Linking Refugees and Host Communities to Agricultural Value Chains in the North of Jordan

Orange, Cucumber, and Small Ruminants' Dairy

ICARDA
Science for resilient livelihoods in dry areas

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Foreword

In 2017, Caritas Switzerland's Agricultural Livelihoods and Markets team, in collaboration with its global technical partner International Center for Agricultural Research in the Dry Areas (ICARDA), conducted a rapid market assessment and value chain analysis for three agricultural products in Jordan focusing on Irbid, the Jordan valley, and Ramtha as part of its planning for regional livelihoods interventions targeting refugees and host communities. The assessments adopted the Sustainable Livelihoods Approach (SLA) and the Markets for the Poor (M4P) analytical framework to selected and prioritize agricultural value chains. The objectives of these assessments focused on seeking innovative ways of linking refugees and vulnerable host communities to local markets. This was through mapping of available knowledge and skills among Syrian refugees and vulnerable Jordanian families within the agricultural sector and identifying entry points for the employment of refugees and host communities in the sector in general and the analysed value chains in particular.

It adopted various analytical frameworks to understand the livelihoods of the target communities and the wider socio-economic contexts and the functioning of the market. These included the Sustainable Livelihoods Approach and the Markets for the Poor analytical framework used to select and prioritize agricultural values chains in terms of their potential impact on and feasibility for the target communities.

The focus on the agricultural sector stemmed from the fact that a large percentage of Syrian refugees comes from agrarian communities in Syria and they possess knowledge and skills that can be utilized in the sector to increase their employment opportunities, improve sector productivity and increase food security in general. Evidence demonstrates that agricultural livelihoods of Jordanian communities have been impacted to a great deal, especially in areas where refugees are highly concentrated such as Mafraq, Irbid, and the northern parts of the kingdom due to the competition for labour, resources, and public services. Impact is demonstrated in different forms including less returns on agricultural assets, increased prices of agricultural inputs, weakened farmer capabilities, increased transportation costs, and decreased investment.

The analysis in this report includes three products: cucumbers, small ruminants' dairy, and oranges value chains. It analyses the supply and demand chains, market opportunities and production systems, and provides general recommendations for organizations interested in supporting the livelihoods of refugees and hosting communities.

We wish to extend our gratitude and appreciation for all organizations and individuals who gave their time and efforts to provide the researchers with the information and data needed for the analysis including the National Center for Agricultural Research and Extension (NCARE), the Agriculture Credit Association, the Jordanian Hashemite Fund for Human Development (JOHUD), the World Food Program (WFP), and others.

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List of Abbreviations

CACH	Caritas Switzerland
CBI	The Centre for the Promotion of Imports from developing countries
CBJ	Central Bank of Jordan
DOS	Department of Statistics
EU	European Union
FAO	Food and Agriculture Organization
Global GAP	Global Good Agricultural Practices
HACCP	Hazard Analysis and Critical Control Point
ICARDA	International Center for Agriculture Research in the Dry Areas
ITC	International Trade Center
JD	Jordanian Dinars
JOHUD	The Jordanian Hashemite Fund for Human Development
MoA	Ministry of Agriculture
M4P	Markets for the Poor
NCARE	The National Center of Agricultural Research and Extension
SLA	Sustainable Livelihoods Approach
SR	Small Ruminants
UAE	United Arab Emirates
UNIDO	United Nations Industrial Development Organization
VC	Value Chain
WFP	World Food Programme

Introduction

This report is part of the Markets for the Poor (M4P) study which aims to identify potential interventions in specific agricultural value chains and to improve the livelihoods of Syrian refugees and poor Jordanian households. This report is based on a rapid market assessment involving a process of key informant interviews and focus group discussions with male and female Syrian refugees and with Jordanian households. Three value chains with the highest potential for improving the livelihoods of refugees and poor Jordanian households were identified and prioritized. The selected value chains are citrus, specifically orange, cucumber, and small ruminants' dairy products. This report provides a detailed analysis of the selected value chains covering production, marketing, logistics, processing and retail. In the rapid market assessment, a detailed review of the literature and an analysis of the effects of the Syrian crisis on Jordan, the Syrian refugee population in Jordan, the livelihoods of the refugees and poor Jordanian households, and the Jordanian labour market were discussed.

Methodology

In principle, the methodology adapted for this study follows the market for the poor (M4P) framework. However, the first aim of this approach is to understand how the value chain functions and how the poor interact with it. The second aim is to identify market-based interventions that can improve the livelihoods of the poor. In order to achieve both aims, surveys of the major nodes of the three value chains were conducted, including production, marketing, processing, different kinds of traders, and retailers. The study was implemented between May and September 2017. Detailed descriptions on how the value chains interact within the local context are critically important in analyzing the viability of value chains (see Timan, 2007). In this analysis, the approach by Bloom and Hinrichs (2011) has been applied: 'scaling up' of local and regional food systems should consider targeted development of technical infrastructure (in processing and distribution), as well as outreach on shared ownership models. In order for both refugee and Jordanian households to benefit, our analysis of the small ruminant farmers would require some agreement with the major distribution food systems. However, they first need to build their processing capacity of dairy and pickled vegetables. With this local capacity, they will not be able to effectively penetrate the major food system. The total number of key informants is given in Table 1. The detailed list of key informants, that were interviewed, and the locations of the interviews are given in Annex 1. The checklist of questions used for the key informant interviews are given in Annex 2.

Table 1. Number and different categories of key informants of the cucumber, small ruminants (SR) dairy, and orange value chains in Irbid.

Type of VC actor	SR dairy VC	Cucumber VC	Orange VC
Producers	5	5	5
Traders	10	10	10
Processors (Syrian and Jordanian)	14	6	6
Retailers	10	10	15
Consumers (Urban and rural)	20	20	20

Demand and supply data were computed from national statistics on production, imports, and exports. The trend direction of these national statistics revealed where the market is heading and provided information about the vulnerability of the value chains to external shocks. At the micro-level, agents along the value chain were interviewed in order to identify specific interventions with the potential of improving livelihoods. The micro-level analysis was focused on the Irbid governorate. A survey of orange producers was conducted in the North Jordan valley. Interviews for the cucumber value chain were conducted in the districts surrounding greater Irbid and Ramtha. Interviews of small ruminant producers were conducted in the districts surrounding Greater Irbid and interviews with the dairy processing industry were conducted in Irbid. Wholesale market traders in Irbid and Amman were also interviewed. Small-scale dairy sheep and goat producers, small- and large-scale greenhouse operators, specialized dairy processing workshops and orange juice factory operators applying vertical integration were also interviewed.

Cucumber Value Chain

Supply Side

Cucumber is the second most common vegetable produced in Jordan. In terms of production, it ranks second after tomatoes (Table 2). Cucumber is grown mainly in greenhouses and the annual production reaches up to 232,000 tons, according to the office for national statistics. However, because it is grown in intensive production systems, cucumber ranks fourth in terms of land use after tomatoes, potatoes, and squash, in that order. Cucumber is produced all year round due to the different agro-ecological and controlled environments that provide favourable conditions throughout the year. The crop is also grown in many geographical areas of the country, but mainly in the areas around greater Amman, in the Jordan valley, and in the Ramtha district in the Irbid governorate. It is a very popular vegetable, consumed mostly fresh as well as in pickled forms, and it is also a major vegetable export for Jordan. The sector also creates jobs for migrant Egyptian workers and Syrian refugees. In this value chain analysis, we will examine the production and marketing of this commodity and identify opportunities for improving the livelihoods of poor Jordanian families and Syrian refugees. National data, such as demand, supply, exports, and imports, will be used in the analysis of the macro-level indicators, but field data, such as the production, marketing practices and opportunities are the focus of this field research.

Table 2. Production of cucumber and other key vegetables in Jordan, 2015 (Dunum=1000 m² = 0.1 ha).

	Winter			Summer			Total	
Crop	Area (Dunum)	Average Yield (tons/ dunum)	Production (tons)	Area (Dunum)	Average Yield (tons/ dunum)	Production (tons)	Area (Dunum)	Production (tons)
Total	271,416	-	-	216,312	-	-	487,728	-
Tomatoes	85,883	7.0	602,220	42,989	6.2	267,797	128,871	870,017
Squash	14,171	2.4	34,563	12,477	2.4	30,214	26,648	64,777
Eggplants	1,371	3.6	40,552	11,865	3.1	36,464	23,236	77,016
Cucumber	**12,314**	**9.3**	**114,603**	**11,787**	**10.0**	**117,379**	**24,102**	**231,982**
Potato	51,194	2.5	128,267	21,363	2.8	60,060	72,558	188,326
Cabbage	3,412	5.4	18,482	1,508	5.1	7,752	4,920	26,233
Cauliflower	14,589	3.1	45,127	8,417	3.2	27,132	23,007	72,258
Hot pepper	2,673	1.0	2,717	7,598	1.4	10,361	10,271	13,078
Sweet pepper	5,324	5.3	28,151	8,808	5.2	45,448	14,132	73,599
Okra	776	0.4	281	7,216	0.8	5,818	7,992	6,100
Lettuce	7,596	4.0	30,195	7,038	3.9	27,556	14,634	57,751

Source: DOS, 2017

Production system: In Irbid, cucumber is commercially produced mainly in the Jordan Valley (lowlands) and in Ramtha (uplands). In Ramtha, there are around 50 large-scale vegetable producers with 1700 green houses, producing cucumber and other important vegetables, including tomatoes, peppers, and beans. The size of these commercial farmers varies from 10 greenhouses to up to 60 greenhouses, with some larger ones reaching up to 200 greenhouses (the farmers we interviewed had 120 green houses on average). Each green house covers about 500 m^2, or about 0.5 dunum, and is able to produce up to 9 tons of fresh cucumber per season. Two main types of cucumber production prevail in Irbid: large-scale commercial production and household-level production. Some comparative information about these two systems is presented in Table 3: (1) commercial systems located in the Jordan Valley (lowlands) and in Ramtha (uplands); (2) household production, consisting of one or two greenhouses, producing for family consumption and for local markets, i.e., local communities and neighbours.

Table 3. A comparison of the two main cucumber production systems in Irbid.

System	Commercial System	Household System
Location	Amman surroundings, Ramtha, North Jordan Valley	Rural Irbid governorate districts
Area	5 -50 dunum	0.5-4 dunum
Number	Can reach 100s of greenhouses per farmer	One or to green house per family
Green house Size	500 m^2	250-500 m^2
Technology	Advanced (modern green house, fertigation system, drip irrigation, etc.)	Also uses modern irrigation technologies or even hydroponic systems.
Water sources	Wells far away from the farms and regular sources	Government water or cisterns for water harvesting next to houses, rooftop water harvesting
Labours	Family (men), Egyptian (men) and Syrian (men and women)	Family (men and women)
Markets	Wholesale markets and few retailers	Family use, local small shops and neighbours
Role of Syrian Refugees	Labourers	Owners (renting lands) and labours

As noted above, there is a high concentration of cucumber and other vegetable production under greenhouses in the Ramtha district. Each producer has an area of 1-10 hectares under green houses. Producers are not specialized in one product, but produce up to 10 products (e.g. cucumber, tomato, eggplant, sweet pepper, squash, beans, potato, okra, hot pepper, and onion), which are sold in domestic and export markets. The purpose of the multiple crop production is to reduce market risks, such as oversupply, which could lead to a price collapse.

Production practices: For some 30 years, the farmers in Ramtha have been producing cucumbers as an important cash crop in greenhouses with drip irrigation systems and in controlled environments. Currently, producers do not seem to be concerned about water shortages. They reported that enough ground water from artisan wells was available and that it is purchased in the required quantities at a price of 0.70 JD per m^3 from well owners. The water is then distributed, in some cases, over distances of up to 1 km using electric pumps, pipes, and ponds to collect water at the farm. They use these water sources on a daily basis for the entire cropping season. Each green house consumes about 200 m^3 of irrigation water per season, which lasts about five months. At the farm, a drip irrigation system is used, which connects all the green houses using a pump and a network of pipes. The irrigation system is linked to a fertigation system, where water and fertilizers are combined and pumped at the same time to all the green houses. Local input traders

supply the drip irrigation equipment and water pumps. Modern production technologies, such as pest control, water management, and fertigation, have improved the yield and fruit quality. All cucumber producers apply green house technology and drip irrigation systems. However, some producers have not yet adopted more advanced technologies, such as fertigation systems.

Production calendar and yields: There are two main seasons for production in Ramtha: spring and autumn. In each of the growing seasons, the crop is harvested 3 times per week, with 250 Kg per harvest for a total of 75-80 days, resulting in a total production of 7-10 tons per season per green house. Another estimate is given by the harvest of up to 30 boxes (10 kg each) every 2 days for 45 days (22.5 harvests X 300 = 6750 Kg or 6.75 t/season for two seasons per year). Undoubtedly, productivity depends on the selection of crop varieties, water quality, pest management, fertilizer application, and other management practices. In spite of the efficient production technology, producers raised questions and showed much concern about the quality of inputs (fertilizers and pesticides). They argue that the application of poor quality products is ineffective, if not harmful to the crop. This concern is particularly troubling since, due to pesticide residuals, Jordan has recently experienced rejections of vegetable exports to some key export markets in the Gulf countries, for example the United Arab Emirates in April and May 2017. The main reasons for this rejection was that farmers do not commit to following the guidelines on the use of chemicals and that the relevant government institutions are not effectively enforcing these guidelines.

