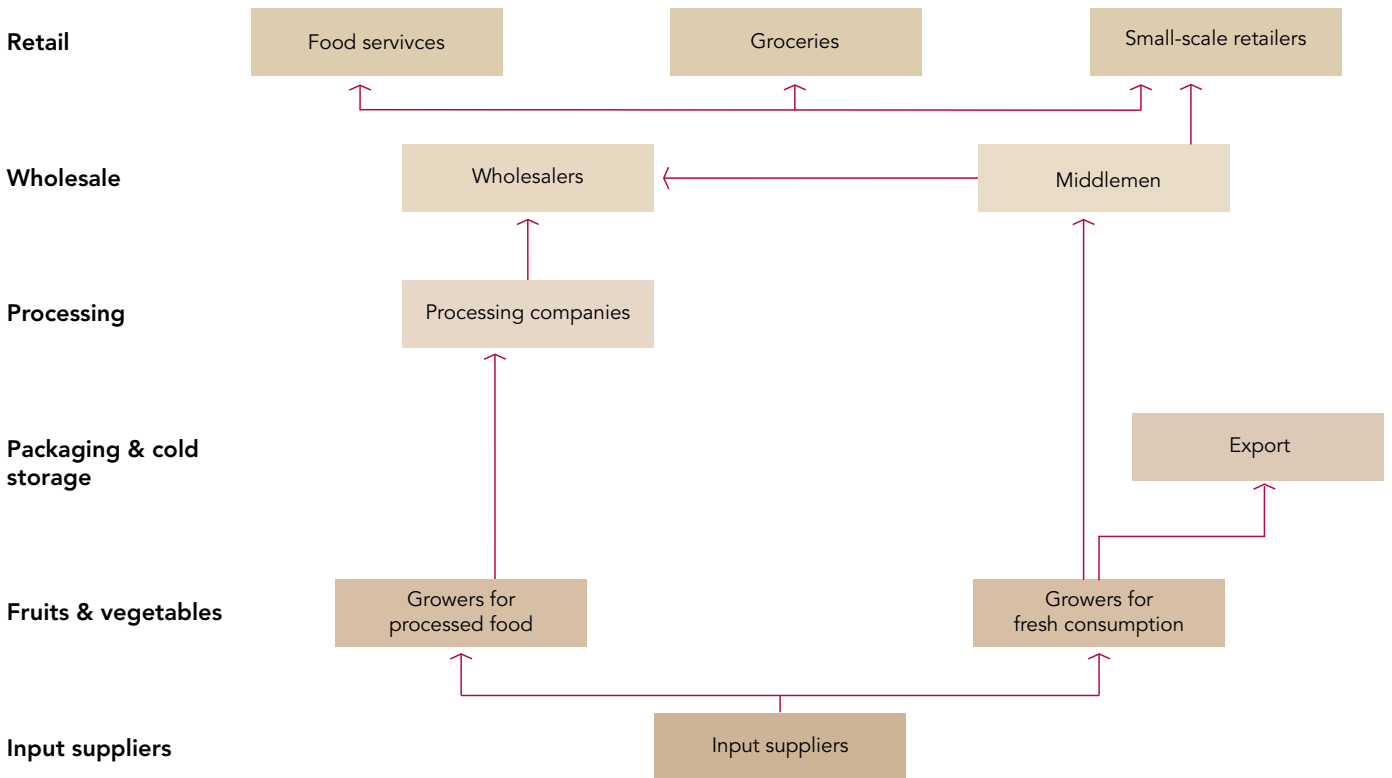


Figure 4: Sample supply chain map produce (fruits and vegetables)

3. Provide details about the flow of goods, services, and information

The final step is to add details about the types of goods, services, or information that flows along those relationship lines and their indicative volumes, quantities, or other characteristics. Gaps in this information can provide a helpful indication of targets for the literature review or stakeholder interviews. The goal with this step is to provide any details that show how specific supply chain actors affect and influence the quantity, quality, price, location, and time—common metrics or standards that help benchmark and track improvements in a supply chain. These are defined as follows:

- **Quantity:** The right amounts of products are moving through the supply chain to meet consumer demand
- **Quality:** The products are not damaged or adulterated, have been safety and quality assured, and are received in the expected or agreed upon quality, including packaging
- **Price:** Actors buy and sell at agreed-to and negotiated prices for the quantity and quality of goods received
- **Location:** The products are delivered to the agreed upon locations and meet the demand of those locations
- **Time:** The products are delivered on time so that it does not impede the operations or work of the next supply chain actor

Figure 5 provides an example of an in-depth supply chain map, which expands upon the dairy supply chain map in Figure 2 with further details regarding flows of goods, services, and information in both the formal and informal markets of Kenya.

One can easily see from this more detailed mapping that although there are over 1 million dairy farmers in Kenya, there are only 200 chilling plants and 3 large-scale dairy processors. This could signify a barrier to entry for Kenyan farmers, or could be interpreted as an opportunity for better food safety and quality control by channelling all dairy through these 3 larger-scale processing facilities. Further literature review and stakeholder interviews will help to determine the context in which to interpret the data presented in the supply chain map.

Note that this is only one way of detailing a supply chain. Based on the goals and objectives of SCAN, such details can focus on any of the five metrics described above or any other metric of interest.

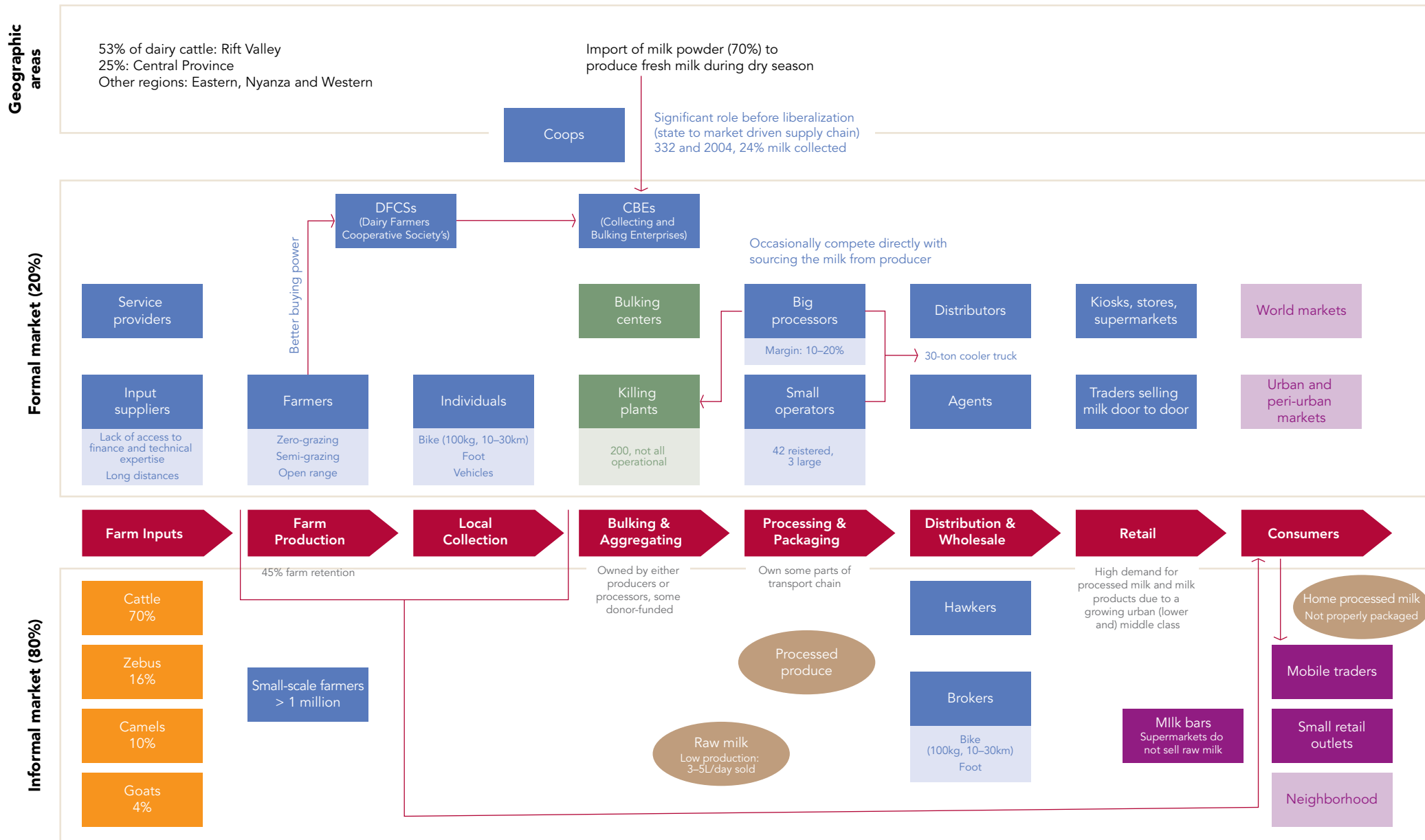


Figure 5: Detailed supply chain map example for dairy in Kenya

CREATION OF A SUPPLY CHAIN HEAT MAP

In the data analysis phase of SCAN, the supply chain heat map is one tool that can be used to organise and capture challenges, bottlenecks, and opportunities along the supply chain. The heat map can show where there might be poor flows of goods, services, and information between supply chain actors and any specific drivers of a food's accessibility, desirability, or quality that should be pinpointed for intervention.

Starting from the supply chain maps in Figures 2-4, the supply chain heat map highlights the supply chain actors most involved or most influential in challenges such as food safety, food loss and waste, prices, or other characteristics of interest. The five metrics described in Part I (quantity, quality, price, location, and time) can also be used to describe the types of challenges that SCAN may want to focus on in such a heat map.

Figures 6-8 provide examples of supply chain heat maps using the dairy, pulses, and produce maps created above.