Employment generation: Commercial green house farms hire Syrian and Egyptian labourers. This sub-sector creates demand for manual farm labour, which is mostly filled by immigrant workers from Egypt and Syrian refugees. Jordanians are less attracted to farm labour. Women are an important source of labour at farm level, where Syrian women work in harvesting and other seasonal work. Green house systems require one worker for every four houses. Thus, it is a huge labour saving technology compared with open-field production. One specific green house grower, who was interviewed, employed 11 labourers (6 Egyptians and 5 Syrians) for a total of 50 greenhouses of different vegetables. This farmer used 1 labourer for every 4 green houses. Most of that labour is seasonal, work is only required during peak activities, such as harvesting, land preparation, structural works in the green houses, and other extensive works. Male workers from Egypt and Syria are paid 20 JD/day, whilst Syrian women, who do most of the harvesting, get 0.7 JD/hour. On this type of farm, there are just 4-5 permanent workers, mostly Egyptian men with a fixed monthly salary. This level of labour utilization shows that green house vegetable production does not create a large labour demand, relative to similar production levels in open fields. Nonetheless, it is an important employment and livelihood source for those who are able to get work. Furthermore, it is a pretty intensive and stable system, retaining its workers for most of the year, and both men and women can be employed. However, women play a major role in harvesting. No share-cropping was reported in the green house production between migrants (Egyptian or Syrian) and Jordanians. A main limiting factor could be a lack of finance on the part of the Syrian refugees or Egyptian labourers.

Costs and profitability: Commercial cucumber production in Ramtha is very advanced, including drip irrigation, fertigation (water and fertilizers), and effective pest control. Cucumber production in Ramtha is estimated at around 14,000 tons per year, amounting to 16 % of the national production. Each green house measures about 50 m x 10 m = 500 m^2, or about 0.5 dunum, with a fixed cost of 1200 JD for a metal frame and 300 JD for plastic sheets, with a life time of 3-5 years. There are three planting windows for cucumber: January–June, May- October, and July-December. However, the most common production seasons are spring (January-June) and autumn (July-December). The crop is thus produced in two seasons per year. Farmers use imported seedlings, fertilizer, and pesticides. They plant 1400 seedlings in each green house at a cost of 120 JD, including labour. Table 4 provides the costs and benefits of a standard single green house. Overall, cucumber

production in greenhouses is highly profitable. However, in order to sustain production, capital investment, good management, a reliable source of water, and good agricultural practices are required to meet global consumer standards. We will revisit this point later in the recommendations.

Table 4. Benefits and costs of cucumber production in greenhouses (0.5 dunum) /1 season in Ramtha, Irbid.

Item	Quantity	Prices (JD/unit)	Total cost/revenue(JD)
Fixed Costs			
Green house (units)	1	1200	1200
Plastic	1	300	300
Irrigation System	3	100	300
Various Tools	3	50	150
Total fixed cost-replaced every 5 years (JD)			1950
Variable Costs			
Seedlings	1400	1	1400
Manure (applications)	1	50	50
Fertilizers (applications)	3	50	150
Pesticides (applications)	5	25	125
Mulch (meters)	1	20	20
Threads (rolls)	1	6	6
Irrigation water (cubic meter)	200	0.7	140
Tilling operation	2	10	20
Manual labour	1	150	150
Fixed cost	1 season	195 (1950/5/2)	195
Total variable cost per year (JD)			**2206**
Revenue			
Class A (Kg)	1000	0.7	700
Class B (Kg)	7000	0.25	1750
Class C (Kg)	1000	0.1	100
Total Revenue per one season JD		2550	
Net Income per one season JD	344		

Marketing

Marketing channels: Medium-size and large-scale producers, who sell their produce in bulk through the two wholesale markets for fresh fruit and vegetables in Irbid and Amman, characterize the cucumber value chain. Producers sell fresh cucumber in the range of 70 tons, if operating 8 greenhouses, and 350 tons, if operating 40 greenhouses per season. Most producers use their own vehicles to transport their products and very few use rented transportation. The transportation cost from farm to the wholesale market is about 0.1 JD for every 10 kg box. The wholesale markets operate an auction or open bidding system. Over 90 percent of farmers sell directly to a wholesaler, mainly through a middleman dealer. These dealers control the wholesale markets in Amman and in six other municipalities. The domestic production of fruit and vegetables and a significant part of imported vegetables transit through one of these markets. Central markets in Jordan do not have a system for regulating quality.

Figure 1 shows that the cucumber production in Irbid is mostly supplied to the two major wholesale markets of Irbid (40%) and Amman (50%). Smaller quantities of fresh cucumber are sold directly to households (3%) or to retailers in Irbid (7%). Producers prefer to supply fresh cucumber directly to the wholesale markets of Amman and Irbid, due to a high and stable demand, reasonable prices, and access to loan support for inputs by traders, who are based at the wholesale markets. Other advantages of this marketing strategy are the low per-unit transport costs and high competition among traders through the open bidding (auction) system. The auction system is a transparent price determination process, achieving better prices for the farmers. Many buyers, including malls, restaurants, other retailers, and street vendors, get their supplies from these wholesale markets.

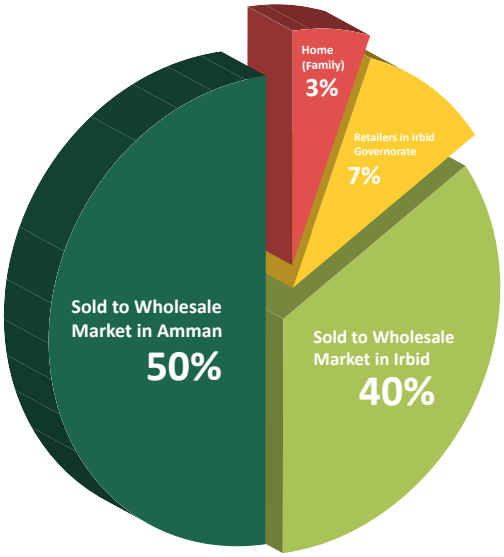

Figure 1. Key Marketing Strategies and Channels for Fresh Cucumber.

The downside, as farmers see it, is the 6-7% commission, which middlemen traders at the wholesale markets charge for their services. No contractual arrangements were reported between farmers, traders, or exporters. The only contractual arrangements noted have been with Turkish traders. Before the Syrian crisis, they procured cucumber from Jordan for export, rerouted via Syria, to the markets of the Eastern European countries and the Russian Federation. This trade has completely ceased after the Syrian crisis began.

Medium- and large-scale producers have less preference for marketing directly to households and retailers in Irbid province. Although they can get higher prices, don't have to pay a commission fee, can benefit from low transportation costs around the neighbourhoods, and can have agreements with malls or large retailers or the pickling industry, the demand is very low and fragmented. Logistics and transportation costs also add up, making it more expensive. Producers also have a positive perception about the supply of fresh cucumber to exporters, because they can get relatively better prices, which could be up to 30% higher than local prices. They can also get financial support for inputs, involving better post-harvest management due to agreements on the exporters' conditions. Producers also benefit from the transfer of know-how and capacity-building from the exporters' technical staff. However, the negative aspects of this marketing option are the low quantities demanded by the exporters from the producers, meaning that exporters get their supplies mainly from wholesale markets. Since exporters target export markets in the Gulf countries, where

there is a high demand on specific quantities. Therefore, they require steady supplies that cannot be filled by individual producers. Unlike individual farmers, wholesale traders can supply ample quantities to exporters. Exporters are not willing to make arrangements, because there is a risk that the farmers are not able to deliver. However, we found that Turkish traders had in the past made contractual arrangements with farmers in the Ramtha area. However, this has stopped after the closing of the Syrian borders. It was reported that a small number of large-scale farmers are exporting directly.

Post-harvest: Most producers have limited post-harvest management facilities that handle activities such as sorting, grading, and packaging at their farms. Large-scale farmers have adequate sorting and packing facilities using the new recommended carton boxes. Most farmers do the packing at the farm using 10 Kg boxes made of different materials, but with little systematic sorting and grading. This post-harvest management (sorting, grading and packing) can be considered as traditional, without labelling, harmonized sizes of fruits and without the use of clean carton boxes. Instead, they use poor packaging with polystyrene boxes, which are not suitable. However, they are cheaper at 0.2 JD per box compared to the recommended carton boxes at 0.5 JD. Fruit growers are considered to be better at packaging than vegetable growers. Traders practice sorting and grading and use more suitable carton boxes mainly for export markets. Such improved packaging is important in responding to the requirements of export markets. Indeed, cucumber is a fresh produce and it needs to be sold immediately. Therefore, when the demand is low, producers offer discounts to buyers and use social relations and personal contacts for marketing. In the high supply season, with fresh supplies arriving daily, cooling is not practiced and considered unnecessary. At the wholesale market, prices decline rapidly over the course of the day for any remaining, unsold products after the early morning sales. In the low supply season, the market quickly clears without the need of refrigeration.

Quality: Quality is only measured by visual assessment of size, freshness, and intensity of color (shining). However, there are no clear and objective standards used to classify the product. In general, the local market takes the small to medium size whereas the export market takes large size products. Although most farms do packing, limited sorting and grading is practiced at the farm level. However, traders classify the products and select higher quality products for export to the Gulf countries or other Arab countries. The main weaknesses of the marketing segment are the traditional packaging used by farmers, mainly polystyrene boxes reused multiple times, the low quality control for pesticide residues, and the lack of specification regarding the origin of the produce. There is a complete lack of awareness for the concerns related to production methods, chemical residues, environmental and health risks. Some producers lack experience and knowledge of certification standards in production practices, whereas others have no formal training in global good agricultural practices. Producers largely respond to market demand in general terms. However, the current marketing system does not provide producers with any detailed product specification. Hence, it does not lead to improvements in meeting the requirements of the export market with regard to product quality, a more measured use of pesticide, or systems that allow traceability. There is a clear need for action on this issue as this can constrain access to future export markets. We will revisit this point in the proposed actions.

Prices: are determined by an auction (open bidding) system at the wholesale markets, benefiting the producers. The selling price at the wholesale market is about 2.0-3.5 JD per 10 Kg box (0.2 to 0.35 JD/Kg). Prices are subject to seasonal fluctuation depending on the supply and demand. Traders sell the produce at prices ranging from 0.5 to 0.6 JD per Kg. Prices change with market conditions, sometimes dropping as low as 0.1 JD/kg and rising as high as 0.6 JD/kg. Furthermore, prices can vary during the day, from morning to afternoon. Roadside sales of 0.42 JD per Kg and street vendor sales in downtown Irbid of 0.33 JD per Kg were found on the 14th and 16th of September 2017, respectively.

At the wholesale market, prices are negotiated through a bidding process and producers are free to sell their produce to any trader at any wholesale market in Jordan. Producers in Irbid prefer to sell their products in Amman, since it is a bigger market with more traders, resulting in better negotiations and a higher chance of meeting exporters. Figure 2 shows monthly farm-gate and wholesale market prices in Amman for 2014.

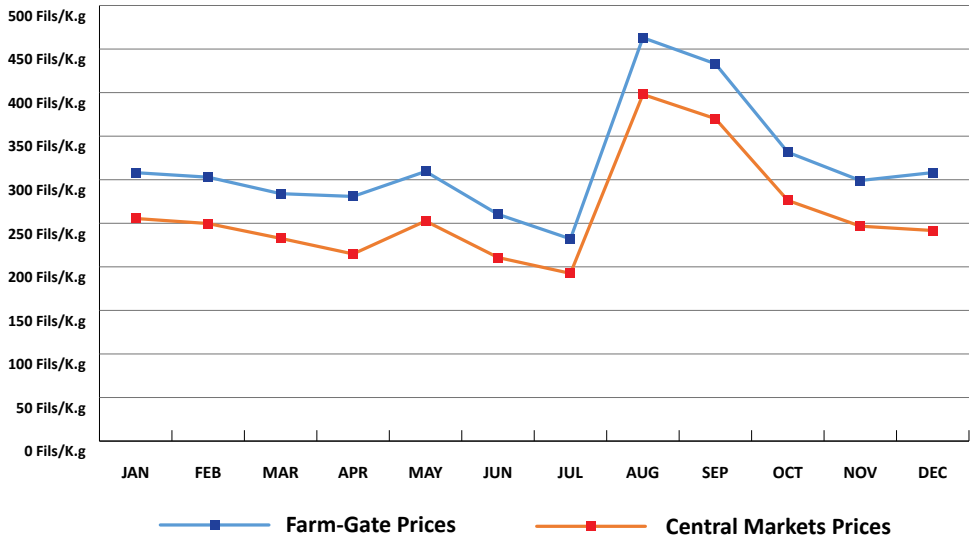

Figure 2. Average monthly prices of cucumbers at farm-gate and the Amman wholesale market, 2014.

Source: DOS, 2017

Value chain map: The value chain of cucumber in Irbid is very short (Figure 3). Producers are directly linked to the traders at the wholesale markets. Their produce is transported to the wholesale markets, where price negotiations with traders occur, and the produce is sold in an open bidding (auction) system for all interested buyers. There are three types of traders: (i) traders at the wholesale market who operate as middlemen and sell produce through a bidding (auction) process; (ii) collector-traders who buy from farmers and sell at the wholesale market; and (iii) exporter-traders who operate only in the wholesale market of Amman. The middlemen-traders sell the commodity to various types of retailers, such as malls, supermarkets, shops, street vendors, restaurants, and occasionally to individual consumers. Some traders buy and resell the produce. Middlemen-traders may also resell part of these quantities to other traders or exporters. The wholesale market is controlled by traders who act as middlemen. They are registered market agents, each with an office and front area where they offer products for sale or conduct the bidding process. Farmers pay a 6% municipality tax and a 7% commission to middlemen-traders. The middlemen-traders deal with many different crops. There is an informal but steady relationship between traders and farmers, as the former provides loans without interest to farmers. Therefore, some producers are tied to specific traders who are their creditors. However, there is no formal contractual agreement for the majority of producers who sell their produce at the wholesale markets.

On the other hand, the pickling and processing units contact producers, either directly or through social networking (e.g. friends, events etc.), in order to agree specific quantities and quality requirements of cucumbers to be supplied. Producers then prepare the product and deliver it to processors at either a pre-agreed price or at the current selling price. Very low quantities are sold at the farm-gate for exporters and sales have suffered a serious decline due to the crisis in Syria and the closure of borders.

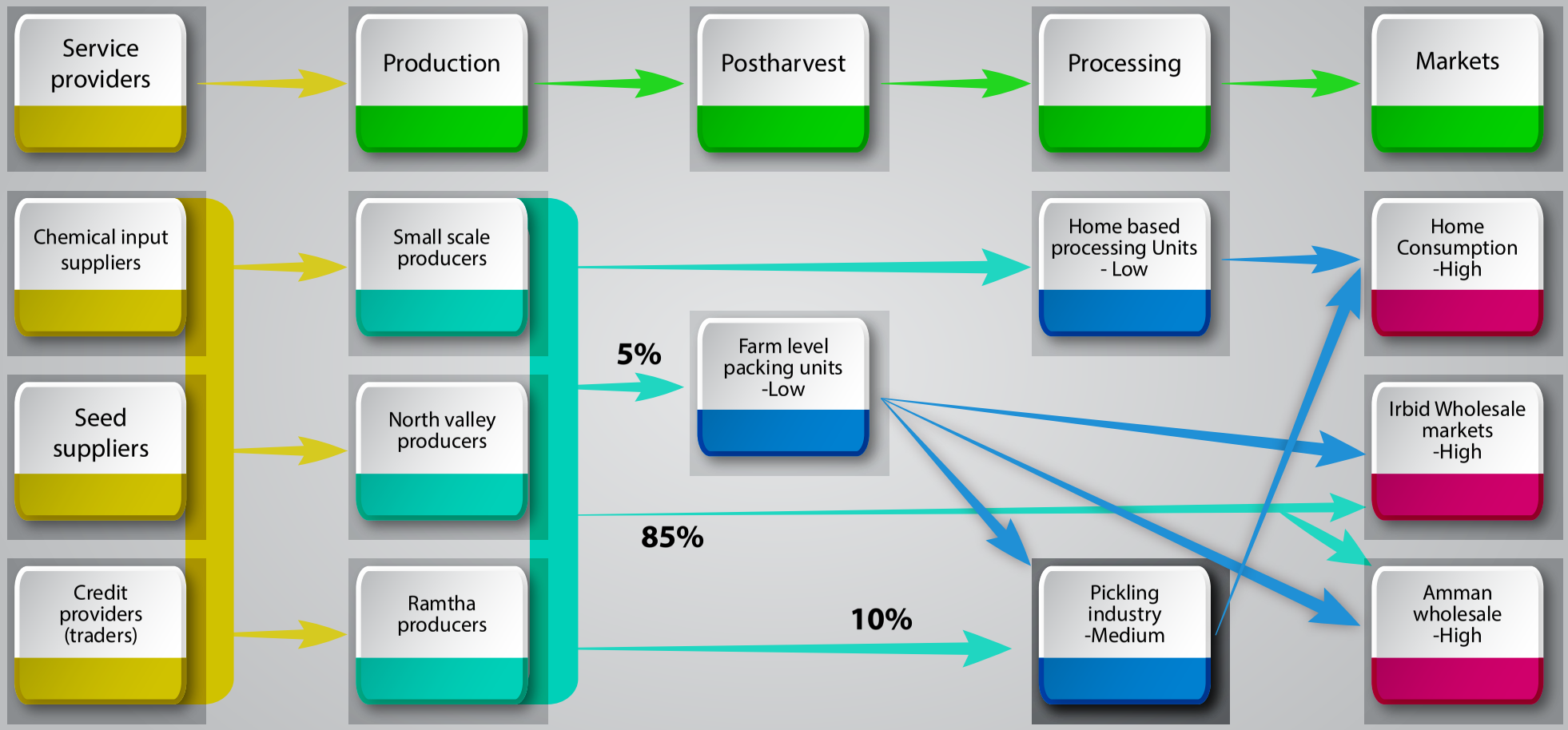

Figure 3. Map of Cucumber Value Chain in Irbid

Exporters: also procure their supplies from the wholesale market, selecting the best quality, mainly determined visually by size (20 cm and above) and freshness. Most importantly, exporters require that the product be packed in new carton boxes at the farm level. Some farmers have established connections with exporters, following export standards and packaging requirements by providing labels and contact information for traceability purposes. These farmers have modern packing and sorting facilities.

Processing: The focus so far has been on fresh cucumber. However, there is a high demand for processed (pickled) cucumber. A few large-scale processing factories (for example Dura, located in Irbid province) follow standard food processing and safety protocols. Many medium-scale processing facilities are owned by or linked to retail business. However, unlicensed home-based processing operations account for most processing activities. Many Syrian refugee women as well as Jordanian households are involved in the small-scale pickling industry. Home-based processing is either provided as a service to retailers or is directly selling to consumers in the neighbourhood through social networking. One example of a Syrian refugee woman who is making vegetable pickling for retailers is presented in Box 1. In this case, the woman earns about 115 JD per month for processing about 275 Kg of cucumbers and stuffed eggplant. The retailer earns a much higher net income estimated at 360 JD per month.

Box 1. Syrian Refugee Woman Service Provider on Pickling to Retailers.

This Syrian refugee woman pickles vegetables, including cucumber, as a service for a retailer. She prepares about 100 Kg/month of cucumber, 75Kg/month of white cucumber (Fagoos), and 100 Kg/month of stuffed eggplant. She pays for 20 cubic meters of water at 3.33 JD per cubic meter which is about 67 JD, salt at about 1.5 JD, rent of 100 JD per month. She prepares the products for the retailer who pays her a service charge of 0.5 JD per Kg of cucumber and 1 JD per Kg of eggplant because it is more laborious. In that way, this Syrian refugee mother makes a monthly net income of 115 JD, which is a critical lifeline for her family. The retailer sells the products at 1 JD per Kg for pickled cucumber and 5 JD/Kg for stuffed-eggplant. The gross monthly income for the retailer is estimated at 360 JD. The cost of rent and related issues can be deducted. However, that would not be a lot given that the retailer is a fresh vegetable retailer and pickled products are only a minor part. When asked if she would sell to consumers rather than to the retailers, the Syrian refugee woman stated that, after she originally started, her skills became known to the community and that she is willing to do that with a little more resources.

Another example is presented by the Alrafeed (Benikenan) Agricultural Women's Association with 100 members. There is a good opportunity to capitalize on the local rural demand of pickled vegetables, as well as urban consumers with proper community-based facilities and effective marketing. Some association members now do home-based vegetable pickling but face problems with capacity and marketing constraints, which are limited to local neighbourhoods. A full feasibility analysis of the improved pickling facility for the Women's Association is presented in Table 5

Medium-scale producers also reported that processing vegetable pickles is profitable when selling to restaurants. The estimated budget for this category of processing is presented in Table 5. All key informants surveyed about the prospects of pickled vegetables agree that the demand is increasing. However, there is no hard data to support that. Overall, the

analysis in Table 5 and the interviews of stakeholders indicate that pickling is a profitable activity with opportunities for both poor Jordanian rural women and Syrian refugee women. Men are also involved in different activities of the pickling business, including transport, purchases of supplies, and marketing.

The risk: The small-scale home-based pickling industry faces an important risk. This risk is coming from the expanding supermarkets, requiring consistent products, standard food safety protocols, and essential labelling, including origin, ingredients, and expiry date. Currently, the home-based industry is more feasible in rural areas that are outside the reach of the supermarkets. However, with improving infrastructure, this increasing influence will inevitably reduce the chances of home-based business in competing with major suppliers. Any initiative that aims to improve the small-scale home-based pickling industry should take that risk into consideration and should build the capacity of these men and women to sustain their competitiveness in this global market. Key factors in that effort should be capacity-building by adopting standard processing and food safety protocols and by acquiring necessary certifications, as well as aggregating production through collective action to reach a minimum level of supplies that can be attractive to supermarkets and retailers. However, in the short term, there is sufficient demand in the rural neighbourhoods that can be exploited with these home-based industries.

Potential for community-based processing unit: In order to reduce the risk described above, households engaged in home-based vegetable processing should be encouraged to adopt more modern methods, using clear guidelines that meet food safety and hygiene standards. The women should be encouraged to aggregate their production in some form of group collective. This will require support in the form of a facility, where these women can collectively work. We conducted an exercise for assessing the feasibility of such a facility with the Alrafeed Agricultural Women Association. The data generated for this purpose are presented in Table 5. The exercise with the women revealed that the facility would require about JD 19,725 of investment in equipment (a detailed list of equipment and their costs are available from the authors). The annual investment cost over 5 years is 3,945 a year and would result in 52.5 tons of processed vegetables a year with a value of JD 142,500. The total operational cost, including annualized investment cost (with no interest rate), is JD 116,445, thus yielding a net annual profit of JD 26,055, which is about 22% annual rate of returns. The net monthly income for the group would be JD 2,171. The most important crop that would be processed in this enterprise, both in terms of volume and value, is cucumber (60%), which shows the importance of cucumber for this kind of value added activity in the study area. Unlike other crops, it is also available all year round (the detailed availability of different vegetables are given in the footnote of Table 5).

If the investment was a grant or after the loan is paid off, the net annual income for the group would be JD 29,606 and the net monthly income for the group would be JD 2,467. Assuming that 10 households were working in this activity, the net monthly household income would be about JD 240. If the women members grew some of the supplies through greenhouse production, the income from this enterprise can be further increased. Clearly, this kind of intervention would need modest capital investment, which will not exceed JD2000 per family, and would reach about 50-70 direct beneficiaries and more indirect beneficiaries through access to these products. This will also need institutional support and capacity development in management, collective action, decision-making and reconciliation, and marketing strategies and actions. However, it is a viable and profitable operation, which can utilize available labour and expertise within these rural communities affected by high unemployment. It also addresses the risks of home-based processing.

Table 5. Cost-benefit analysis of community-based vegetable pickling.

	Kg/ month	Duration (available months)	Total (Qt/yr)	Purchase price	Total unit cost (JD/Kg)	Total operational cost (JD)	Selling price (JD/Kg)	Total sales (JD)
Olives	2,500	3	7,500	1.0	2.0	15,000	2.5	18,750
Cucumber (Fagoos)	2,000	2	4,000	1.0	2.0	8,000	2.5	10,000
Cucumber (baby and medium size)	2,500	12	30,000	1.0	2.0	60,000	2.5	75,000
Eggplant	1,500	2	3,000		4.5	13,500	6.25	18,750
Turnips	1,000	2	2,000	1.0	2.0	4,000	2.5	5,000
Mixed vegetable	1,000	2	2,000	2.0	2.0	4,000	2.5	5,000
Carrot	2,000	2	4,000	2.0	2.0	8,000	2.5	10,000
Labour: provided by the families who are operating the processing unit.								
Total						**112,500**		
Investment costs								
Total investment cost without vehicle						19,725		
Annualized total cost (Without interest) over 5 years						3,945		142,500
Year 1 to year 5:								
Total operational annual costs and returns						116,445		142,500
Annual net income								26,055
Monthly net income								2,171
Monthly net income per HH (assuming 10 HHs)								217
Annual ROR								22%
Year 6 and onwards, loans paid off, or grant scenario:								
Total operational annual costs and returns						112,895		142,500
Annual net income								29,606
Monthly net income								2,467
Monthly net income per HH (for 10 HHs)								247
Annual ROR								26%

Notes: Olive is available for 3 months, October to December; white cucumber (Fagoos) for 2 months, May and June; other cucumber of different sizes are available all year round, and account for 53% of the processed vegetables; eggplant for 2 months, August –September, all other vegetables, including turnips, mixed vegetables and carrots are viable for 2 months, January and February.

Demand Side

Domestic demand: The local market demand for fresh cucumber in the Irbid governorate is growing, just as it is in the whole country. After Baqaa and Amman, it is one of the major wholesale markets. Fresh cucumber is almost a daily consumption in Jordan. The per capita consumption in Irbid is about 16 kg per year for fresh cucumber. It is a popular vegetable consumed in different forms and can be easily purchased in all retailer shops, supermarkets, malls, street vendors, and also from the traders in wholesale markets, at a price of 0.2-0.70 JD/kg. There is also local demand for pickled cucumber as an important component of the local diet. One interviewed processor reports selling all the produced pickled cucumber of about 4 tons per season to local consumers, local retail shops,

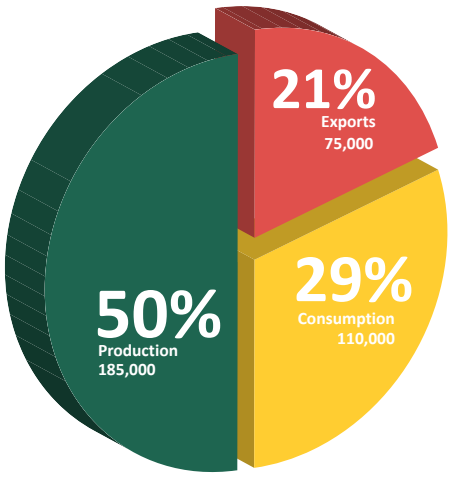

Figure 4. Cucumber production, export and consumption in 2013-2014 (in tons)

restaurants, and local exhibitions and festivals, at a price of 1.5-3 JD/kg. This price is 2-4 times the price of fresh cucumber. This shows that pickling is an attractive option for poor households and refugees, who have no other assets other than their local knowledge of food processing and labour. As shown in Figure 4, in 2011-2013, Jordan produced 185,000 tons of cucumber, of which 75,000 tons were exported and 110,000 tons were consumed (DOS, 2017).