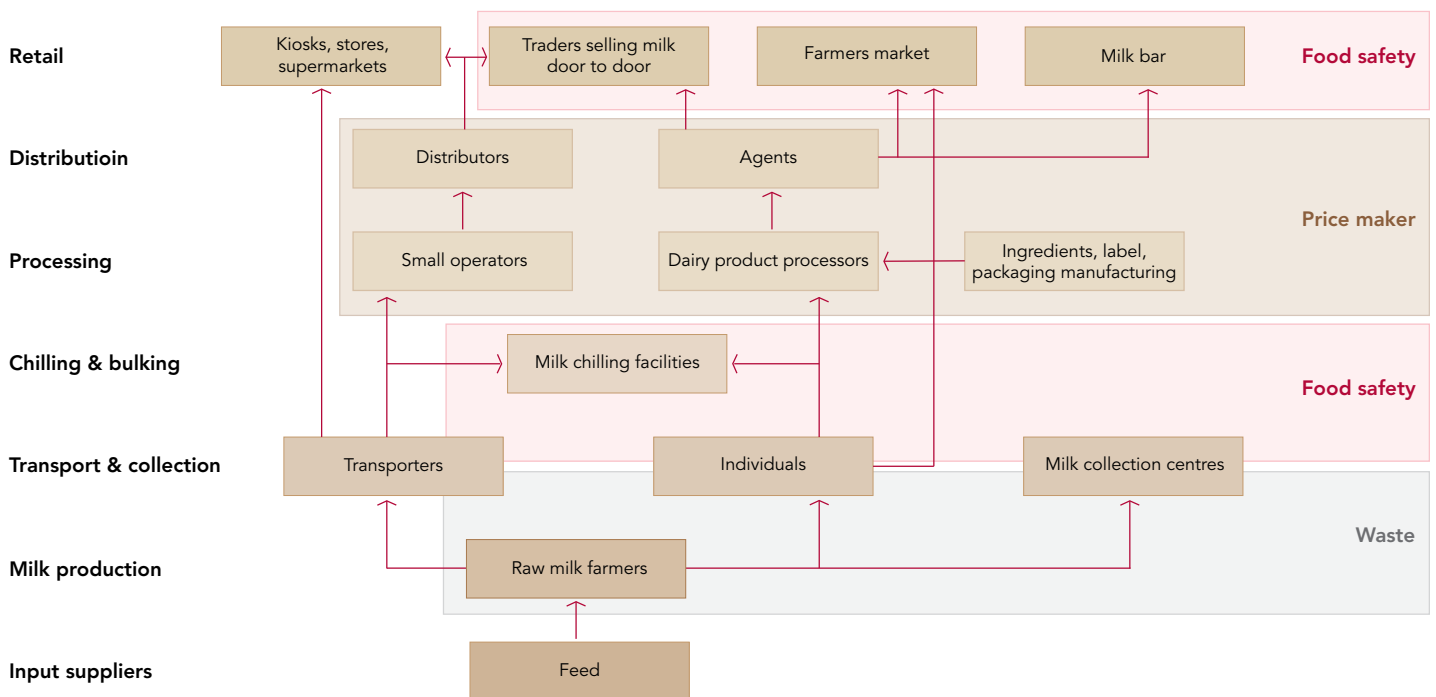


Figure 6: Example Supply Chain Heat Map for Dairy

In the dairy example, food loss and waste were identified as highest in the milk production stage with the raw milk farmers. The distributors and agents are those that set prices and often add the highest margins affecting the final cost of dairy to the consumer. Largest risks to food safety that need to be controlled are present in the transportation stage from raw milk farmers to milk chilling plants and onward to the processors and distributors. Another risk to food safety is present in the storage at retail level, just prior to purchase and consumption by consumers.