Export demand: As a relatively low-cost supplier of cucumber, Jordan is considered to be in an advantageous position with significant export demand from the Arab Gulf countries, other Arab countries, Eastern European countries, and the Russian Federation. The Gulf region represents Jordan´s main export market. The export markets are increasingly demanding quality standards related to the production systems that may affect human health or environmental and ethical indicators. A major challenge for Jordan's exports is to satisfy these requirements. National effort is needed in order to set up standard procedures, consistent with good agricultural practices (Global GAP). The requirements also include standards in packaging and transport conditions. Jordan's competitive advantage is mainly during May-November. However, Jordanian vegetables, in general, can be positioned as year round supplies for the Gulf countries.

Table 6 identifies the different countries importing cucumbers from Jordan. Traders at wholesale markets load cucumber in containers or trucks (20 tons per truck) for export. They re-grade and sort the cucumbers into boxes. Cooled trucks are then used to transport the produce to the export destinations. Producers have no information about their products and are not informed to do anything differently or meet any requirements to satisfy the standards of export markets. This lack of feedback constrains producers' incentives to innovate and to improve the production practices and product quality.

Jordan had significant export demand for cucumbers before the Syrian crisis, covering both the regional market and the Eastern European market. However, there has been significant loss of access to these export markets, particularly countries in the regional market, including Syria, Iraq, Lebanon and Turkey; and markets in Eastern Europe, including Russian Federation, Ukraine, Bulgaria, Georgia, Hungary, Poland, Romanian and Slovakia (CBI, 2017). In the aggregate, Jordan exported close to 105,000 tons in 2012, but that has dropped to just about 45,000 tons in 2016 (Figure 5). Exports to Syria suffered the biggest drop,

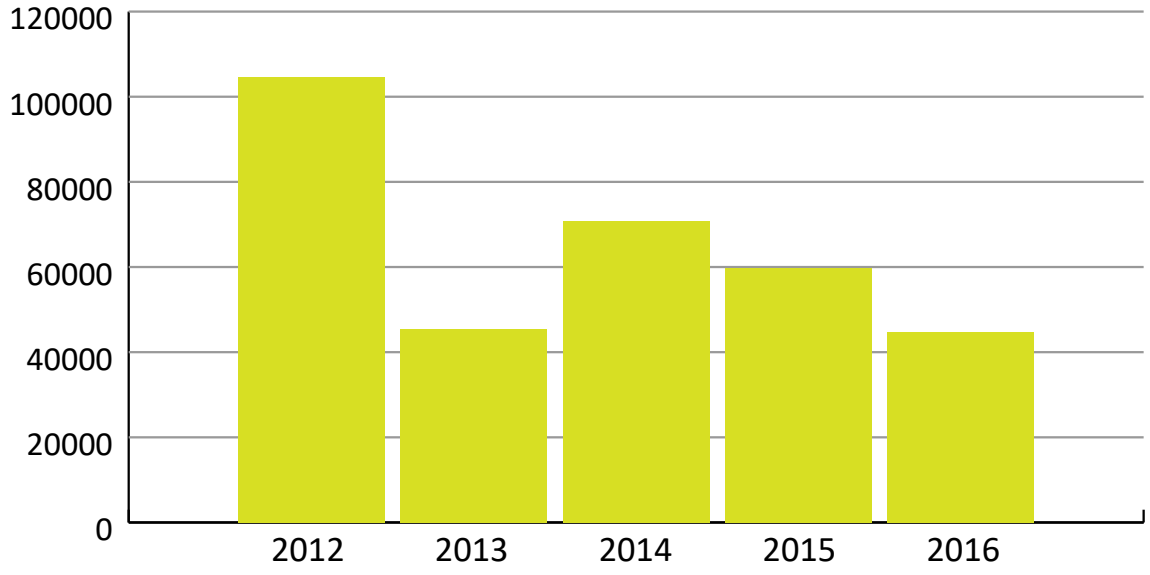

Figure 5. Trends in the Jordanian cucumber exports 2012-2016 (in tons).

accounting for about 57% of Jordan's exports to non-Arab Gulf countries. Other major export markets that are lost to Jordan are in the Russian Federation, accounting for 13% of the non-Gulf countries. Prior to the Syrian crisis, Iraq and Turkey accounted for 12% and 8%, respectively. In fact, three of the top five export markets (Syria, Russian Federation, and Iraq) with a total export volume of 64,480 tons in 2012 have completely ceased in 2016 due to the conflict in Syria. The exports to Turkey have also stopped. A major reason for the loss of these markets is the closure of the road transportation through Syria, which was key in increasing exports to Syria, Lebanon, Turkey, Eastern Europe, and Russia via Turkey. Turkey was also providing an indirect route for exports to the EU market, which is now completely cut as a result of the Syrian crisis. The Jordanian cucumber export demand in Arab Gulf countries remained intact and increased by 73% in 2016, compared with 2012 levels. However, that did not compensate for the losses in other markets. The result has been an overall contraction of exports by 57% in 2016, compared with 2012 levels. Currently, efforts are made to link Jordan with the EU market. However, that will require a significant shift in production practices to satisfy the demands of EU food safety, environmental and ethical requirements. Export to the EU market faces two major obstacles. The first one is to meet stringent food safety standards and the second is the high freight costs estimated at 0.75 JD per Kg. Jordan is the third most important vegetable supplier to the Gulf, after Egypt and India. This market is very important for Jordan's vegetable exports, with a value reaching € 238 million in 2015 (MoA, 2017). It is very important that Jordan takes steps to upgrade production practices that satisfy the requirements in quality standards, which will only increase in the future. Thus, not taking action is not an option, as it will otherwise negatively affect important national trade and the livelihood of many households.

Table 6. List of importing markets for cucumbers and gherkins, fresh or chilled, exported by Jordan.

Importers	2012	2013	2014	2015	2016
	Exported quantity, Tons	Exported quantity, Tons	Exported quantity, Tons	Exported quantity, Tons	Exported quantity, Tons
Syrian Arab Republic	45191	11676	19887	7288	0
Russian Federation	10106	1311	0	19	40
Iraq	9183	3621	19084	2315	0
United Arab Emirates	6866	6149	6181	9516	10073
Turkey	6649	0	0	0	0
Israel	6256	6602	6395	12341	11396
Kuwait	4462	5400	6659	12761	8145
Lebanon	4332	2429	2900	1309	261
Bahrain	3173	2765	3112	4898	5076
Qatar	3123	3432	4137	5510	5503
Romania	2438	212	11	0	0
Oman	1223	1244	1619	1931	1785
Ukraine	595	70	0	0	0
Bulgaria	395	10	0	0	0
Hungary	213	131	0	0	0
Saudi Arabia	164	297	922	1878	2397
Slovakia	126	1	0	0	0
Egypt	100	20	0	0	0
Georgia	88	18	0	0	0
Poland	59	0	0	0	0
Sweden	3	0	0	0	0
Palestinian Territories	0	0	0	0	13
Morocco	0	0	0	0	3
Algeria	0	0	0	0	1
Germany	0	0	1	0	0
World	104744	45385	70908	59766	44692

Source: CBI, 2017

Recommendations

1. **Build capacity of Jordanian farmers in Good Agricultural Practices in cucumber production**: From this report, it is clear that Jordan is a leading player in the cucumber market and a leading exporter to the Arab Gulf countries. It has a significant impact on the national balance of payments and is an important source of economic returns and livelihoods in rural areas. It is also clear that the sector provides employment opportunities to Syrian refugees. However, the production and trade of the sector is highly vulnerable to non-tariff trade restrictions, particularly restrictions related to residues from chemical applications (mainly pesticides). This risk has manifested itself more recently when the United Arab Emirates notified Jordan that some vegetables would no longer be allowed to enter UAE for that reason. Access to the European market is also contingent on meeting specific standards. This study shows that farmers are unaware of good agricultural practices that minimize this problem and the majority did not have any training in this subject. The relevant government institutions do not strongly inspect and enforce compliance of national and international standards of good agricultural practices. However, consumers are becoming increasingly aware and are demanding higher standards on environmental and health effects. For these reasons, we recommend an intervention, by focusing on educating farmers in good agricultural practices and by establishing model farms. The knowledge transfer and capacity development will not only be limited to pesticide use. Indeed, it will be about the entire farm management practices, with specific emphasis on water use, as well as record keeping practices, and cost-benefit analyses. This intervention will develop practical demonstrations on the differences between improved and traditional practices and the resulting benefits. It will also promote public awareness, as well as further dialogue with relevant public organizations in order to explore ways of strengthening polices for monitoring and enforcing standards. The intervention will build the capacity of the Syrian farm workers, who will benefit from the gained knowledge on good agricultural practices and safety in farm operations and will apply that knowledge in the future.

2. **Enable poor Jordanian households to benefit from home-based cucumber and other vegetable production:** In this report, we highlighted the benefits of home-based small-scale cucumber and other vegetable production using green house technology. The proposed intervention aims to map out the poor districts of the Irbid governorate that provide suitable conditions for small scale green house vegetable production, particularly identifying sources of water, based on water harvesting techniques. Water harvesting can be achieved on a small land surfaces or on rooftops. The water can then be stored in constructed cisterns and used for irrigating green houses. The production is to be sold in the neighbourhood and local communities. This provides good income and fresh vegetable consumption to rural households and will increase the availability of fresh vegetables in remote rural areas. One greenhouse per family would be sufficient and the family can provide the required labour. The intervention involves capacity building, knowledge transfer, and injection of modest capital in the form of micro-finance or small grants to enable the investment needed for establishing the basic infrastructure. Marketing of the produce can be done through direct sales to consumers in the neighbourhood or through small local retailers.

3. **Enable the Jordanian women to benefit from added value activities of cucumber and other vegetables:** There is local, provincial, and national demand for pickled vegetables. However, there is a high risk for home-based operations, currently relying on the demand in rural areas, of completely losing their market as supermarkets expand. This intervention calls for aggregating women's home-based value-adding activities, where there are strong women's associations, into medium-sized operations that can adopt standard production protocols and effective marketing strategies. The profitability analysis of such operations is presented in Table 5. Such operations would empower more women to generate independent income and would improve rural livelihoods. This will require capacity development in standard processing protocols, marketing strategies, and collective management of the enterprise. It will also require modest investment for establishing the basic infrastructure. The intervention will strengthen women's collective action and group decision making, high standard processing practices, and book-keeping to be able to analyze the economics of the business.

4. **Enable the Syrian refugee families to increase their access to fresh vegetables and to earn income with green house technology:** So far, Syrian refugees are involved in agriculture as labourers and their participation in the production sector requires access to land by renting or through share-cropping. In this study, neither of these options was found. However, it is quite possible that both

are already taking place through informal arrangements. The intervention proposed here aims to facilitate access to land for agricultural production for Syrian refugees. Many Syrians are now working as agricultural labourers and have already relations within the communities they live in. It is possible for these Syrian families, if they have the means or support, to rent land or engage in share-cropping agreements. Modest resources will be needed to support Syrians so that they can meet the obligations of their contractual or rental agreement. The approach would be similar to the interventions described above, except the Syrian refugee families will lead it. Some civil society organizations (for example Idoun) have land, where the refugee families can establish green house production with some support.

5. **Enable Syrian refugee families to benefit from added value activities of cucumber and other vegetables:** The skills of Syrians in food processing are well known. In the course of this study, many Syrian women from refugee families were found to be pickling vegetables, of which cucumber is the main one. They sell these pickled vegetables among the refugee community and to Jordanians. This beneficial activity provides income to the women refugees. During the focus group meetings, the refugee women have shown their enthusiasm for this type of work. The proposed intervention is to build the capacities of refugee women in modern processing and preserving techniques of vegetables by establishing learning centers at different locations and in areas with large refugee populations. The women can then, as a group, make their products following standardized high quality procedures and sell to the local communities. It is envisaged that with sufficient technical and management skills and with sustained professional support, these centers can produce products that can compete with the mainstream market in Irbid. The gained knowledge will be a permanent human capital that will last for generations.

Small Ruminant Dairy Value Chain

Supply Side

The small ruminant dairy value chain includes the production, processing, and marketing of different milk products and their derivatives. On the input side, it also includes the feed and health aspects of the animals. The production, processing, and marketing of meat are part of the wider small ruminant value chain and are not covered in this report. However, the focus here is on the dairy value chain. The feed and health aspects are crucial for animal productivity of milk, both in terms of quantity and quality. Jordan produces over 320,000 tons of fresh milk (Table 7), 70% of which is cow milk, 20% is sheep milk and only 3% is goat milk. Other estimates put sheep milk at 30%, goat at 7% and cow at 63%. The production of cow and sheep milk was steady, with a slight overall annual growth of 2-4%. However, goat milk has been highly fluctuating, with strong drops in 2011 to 2013, but with a strong recovery in 2014, sustaining an overall negative growth in that period.