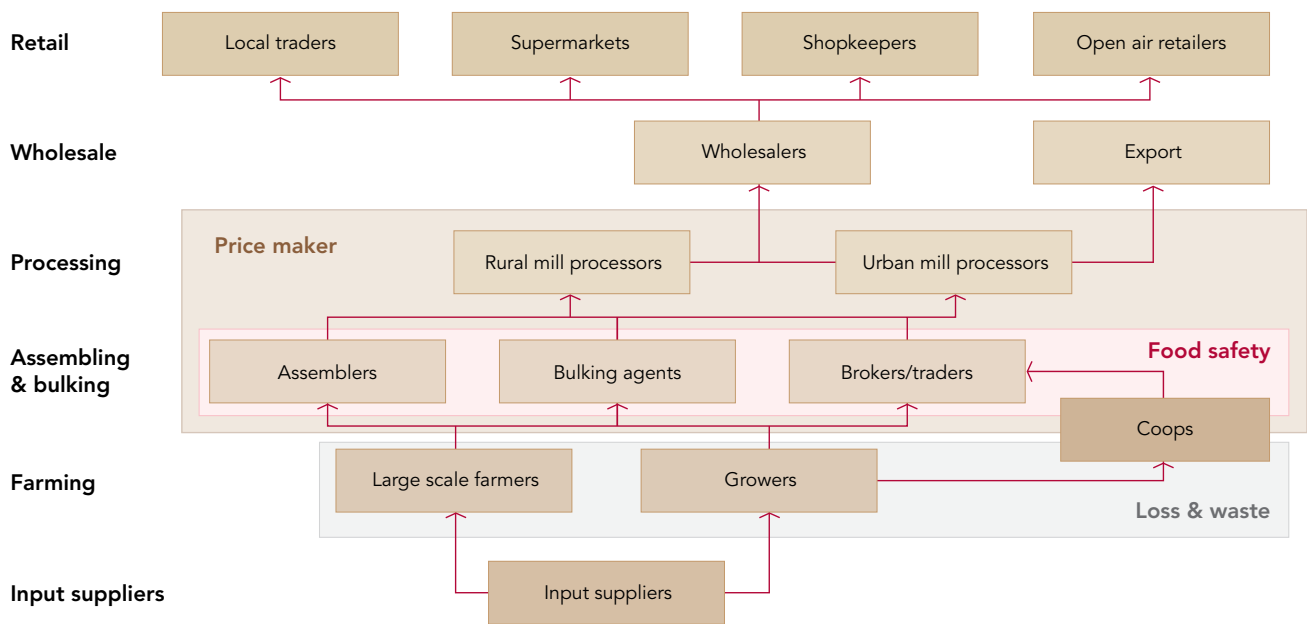


Figure 7: Sample Supply Chain Heat Map for Pulses

In this example, the mills and processors are driving the prices due to their ability to sort, grade, and have a diversified portfolio of products. They are also able to negotiate their supply prices down based on the amount of usable raw materials. Food loss and waste are greatest at the farming stage where often a significant portion of the pulses grown are unusable for further processing for safety and quality reasons and their ability to be sorted from other farm refuse and debris. The assemblers, bulkers, and traders pose the greatest risk to food safety, particularly in the conditions and duration of