Table 7. Fresh milk production and growth rates in Jordan, 2010-2014.

Fresh milk by specie	2010	2011	2012	2013	2014	Shares
	tons	tons	tons	tons	tons	%
Cow	214,950	238,569	240,685	236,773	247,820	77
Goat	15,846	10,481	9,939	7,739	10,757	3
Sheep	58,574	57,866	59,806	62,630	63,868	20
Total	289,370	306,916	310,430	307,142	322,445	100
			Growth rates (%)			5 years average
Cow		11.0	0.9	-1.6	4.7	3.7
Goat		-33.9	-5.2	-22.1	39.0	-5.5
Sheep		-1.2	3.4	4.7	2.0	2.2
All		6.1	1.1	-1.1	5.0	2.8

MoA, 2017.

Analyzing the data in Table 7 revealed that dairy production was growing at about 2.8% per year for the 5-year period (2010-2014). However, although cow and sheep production mostly maintained significant positive growth, goat milk production was declining for 3 years in a row out of 5 years. However, it made a strong comeback in the last year. The positive overall annual growth of 2.8 % provides some comfort, however, the great volatility should be concerning and action is needed to maintain the competitiveness of the sector. The feed sector is one factor with a high impact on livestock production and actions are needed in this regard and for other important factors (see the recommendation related to this point).

The sheep and goat populations in different governorates are presented in Figure 6. Irbid has an important livestock population, accounting for 10% of the number of sheep, 9% of goats and 25% of the cows in Jordan. Sheep are the dominant small ruminant with over 217,000 heads registered in Irbid in 2017. Goats provide 7% of fresh milk and 25% of red meat, while sheep provide 30% of fresh milk and 60% of red meat. Moreover, rural families, especially women, play an important role in livestock breeding, where they are responsible for most tasks in animal care, milking, feeding and watering. Sheep and goat breeders rely mostly on open grazing during years of good rainfall, allowing the growth of natural pastures.

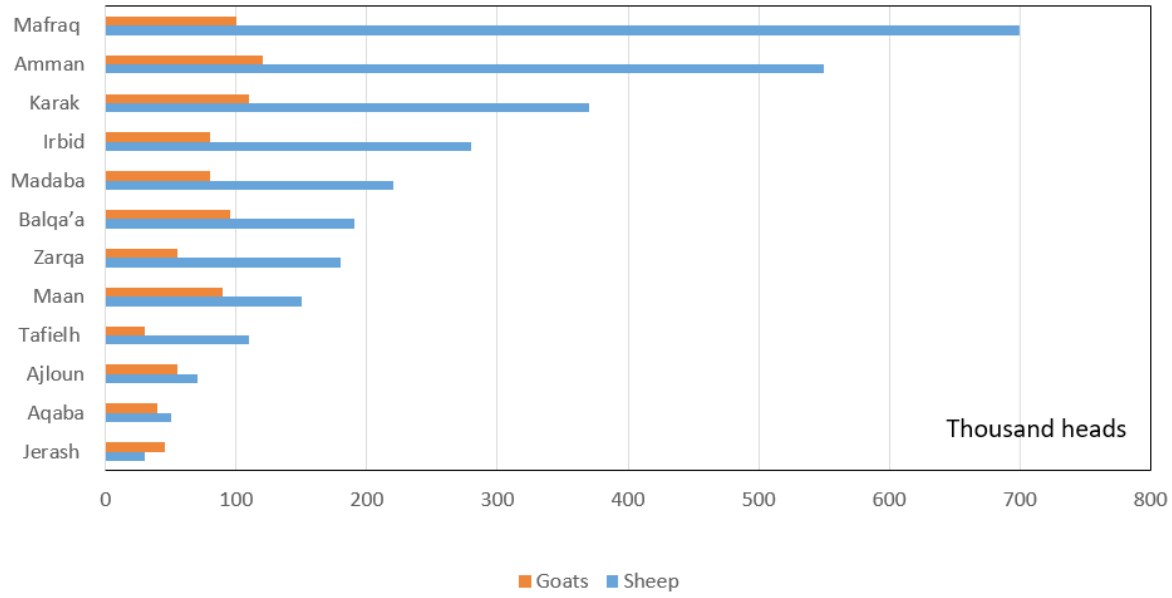

Figure 6. Sheep and goat population in Jordan, year 2016

Nomadic grazing has declined to less than 10% for sheep and goats, which belong to less than 5% of herders. Meanwhile, the ratio of semi-settled herds has increased to more than 70% for all sheep and goats. The main sheep breed is Awassi, which is a tough-wool, fat-tailed, and triple-purpose (milk, meat and wool) sheep. Very limited numbers of other breeds exist in Irbid, such as Najdi, Assaf, and Chios. Although the number of sheep and goats is increasing year after year, the area for natural grazing is decreasing. The main reasons are urban developments and climatic effects, such as drought incidences, which have been increasing in recent years. For example, the rainfall was 13 days in January 2013 with an average total amount of 150 mm; which then decreased to 11 days in January 2016 with an average total amount of 75 mm (https://www.worldweatheronline.com/irbid-weather-averages/irbid/jo.aspx.).

In this section, we will explore the sheep dairy value chain, its constraints, and opportunities for both Jordanians and Syrian refugees. Sheep and goats are often kept in marginal environments with scarce grazing and unfavourable climatic conditions. Resource-poor communities in Irbid mostly farm small ruminants due to lower capital investment and production. The short breeding cycle, short pregnancies, and good milk supply, suitable for household consumption or for sales, makes these animals attractive for resource-poor households.

Production Systems

Small ruminant production systems in Irbid vary depending on the agro-ecology, availability of grazing space, intensity of production and herd size. The large majority of producers are small independent family farms. There are two main viable small ruminant enterprises. The first type consists of small units of sheep and goats, which are kept within farms with a holding size of 50-200 heads, and micro units of 10 animals are mainly held in farms for household consumption. Semi-sedentary systems form the second type, with larger holdings of 200-500 heads.

The micro units of around 10 animals are intensive systems and include any animals kept for fattening. In this case, animals graze in the morning and return to their units in the

afternoon. The animals of such micro-units are kept either at zero grazing or limited grazing. However, our classification of small-scale production systems with holding sizes of 50-200 heads is the more viable and interesting enterprise that contributes significantly, if not exclusively, to household income. Small-scale producers are often located within the farming areas of Irbid, are permanently settled, and rely on grazing for 2-4 months. They rely on crop residues and purchased feed for the remaining 8-10 months. These producers are well settled and they operate commercially oriented enterprises, generating good income from the sales of milk and lambs. These small-scale producers directly sell milk or produce different dairy products for higher value. Examples of such operations are presented in Box 2. There is high potential for improving these small-scale SR production systems, as well as for giving poor Jordanians and Syrians access to capacities to acquire these productive assets.

The second system is the transhumant (semi-nomadic) system, where animals partially depend on natural grazing and on crop by-products. This is the main production system for sheep and goats in terms of the number of animals and the number of households depending on it. The transhumant system is quite mobile in searching for feed resources and has much larger flocks. The average holding range is 200-500 heads. They move to land adjacent to the fields, and return to spend the winter around the houses, where they are fed with a mix of straw, barley grain, and other concentrates. This system is more prominent in Ramtha.

Goats are common in Irbid and are generally kept in small flocks of 10-100 heads or mixed with sheep herds, which fall under the first production type. They are considered to be the major source of milk and meat for many poor households, consuming these products as well as trading within local communities. Goats have a higher milk yield than sheep. The local Baladi breed and the Shami breed are medium-sized goats and the most widely distributed dairy goat breeds. However, sheep are the pillar of the national small ruminant industry in Jordan, representing about 76% of the small ruminant population, as shown above in Figure 6. Some producers prefer goats because the feeding costs are considered smaller as they can graze on open lands for up to three months, rather than two, and they can reach longer distances than sheep. An example of dairy goat producer is presented above in Box 2.

Box 2. Two Dairy Sheep Farmers in Irbid.

Two sheep dairy farmers were interviewed in Alwasadiyah district in the Irbid Governorate, with an annual rain fall of about 400mm. Farmer #1 has 120 sheep, with 80 lactating ewes and farmer #2 has 130 sheep with 60 lactating ewes. These ratios are considered low, so either they have unproductive animals or young animals, which have not reached the productive level. Farmer #1 uses the services of a dairy processor for a fee of JD 0.25 /kg of cheese and gets his dairy products (cheese, yogurt, lebnah, jameed, ghee, and cream butter) and sells those to the local community. The conversion rate is 3-4 Kg of milk for1 kg of cheese, and 2.5Kg of milk for 1 Kg of yogurt. Farmer #2 farmer sells fresh milk to processors at the price of 0.7 JD per Kg. The price of cheese is 6 JD per Kg (this needs about 3-4Kg of milk at 0.7JD/Kg=2.1-2.8 JD+ commission of 0.25JD/Kg=2.85-3.8JD), and the value addition option through processing, even with processing service fees, gets extra 0.55-1.5JD/Kg of milk compared to no processing, resulting in 78% to 150% extra net income. Farmer #1 has 3 Syrian workers. Farmer #2 has retired from the military and is drawing a pension. He was content with this additional income, which he considered quite sufficient for his modest livelihood. He is not seeking added value of his milk by processing. He has only Egyptian or Jordanian workers. The feeding systems are traditional and animals are not fed for specific nutritional needs. These small-scale producers rely on open grazing for only two months per year, January and February, and use purchased feed for 10 months at the cost of about JD 5.0 per head per month. They produce about 22Kg of milk per day for 90 days, resulting in total revenue of JD1386 per seasons. In addition, they sell about 70-80 newborn lambs per year at the rate of JD85-120 per head depending on market conditions. They complain about high feed cost, uncontrolled imports of dairy products, particularly, powder milk, and the high mortality of young lambs, which may result in a 20% loss. An estimation of 50 smallholder dairy sheep and goat producers in this district, of which the majority (80%) are sheep owners (dairy goat herd 20%), range from 10 heads to 150 heads.

There are specialized goat producers scattered around North Irbid (for example, in the Al Wasediah district and the Alrafeed community (in the Benikenan district)) ranging from 10-100 goats. These communities prefer goats because goats consume less feed (40 Kg per month per head) than sheep, which consumes 45Kg per month per head. Goats can graze farther distances and for longer periods than sheep, up to 4 months, and they are more tolerant for walking on rugged landscapes. They can also give birth to twins, providing additional animals to sell. One clear advantage of sheep is the higher cheese yield, 6 Kg of cheese for every 10 Kg of milk, whereas for goats this drops to 3 Kg for every 10 Kg of milk. However, goats have a higher milk yield of 1.5-2.0 Kg per day compared to sheep yield of 0.5-1.0 Kg per day. The goats in these communities are mixed Shami breed and crosses between Shami and the local (Baladi) breed. Shami has a strong advantage in terms of high productivity, but is more susceptible to diseases, less tolerant to the rugged landscape, and requires more feed than Baladi. The experience with the Cyprus goats is not positive because these goats, despite having a high production yield, are not adapted to the Jordanian ecosystem compared with the Baladi. These goat producers process their milk at home for domestic consumption and for sales to the neighbourhood. They produce Labneh, cheese, jameed (dried yoghurt), butter, ghee, and Kishk. Currently, they do not encounter any problems in selling their products. However, they lack any guidelines for standardizing their products and thus risk losing their markets.

Feasibility of small-scale goat enterprise: A simple simulation model for small-scale goat enterprises is developed and the results presented in Table 8. This simulation assumes basic goat production indicators relevant in Irbid. These include investment in initial goats for 5 years either by loans or by grants, with a goat price of 150 JD per head, and flock growth of 20% a year to reach a stable size in year 5, with 100% births without twinning and replacement rate of 20% for the older does. Goats can graze common land and crop residues for 4 months without the need of significant feed supplements. For the remaining 8 months, the animals will be fed with daily amounts of 1.3 Kg of barley grain per head at a price of JD 240 per ton. Exceptions are goats sold for meat (old replaced does, young females and males), which are fed only for 3 months. The average price of sold animals is JD 130 per head. The milk production is 1.2 Kg per head per day for a milking period of 90 days. Fresh milk is sold at JD 0.45 per Kg and if processed their value can increase to JD 1.38 per Kg. The analysis considers five scenarios in the starting number of goat investments as: 10, 20, 30, 40, 50 heads, at purchase prices of JD 150 per head. These initial goat numbers increase until year five to about double of the initial numbers: 20, 40, 60, 80 and 100. After that point, these goat numbers are maintained. The income stream comes from sales of milk and dairy products, of the female births not used to increase flock size and flock replacement, all male births, and replaced old does. Family members provide the required labour.

The results of this analysis, presented in Table 8, reveal that investments in a small number of goats (20 goats and less) for fresh milk sales will result in a monthly family income not exceeding JD 300, starting only after the 6th year. The monthly income for the first 5 years is low due to fewer milking goats and partly due to some income diversion to pay off the initial loan. This low income in the first 5 years is an important disincentive for the resource-poor households to invest in goat production. Investments in larger initial goat numbers of 30 to 50 goats that double after 5 years, will generate income flow of JD 450 and JD 750, respectively, starting in year 6. However, poor households are unlikely to have the resources for this option.