storage. Limitations of economies of scale mean there are relatively few alternatives to the services bulkers and processors offer.

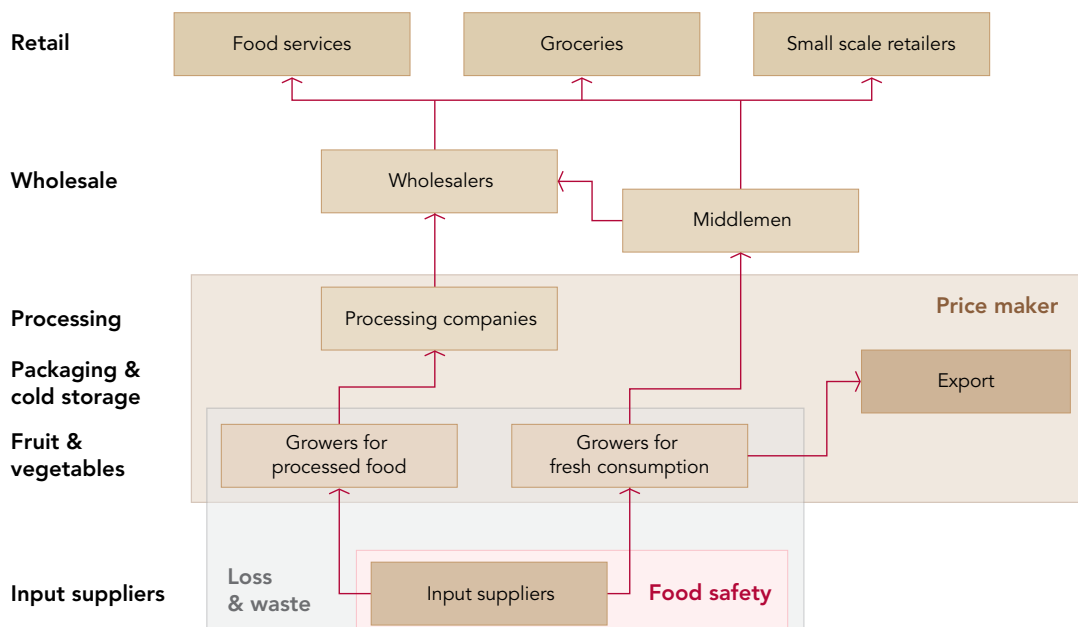


Figure 8: Sample Supply Chain Heat Map for Produce (Fruits and Vegetables)

Similar to the pulses example, those with greatest control of prices for produce are the processors and wholesalers who have the greatest market insights and are able to capture the value of sorting and grading. Both food safety and food loss and waste are most at risk during production, packaging, and storage, particularly in the existence (or lack) of cold chain transportation and storage that may be necessary for some produce to extend their shelf life.