The effects of grants and sales of processed dairy products, rather than selling milk, on income streams are presented in Table 9. When producers are given grants rather than loans, the income stream changes. However, the difference in the income streams between grants and interest free loans is not significant. The difference, however, is that farmers are much more likely to take the grants than seek loans for such investment. *Thus, development*

programs shall consider grants for creating economic activities in order to increase incomes of the rural poor.

When farmers process their own milk, rather than selling fresh milk, the income flow changes in a significant way. Under this scenario, the monthly income flows from small initial number of 20 and 30 goats can reach JD 630, and JD 950, respectively. That monthly income flow can reach JD 1,270 and 1,590 for investments in the initial number of 40, and 50 goats, respectively. These results are illustrated by the detailed description of the dairy goat producer in Alrafeed, Benikenan district, in Box 3. That farmer was milking 15 of his 30 goats and reported earnings of 900 JD/month, because he is processing and selling dairy products, rather than fresh milk. The difference is the high value of dairy products estimated at JD 1.38 per Kg compared with a milk price of 0.45 JD per Kg. These results suggest that development programs should develop the capacity of sheep and goat producers to process their own milk and to sell dairy products to increase their income. The formation of dairy processing units, providing processing and marketing services, where milk from sheep and goat producers is processed whilst livestock keepers retain the value of their milk, could lead to an increase in the number of farmers processing their own milk. Processing units are considered advantageous over home processing because the latter is more susceptible to lower standards and will face marketing problems.

One intervention that emerges from this analysis is to organize current dairy goat producers, by establishing interest group dairy facilities, by enabling the processing of their milk and by acquiring all the standard procedures for ensuring health and food safety standards in order to secure their market share and to gain higher income with lower costs. This will not be a cooperative facility, but it will be based on a user-pay approach by charging processing and marketing service fees to livestock farmers who will gain substantially from retaining the total value of their processed dairy. One farmer using such a processing service was reported earlier in Box 2.

Table 8. Analysis of the investment in small-scale goat enterprises in Irbid: simulation results.

Value indicators	Year1	Year 6 and after	Year1	Year 6 and after	Year1	Year 6 and after	Year1	Year 6 and after	Year1	Year 6 and after
Starting and ending number of goats	10	20	20	40	30	60	40	80	50	100
Total investment	1,500	0	3,000	-	4,500	-	6,000	-	7,500	-
Annualized Investment cost (over 5 years)	300	0	600	-	900	-	1,200	-	1,500	-
Annual Feed cost (barley price JD200/t)	827	1,760	1,654	3,520	2,481	5,280	3,308	7,040	4,135	8,800
Total annual cost	1,127	1,760	2,254	3,520	3,381	5,280	4,508	7,040	5,635	8,800
Total number of animals sold	8	20	16	40	24	60	32	80	39	99
Sales of male goats	650	1,308	1,300	2,615	1,950	3,923	2,600	5,230	3,250	6,538
Sales of female goats	374	753	749	1,506	1,123	2,260	1,498	3,013	1,872	3,766
Sales of replaced old ewes	-	523	-	1,046	-	1,569	-	2,092	-	2,615
Total sales of animals	1,024	2,584	2,049	5,168	3,073	7,752	4,098	10,335	5,122	12,919
Sale of milk	486	978	972	1,955	1,458	2,933	1,944	3,911	2,430	4,888
Total income	1,510	3,562	3,021	7,123	4,531	10,685	6,042	14,246	7,552	17,808
Net annual income	383	1,801	767	3,603	1,150	5,404	1,533	7,206	1,917	9,007
Net monthly HH income	32	150	64	300	96	450	128	600	160	751

Source: Authors' calculations.

Table 9. The effects of grant and sales of processed dairy versus milk on farm income.

	Year1	Year 6 and after	Year1	Year 6 and after	Year1	Year 6 and after	Year1	Year 6 and after	Year1	Year 6 and after
Starting and stable number of does after 5 years	10	20	20	40	30	60	40	80	50	100
Net monthly HH income with investment of interest free loans										
When selling milk	32	150	64	300	96	450	128	600	160	751
When selling own processed milk	116	318	231	637	347	955	463	1,274	578	1,592
Net monthly HH income with investment by grants										
When selling milk	57	150	114	300	171	450	228	600	285	751
When selling own processed milk	141	318	281	637	422	955	563	1,274	703	1,592

Inputs: In Irbid, as in the rest of Jordan, small ruminants depend on imported feed for their requirements. Natural grazing only supplies 15-20% of their requirements, as productivity has declined to half of its potential and the green fodder producing area has decreased. Most importantly, in the last 30 years, land use has shifted to olives, restricting open grazing areas. In areas where more extensive systems are practiced, as in the Ramtha district, availability of fodder and water were the limiting factors for the movement of herds. Nowadays, feed and water are transported to herds wherever they are, and it is also possible to quickly transport the herds themselves. In these systems, crop residues are a major source of feed, playing a major role in the animal feeding calendar, supplementing the natural grazing resources and natural vegetation in rain-fed areas. The crop residues include straw, stubble, and by-products of vegetables in the irrigated areas. In addition, sown forage production in the rain-fed and irrigated areas as well as barley grain and wheat-bran are used as the main feed sources.

Small-scale producers with 10 heads and above are allowed to register with the Ministry of Agriculture, which in return provides them with feed support. Each sheep or goat requires around 1-2 kg feed per day. The government provides subsidized feed to sheep and goat producers with specific monthly quantities per registered head, which farmers collect from the Ministry of Industry, Trade and Supply centres located at multiple sites in the Irbid

governorate. Farmers are responsible for the transportation and handling of the feed against a payment 175 JD/ton (8.75 JD for 50kg of barley), which is mainly barley grain, and 40 JD per ton of barley bran (or 2 JD for 25 kg).

The subsidized feed is provided to farmers at a rate of 15 kg/head/month with a subsidy of about 2.63 JD/head/month. Produces are not satisfied with the quantities and qualities of feed, because they are considered to be insufficient for their daily needs. The market price of barley is about 200-220 JD per ton. Relatively inferior feeds (compared to barley grain) cost 140 JD/ton.

Box 3. Dairy Goat Producer of Alrafeed, Benikenan

This retired customs officer has 30 goats, milking 15 at the time of the interview, with the rest being young. He started this business in 2001 with only 3 goats and reached 80 heads, but reduced the flock size because of a lack of grazing land, as the land is transformed and used for olive trees. He depends on his extended family of 25 people, including several brothers and sisters for labour. However, he considers a minimum of 100 goats to be a commercially viable goat production unit. In the same village, there are 3 Jordanian families with Syrian families who are working on small ruminants, on a 33:67 profits sharing basis. Hence, this is an open option. His goats are mixed shami and crosses between shami and local (baladi) breeds. Shami has the strong advantage of high productivity but it is more susceptible to diseases, is less tolerant to the rugged landscape, and needs more feed than baladi. He relies on open grazing for only 3-4 months and on feeding for the rest of the year. Goats consume about 40Kg of feed per month per head. The price of feed is JD10.5/50Kg (JD0.21/Kg) in the open market without subsidy; and JD 8.75/50Kg with government subsidy (JD 0.175/Kg). Sheep consume more than goats at 1.5Kg/day/head or 45Kg/head/month. Sheep milk produces higher cheese yields where every 10 Kg of milk produce 6Kg of cheese, whilst goat milk has a lower cheese yield of 3 Kg for every 10 Kg of milk. However, goats compensate with higher milk productivity of 1.5-2.0Kg per day compared to sheep productivity of 0.5-1.0 Kg per day. Another important advantage of goats is that they give birth twice a year, if well maintained. This increases the income potential of goats. Milk production is 20-25 Kg per day. Goats are milked twice a day (morning and evening). Kids are separated from their mothers after 2 months. Milk is processed at home, resulting in direct daily sales of 10 Kg/day at 0.5 JD/Kg and 5 Kg dehydrated yogurt (labneh) at 2.5 JD/Kg; weekly sales of 10 Kg of cheese at 6 JD/ kg and 2 Kg of Kishk at 15 JD per Kg; monthly sales of 4 Kg of ghee (1Kg takes 4 Kg of butter) at 15 JD/Kg and 8 Kg of Jameed (dried yogurt) at 15 JD per Kg. All products are sold to the neighbourhood. People making mansaf (common Jordanian dish) come and buy the products. About 30 new births and older replaced does are sold for meat at about JD 130-150 per head. This producer is making a gross income of close to 1400 JD per month against the operational expenses of about JD 500. The high net income (JD 900) is partly due to the fact that he is processing his own milk, which adds substantial value. However, he does not make all these products simultaneously, but he only makes a few per week and then shifts to others. The lady of the house processes all dairy goods, while goat milking is a shared activity across gender.

This farmer is quite innovative. He feeds goats with onion leaves after harvest and has discovered that this has a de-worming effect. He regularly uses this as a traditional remedy. He also solved the problem of losing newly born kids due to cold by putting them in a special room with heating for 15 days with their mothers. This practice helped him to cut losses of births from about 80% to almost none.

For veterinary services, livestock keepers depend on the public and private sectors. Overall, the feeding system is traditional and producers do not measure types of feed and its value against the performance and productivity of animals. They do not target any specific feeding regimes to particular animals based on their requirements, for example, lactating or pregnant animals which have specific needs. Extension services for livestock keepers are very weak

and producers do not have easy access to innovations in animal husbandry and management. In terms of labour, there is a clear gender differentiation for livestock work. Overall, women form the majority of the sector's workforce and are involved more than men in small ruminant production and processing. This should be taken into account when designing interventions.

Box 4. Dairy Goat Producer in Al Wasediah District, Irbid.

This young goat producer is located in Al Karach, 14 Km from Irbid, with about 400 mm annual rainfall. He started this enterprise with 20 goats in 2013 after working and gaining experience in a dairy processing unit. He has been gradually building this asset and currently has 130 goats, of which 40 are productive. The rest are young and will only reach full production after 2 years, at which time he expects to have 100 productive goats. He aims to increase his flock to 300 heads. This farmer prefers goats because their feed costs less than that of sheep as they can move long distances for grazing. The goats rely on open grazing for 3 months (January to April) without the need for supplementary feeding. They are handfed for the remaining 9 months. The feeding cost is about 20 JD per month for the whole flock including water. The current milk production is about 30-35 Kg per day for 6 months, with a productivity of 1Kg per head, which declines to 200 g per head as animals dry up. This farmer produces and also processes his milk with a basic processing unit and simple equipment. He lacks a refrigerator and other tools. The cheese is preserved in salt. Milk is processed into cheese at a rate of 5-8 Kg of milk for 1 Kg of cheese, depending on the season, where in the summer animals drink more water making the milk more watery, yielding a lower conversion ratio. Cheese is marketed to the local community and to small shops in the area at the price of 4 JD per Kg. With the demand for his products being quite high, the farmer is content with the operation and plans to expand it. The total revenue for this farmer is estimated at around JD 20 per day during the height of the milking season. If this producer reaches his plan of 100 productive goats, he will produce at least 10 Kg of cheese per day fetching daily revenue of JD 40. This is quite a reasonable income for a rural household.

Opportunity: The Al Wasediah district has only two processors, which indicates the potential for developing home-processing capacities like this farmer and for increasing the processing capacity of such entrepreneurs who can provide services to farmers. This will further increase the commercialization of sheep and goat dairy products, which are in high demand by local populations.

Feed: The main animal feeds consist of barley, corn, soya, and bran. In addition, barley and wheat straw are used for feed. Large-scale feed traders import those main four feeds. Small-scale traders buy the feed and distribute it through a network of local feed shops to producers. The current prices of the main feeds are given in Table 10. These small-scale feed traders have monthly sales of about 50-60 tons. The main feed sold is barley, accounting for 37%, followed by corn and bran, each contributing 28%, and soya with 7% share of the sales. Small ruminants are not offered any soya, but their diet consists of barley, corn, and bran. However, cows receive 20% of their diet as Soya. Unlike cows, small ruminants are largely kept as a traditional activity rather than as a business governed by input–output rules. There is a clear opportunity to provide small ruminant producers with the most effective feeding regime that can minimize their costs and maximize their incomes.

Table 10. Feed prices and blended feed composition for different species in Irbid.

Traders purchase and selling prices of major feeds				
Prices	**Imported feeds**			
	Barley	**Corn**	**Soya**	**Bran**
Purchase prices JD/t	180	175	300	140
Selling prices JD/t	190	200	320	160
Monthly sales Tons	20	15	4	15
Share of sales (%)	37	28	7	28
Feed traders' estimation of the components of one ton of blended feed for different animal species				
Animal species	**Blended feed ingredients (1 ton)**			
	Barley	**Corn**	**Soya**	**Bran**
Cows feed mix (Kg)	400	200	200	200
Shares (%)	40	20	20	20
Sheep feed mix (Kg)	500	400	none	100
Shares (%)	50	40	none	10

Source: field survey, 2017.

Performance: Intensive small ruminant dairy production is not wide spread in Irbid, but the results on existing farms are promising. The production level per sheep in a semi-intensive system is in the range of 0.4-0.60 Kg per day (Table 11). One sheep (ewe) produces fresh milk for around 100 days (March-June). In total, one ewe produces 50 kg of fresh milk per year. In the southern Mediterranean region, well-managed dairy sheep achieve a higher yield. The hygienic condition of milk production is an important issue. Livestock keepers practice manual milking, characterized by a lack of hygiene and sanitation, and they do not test milk for quality attributes. They do not have refrigerators and thus lack the capacity to store milk for more than one day.

Table 11. Description of Small Sheep Producers in the Different Governorates in Jordan.

Governorate	Milk production (Kg/head/day)	Milk production (Kg/head/ year)	Feed supplements (Kg/head/day)	Grazing (Kg/head/ day) In spring	Milk production (%)	Meat production (%)
Irbid	0.5	50	2	0.4	80	20
Mafraq	0.25	25	1-1.5	0	5	95
Jerash	0.6	60	1	0.5	70	30
Ajloun	0.6	60	1	0.5-1	30	70
Madaba	0.4	40	1-1.5	0.7	40	60
Amman	0.35	35	1-1.5	0.5	30	70
Karak	0.4	40	1	0.5	60	40

Source: Ministry of Agriculture (MOA), 2017.

Production Constraints: The small ruminant dairy production systems face numerous challenges and are not performing as well as they could. These challenges include socio-

economic, infrastructure and technical constraints that affect the development of the sector. The main constraints facing the sector are: (1) the high cost of feed due to poor feed availability and governmental controls on feed imports, which are sold (165 JD/ton) in limited quantities to registered producers, as well as a lack of grazing resources, which contribute 5-20 % of animal feed; (2) the prevalence of diseases and losses of newly born animals; (3) the high transportation costs for feed (6 JD/ton) and milk (0.1 JD/kg); (4) a lack of adoption of milking technologies (e.g., almost all small producers use manual milking); in feeding: traditional feeding system that does not allow equal distribution of feed are used; in processing, traditional equipment to transform milk to dairy products are commonly used, for example, they lack proper storage and cooling facilities contributing to spoilage of the milk in some cases; (5) a lack of institutions providing relevant information and technical support; (6) a lack of finance and limited knowledge on financial sources; and (7) a lack of knowledge-based farm management. For example, producers do not follow balanced feed rations, which include all necessary nutrients. Indeed, they often only use two types, barley and bran to feed their animals. Furthermore, producers often do not have adequate transportation and cooling infrastructure in rural areas that can lead to a loss of milk.

Marketing

For small ruminant producers, sheep are the main source of fresh milk. Small-scale producers perform milk processing, storage and marketing at their production units in Irbid. However, only limited amounts of dairy products are consumed at home, as the majority of these dairy products are supplied to the market through formal and informal market channels.

Most of the small farms do not have refrigerated storage/cooling facilities for their milk. Therefore, milk has to be collected twice a day, especially in summer, adding to the cost of collection. Furthermore, high temperatures in summer increase the deterioration rate of milk and hence collection becomes riskier without the use of refrigerated vehicles. It is reported that very little fresh milk was consumed (5% of total quantity: fresh milk and processed) or processed (10% of total quantity: processed milk sold to others) at home. However, the rest is sold to traders and processors. In fact, producers reported that milk production is profitable and they generally receive reasonable prices for their dairy products. In addition, most of the operational costs of the interviewees were for concentrate feeds, grazing land, veterinary services, and logistics.

In the survey, producers were asked about different marketing strategies and about their advantages and disadvantages in marketing their products. Producers mostly sell their milk through three main channels. They may partly or fully process the milk at home if they have a low level of production, they sell to shops and local processors in their neighbourhood, or they sell to milk collectors or labban who transport milk to different processing facilities around the governorate. Some small producers transport fresh milk and milk products to customers using their own trucks. However, transfers through milk collectors is the most common option as collectors can absorb large quantities of milk, are well connected to the market, and are very effective in transferring milk to the processing facilities. These marketing options for producers are illustrated by the participants in Figure 7.

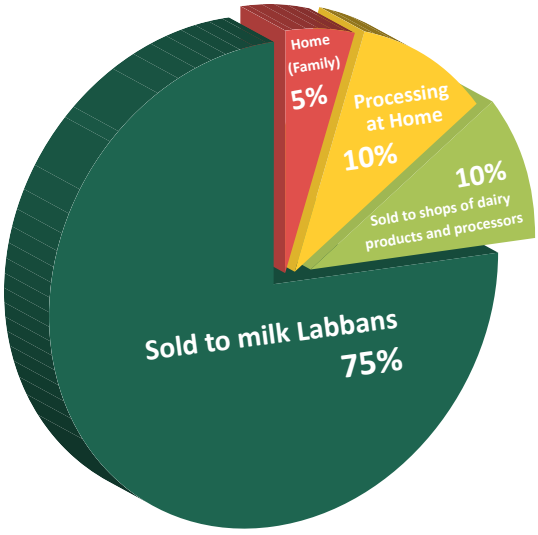

Figure 7. Marketing channels for small ruminant dairy producers in Irbid.

Four marketing strategies were reported and the advantages and disadvantages of different marketing strategies were summarized. ***Strategy # 1:*** *Producers directly supply fresh milk to households.* The advantages of this approach are the low costs of delivery as sales are mainly confined to the neighbourhood and loyal customers, who receive fresh and trusted products. The disadvantages were low prices due to a limited number of customers in the neighbourhood and difficulties of logistics in reaching more households, resulting in a limited market share. However, given that production of small-scale producers is not large, the possibility of selling all products in the neighbourhood is quite high. ***Strategy # 2****: Producers directly supply processed dairy products to consumers (households).* The advantages are loyal customers, added value, and a high profit. The disadvantages are high competition with the processing industry and low quality control. ***Strategy # 3:*** *Producers directly supply fresh milk to retail shops and processing units.* The advantages are the high quantity and stable demand, which results in a stable market. The disadvantages include low profit due to high costs of transporting small amounts of milk to these demand points would be inefficient and would have a higher per unit cost than traders who haul larger volumes; it also has low quality control. ***Strategy # 4****: producers supply fresh milk to traders (Labban).* Selling fresh milk directly to collectors (traders) is the most common marketing strategy for the majority of the large-scale small ruminant producers in Irbid, particularly in the Ramtha district where large flocks are kept. The advantages are high and stable demand and the provision of inputs on loan by the traders. The disadvantages are low profit, relative to the cost of feed, which is directly deducted from the milk sales, and low quality control.

The dairy VC map: The small ruminant dairy value chain is mapped in Figure 8. The market is semi-structured, where dairy products are supplied to different market agents through formal and informal channels both within Irbid, between Irbid and other governorates, and a few exporter destinations. The value chain consists of four major segments: production, collection, post-harvest processing, and marketing of the final products. In all these components, there is a fairly large number of operators, ranging from micro-units at household level to large-scale dairy factors. However, the bulk of this market is dominated by informal practices without any formal guidelines, licensing and regulations, with the exception of the large-scale industry, which is under statutory regulations. There is currently only one large-scale dairy processing factory in Irbid (Al Andalous, *see description below*). This market is dominated by small to medium enterprises with more traditional practices. The market agents in the dairy value chain include: input suppliers-sellers of animals (feed and veterinary services); producers-farmers and households; different kinds of traders, including milk collectors “Labban”, the processing units, dairy factories; small retailer shops, supermarkets, and malls; and consumers inside and outside Irbid. There are few exporters. The market system is the complex interactions of these different market agents, service providers, and government policy and programs. The production segment was discussed earlier. In the next sections, the main components of the value chain will be described, following the path of product from farm to consumers. Any constraints and opportunities are also analyzed.

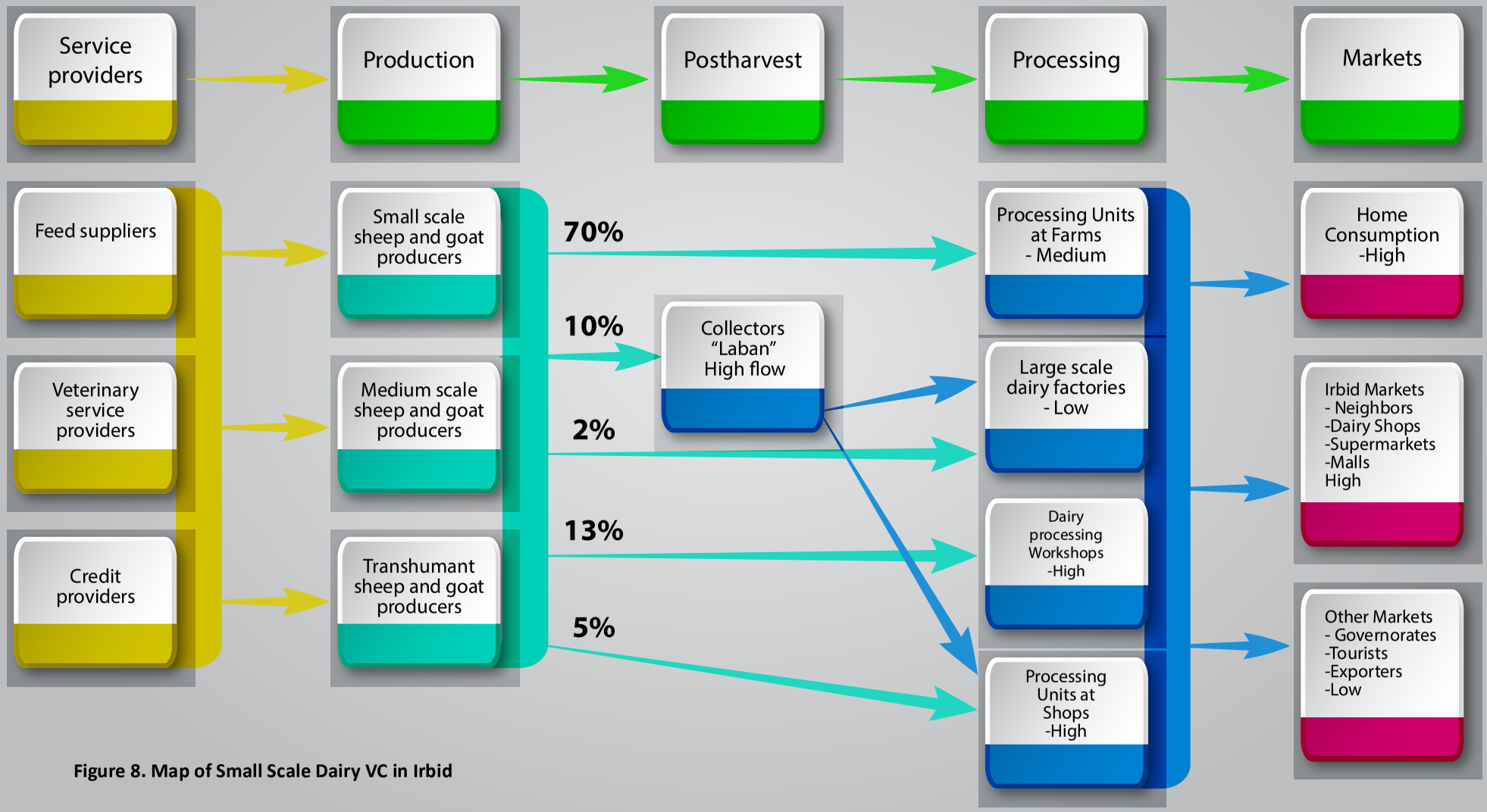

Figure 8. Map of Small Scale Dairy VC in Irbid

Collection: milk collection under the right conditions is critical for providing good quality milk and milk products to consumers and to processing units. Milk collection is dominated by an informal sector. Some farmers transport their milk and milk products to consumers or to processing workshops. However, specialized milk collectors, called "Labbans", perform the function of milk collection. Each "Labban" has a number of suppliers (producers), negotiates prices with farmers, and works independently. Fresh milk is collected without using refrigerated trucks and is stored in aluminium or plastic containers. They supply the milk to specialized dairy processing workshops, retail grocery shops with processing units, dairy processing factories, or individual households. This process runs its course without governmental control and regulations. The size of the informal market is quite significant and for some items, such as fresh milk, it is the dominant market. Formal commercial channels exist where milk collectors with licensed processing units and/or unlicensed processing units sell their collected milk or milk products directly to retailers, such as small shops, groceries, supermarkets, and malls in and around Irbid.

Quality deterioration of the milk in uncertified conditions, under which the Labban collects milk, and the lack of adequate storage facilities are major concerns. It is common practice to pour milk obtained from different farmers and of different quality into the same aluminium or plastic tank(s) mounted on a truck. It is not possible for the Labban to control the quality of the milk bought from each farm; the inspection tools are visual and olfactory. Some collectors use density meters and test acidity, only to be able to evaluate the overall condition of the milk obtained. These aluminium or plastic tanks used to transport milk are often insulated to keep the milk cool, if they had been refrigerated initially. Some farms are equipped with their own refrigerated collection or storage facilities using kitchen refrigerators of varying sizes. This capacity is usually sufficient for 48 hours and the farmers are required to sell their product within that period. Small farmers do not have transportation facilities; they deliver the milk directly to the mobile collection tanks owned by traders or collectors who have a collection center nearby. The collectors, Labban, provide loans to farmers for feed supply and other farm management requirements. These are good market-based services (credit) and provisions to farmers. However, it could provide an advantage to the collectors and to use it as leverage on producers, for example in price negotiations. Very few collectors process the milk themselves and they mainly specialize in collecting milk for processing units. In a few cases, collectors also collect other products, such as yoghurt produced at farm level.

Processing: There are many dairy-processing workshops of varying scales in Irbid. The dominant product for sheep milk is white cheese. Small and simple production and processing units are spread over many Irbid districts, which produce different dairy products. They mainly use traditional tools and sell to the local population.

Household processing: The preference of many rural and urban households is to procure fresh raw milk from their local farmers or collectors. They process it at home into mainly yogurt and labneh, and in some cases, ghee, jameed, and white cheese. If we consider that over 50% of the milk produced is purchased fresh and mostly processed at home, then it is natural to conclude that the first processor is the household level, and the highest consumed milk product is Laban "yoghurt", followed by labneh, and then white cheese, in that order. These processing units transform mainly cow and sheep milk; goat milk is also processed but in smaller quantities. Key results from the interviews highlighted that fresh milk, yoghurt, and labneh are mainly made from cow milk; and white cheese and jameed are made from sheep milk. The dairy-processing sector is one of the most promising opportunities for Syrian refugees and poor Jordanian households who do not have livestock assets. The advantage exists because the demand is high and this activity does not require major capital investment, only know-how and a relatively small operating capital.

Retail shops with processing units: Processing units can be part of small or medium size retail shops, non-registered small units working without official license, single semi

processing units with very basic processing equipment and with low level standards in sanitation and hygiene. In these types of processing units, almost all final inventories are unbranded, without returnable packaging, and with inconsistent quality.

Specialized dairy processing workshops: The most common processing units are small-scale processing workshops with a daily capacity of about 200-300 kg of milk. They often receive milk (both cow and small ruminant milk) from 2-3 farmers or from milk collectors. Fresh milk is processed into several different products. The most important products are: yoghurt, labneh (made from strained yogurt, which is thick and spreadable also called "yogurt cheese"), white cheese, jameed, butter, ghee and Kishk: burghul or cracked wheat fermented with yogurt (leban), usually from goat milk, presented in powdery form or dry biscuit type. It is easily stored and consumed in the winter. Each workshop is a client of specific collectors or owned by a collector. Some larger workshops (1%) have their refrigerated vehicles for collecting milk. They process some milk and sell some to other workshops. Whilst some have more advanced processing equipment, most workshops use simple processing units and equipment. Many of these workshops do not have licenses and their operational practices are unregulated.

Most of the products produced by these workshops are packed in bulk into plastic buckets. The processing units use non-recommended packaging materials, packaging material is considered expensive and the bags are usually re-used without sufficient cleaning. There are no means of controlling milk quality, except visually or by simple testing equipment. Furthermore, the government has no control over operations, including the used equipment, chemical use, packaging standards, and hazard analysis. The industry could benefit from improving standard procedures, proper packaging and quality control in order to qualify for Hazard Analysis and Critical Control Point or HACCP certificates (*HACCP is a management system by which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product*). These small-scale processing units need equipment upgrades in order to comply with the food safety standards and requirements. Such upgrades include: fridges for displaying products, air conditioners for keeping the room cooler, mesh doors for keeping out insects, heaters for processing milk after boiling, pumps for milk boiler, and water heaters for cleaning utensils. A potential intervention is to establish model dairy processing units in full compliance of food safety standards as training units. This is an option for Syrian refugees and poor Jordanian households (see recommendations).

Benefit-cost analysis of processing unit: Tables 11 and 12 present the accounting of a dairy processing unit, which produces dairy products, such as cheese, Labneh, and yogurt products. The table is an average representation of a medium-sized processing unit, which is operating for 6 months (milk production period of sheep and goats). As noted before, this kind of processing workshop is very common in the Irbid area. The cost-benefit analysis shows that the dairy processing units in Irbid are profitable. These are family-based businesses with hardly any external labour. The profitability calculations in these tables suggest that farmers will benefit a lot if they get engaged in milk processing. Cooperative models try to capitalize on this opportunity, but these cooperative models often fail. As discussed earlier, we recommend a market-based model, where livestock keepers pay a processing and marketing fee for the services whilst retaining a large part of the full milk value.

Table 11. Benefits and costs of small-scale dairy processing unit

Categories	Items	Quantity (KG)	Prices (JD)	Values (JD)
Costs	Total Fresh Milk	18,000	0.75	13,500
	Labour (person days)	400	8	3,200
	Other costs			200
	Water			?
	Electricity			?
	Total cost			16,900
Revenue		Products		
	Yoghurt	1,500	1	1,500
	Labneh	3,000	3	9,000
	Cheese	1,500	6	9,000
	Jameed	400	10	4,000
	Butter or Ghee	200	10	2,000
Total Revenue				25,500
Net income per season of 6 months				8,600

Source: Authors' computation from field survey

Table 12. Cost-benefit analysis of a dairy processing workshop in Irbid.

Cost/revenue items		Quantity	Price	Value
Fixed cost	JD/year	1	2000	0.5479
License	JD/year	1	35	0.0959
Additional daily cost		1		1.0000
Rent	JD/month	1	70	2.3333
Electricity	JD/month	1	70	2.3333
Water	JD/month	1	20	0.6667
Gas	JD/month	1	70	2.3333
Daily cost	**JD/day**			**9.3105**
Processing	Units	Quantity	Price	Value
Cow milk	Kg/day	150	0.45	67.5
Sheep Milk	Kg/day	80	0.9	72
Milk Cost				**139.5**
Total daily cost				**148.8105**
Products				
Cow milk				
Yogurt	Kg/day	95	0.6	57
Lebnah	Kg/day	6	2.3	13.8
Jameed	Kg/day	8	5	40
Shineenah	Kg/day	4	2	8
Butter	Kg/day	2	5	10
Sheep milk				
Cheese	Kg/day	20	5	100
Total daily revenue	**JD/day**			**220.8**
Daily net revenue				**72.0**
Monthly income estimate				**2,159.7**
Annual income				25,916.2

Source: Authors' computation from field survey

The risk for small scale and home-based processing: Currently, the home-based and small-scale processing workshops depend on the preferences of rural consumers, proximity and familiarity with the products produced within the neighbourhood. Malls and retailers sell highly standardized products, but these products are not widespread and most rural areas do not have easy access to these major retail chains. Therefore, small-scale dairy processing remains their main suppliers. However, the threat of the major retail industry to the small-scale processing industry is real and it is a matter of time before rural areas are also more widely covered. According to the retailers interviewed for this study, the retailers do not source from small-scale producers because they do not comply with the food safety regulations. Furthermore, they do not provide labelling or expiration dates. Major retailers agree with large-scale dairy suppliers to collect and take back all the products five days before the expiration date. Small-scale producers cannot afford to do that. In order to accept small-scale producers as suppliers they must provide labels, they need to have patch numbers from the department of standards and quality, they must maintain records, and they need to register with the Ministry of Industry and Trade (a process which requires registration with the Ministry of Agriculture, a local municipality license, registration with the department of standards and quality and with the Ministry of Industry and Trade). Small-scale industry also does not pay taxes, making their products cheaper. Therefore, action should be taken to improve the small-scale processing industry.

Large scale Processor: There is only one large-scale dairy-processing factory in the Irbid province, named Al Andalus, which only processes cow milk. The factory opened in 2015, backed by Syrian investors, who leased the facility from the Dairy Cow Producers Association. The current production is two tons per day. However, the plan is to reach full capacity of 15 tons per day, but this requires new equipment and further investments. Currently, only cow milk is processed because of its stable year-round supply. Over 20 farmers supply the factory with an average delivery of 100 Kg per farm. Farmers supply the milk themselves using their own vehicles. All farmers have on-farm refrigerators to keep the milk cool. They receive milk only up to noon every day and they do not accept sheep milk because it is seasonal. The milk price paid to farmers is 0.4-0.5 JD per Kg and agreements for price and quality are made with the producers. Prices do fluctuate and farmers are given prices commensurate with market prices. However, prices are not fixed prior to the season. The milk is evaluated for quality and the test indicators are pH, acidity, fat (3.3% is required), protein (3.1% is required), and incidence of chemical residues. The factory produces cheese, yogurt, shineenah, and labneh. It has distribution and marketing departments, distributing their products to many different retail shops in Irbid and Amman. The factory has 20 labourers in total, an equal proportion of male and female workers, and seven of these labourers are Syrians. A key informant pointed out that **t**he use of milk powder for processed dairy products is illegal in Jordan. However, people could be using it illegally. The use of milk powder is only allowed for the production of ice cream or chocolates, and similar products but not for dairy products. This factor considers the small-scale dairy processing units as its main competitors as the latter can afford to sell at lower prices. The factory has higher costs due to modern dairy machinery, costs of compliance with food safety regulations, and social security for employees, which small-scale workshops do not have. This results in higher prices of the factory, but achieves high-quality standards and consistent high-quality products.

Demand Side

Domestic demand: Jordan has a high consumptive demand of dairy products and this will continue to grow steadily, due to a population increase and personal income growth. There is high domestic demand for all dairy products. In particular, growth in jameed consumption has been reported. Jameed is a processed dairy product in the form of dehydrated yoghurt used for traditional dishes at social events and it is very popular with consumers in local and export markets. Jameed is exported to sizeable Jordanian communities in the Arab Gulf countries. Jameed imports from Syria were hampered by the Syrian conflict. Dairy products, including milk, yoghurt, jameed and white cheese, are in high demand as these are part of the daily household diet. Reliable and consistent data over multiple years is needed for a consumptive demand analysis, but this data is hard to come by. We examined the FAO data and data from the International Trade Center (http://www.intracen.org/itc/market-info-tools/statistics-import-product-country/).

Domestic Consumptive demand is the sum of the local production plus imports minus exports. Exports are negligible and we therefore use the first two terms. Using the FAO data for the years where both production (Table 13) and import data (Table 14) were available, we can see that demand is growing faster than production, except for the year 2013 with a recorded negative growth in imports. Data show that overall demand has been growing at a high rate (4-8%). However, imports were increasing at a much faster rate than the domestic production (Table 14). This should be concerning and measures should be taken to ensure that domestic production maintains a sizeable market share.

Based on the FAO data, self-sufficiency has been sustained at 90% for the years of 2010-2013 (Table 15). This is quite a high ratio. However, given the fact that imports are growing much faster than the domestic production, this share will certainly decline over time. When we used the import data from the International Trade Center (ITC), which is almost double the size of the FAO data, along with the FAO production data, we found that a self-sufficiency rate of about 82% (Table 15). Other estimates suggest that locally produced dairy products represent 50 % of the total demand in 2016. This is still substantial, given the natural resource limitations of Jordan, and shows a strong competitive advantage, which should be increased to maintain this market share.

In conclusion, the Jordanian dairy sector has a healthy domestic market share, which shows a competitive advantage for various reasons, including proximity and consumer preferences. This advantage should be maintained with investment, knowledge transfers, and effective policies. The small ruminant share of the dairy production is 23%-37%. This competitive edge of the Jordanian dairy industry is due to the consumer preferences for the unique small ruminant products. Imports do not have that competitive advantage. However, the small ruminant industry faces the risk of losing its advantages and people's preferences can change over time. The small ruminant sector must be modernized and made more efficient to remain viable.

There are 15 major importers of dairy products to Jordan, which are shown in Figures 9 and 10 (Source: International Trade Center (http://www.intracen.org/itc/market-info-tools/statistics-import-product-country/). These are led by Saudi Arabia controlling about quarter of the imports, followed by the United Arab Emirates and Egypt. These three countries are important dairy trade partners, accounting for 50% of the Jordanian milk and dairy product imports, followed by New Zealand (6%), and a group of six European countries (Belgium, Germany, Poland, Netherlands, Denmark and Hungary), which collectively account for 24% of the Jordanian imports.

Table 13. Value of fresh milk production in Jordan (tons), 2010-2014.

	2010 tons	2011 tons	2012 tons	2013 tons	2014 tons
Milk, whole fresh cow	214,950	238,569	240,685	236,773	247,820
Milk, whole fresh goat	15,846	10,481	9,939	7,739	10,757
Milk, whole fresh sheep	58,574	57,866	59,806	62,630	63,868
Total	289,370	306,916	310,430	307,142	322,445
Growth (%)		6.1	1.1	-1.1	5.0

Source: FAOSTAT, 2017.

Table 14. Milk and dairy products imports of Jordan (tons), 2010-2013.

	2010	2011	2012	2013
Milk, products of natural constituents	385	230	291	33
Milk, skimmed cow	466	3650	7266	9714
Milk, skimmed dried	12342	13728	18819	17664
Milk, whole condensed	995	818	458	598
Milk, whole dried	2698	2633	3586	969
Milk, whole evaporated	201	2685	3083	3211
Milk, whole fresh cow	344	621	1469	1556
Yoghurt, concentrated or not	2133	1869	2146	2106
Total	19,564	26,234	37,118	35,851
Growth (%)		34.1	41.5	-3.4

Source: FAOSTAT, 2017.

Table 15. Consumptive demand of milk and dairy products (tons)

	2010	2011	2012	2013
Production (FAO)	289,370	306,916	310,430	307,142
Imports (FAO)	19,564	26,234	37,118	35,851
Total demand	308,934	333,150	347,548	342,993
Demand growth (%)		7.8	4.3	-1.3
Self-sufficiency ratio	0.94	0.92	0.89	0.90
Import (ITC)			61,902	66,872
Self-sufficiency ratio using ITC imports data			0.83	0.82

The demand analysis shows substantial and growing market demand for milk and dairy products. Locally, Irbid does not produce enough dairy products for its own population and it imports more than it produces. Some districts do not have sufficient processing facilities and there the gap is even more pronounced. Therefore, an opportunity for increasing domestic production exists and further indicates that there is an opportunity for the poor in the local dairy production and in the processing sector.

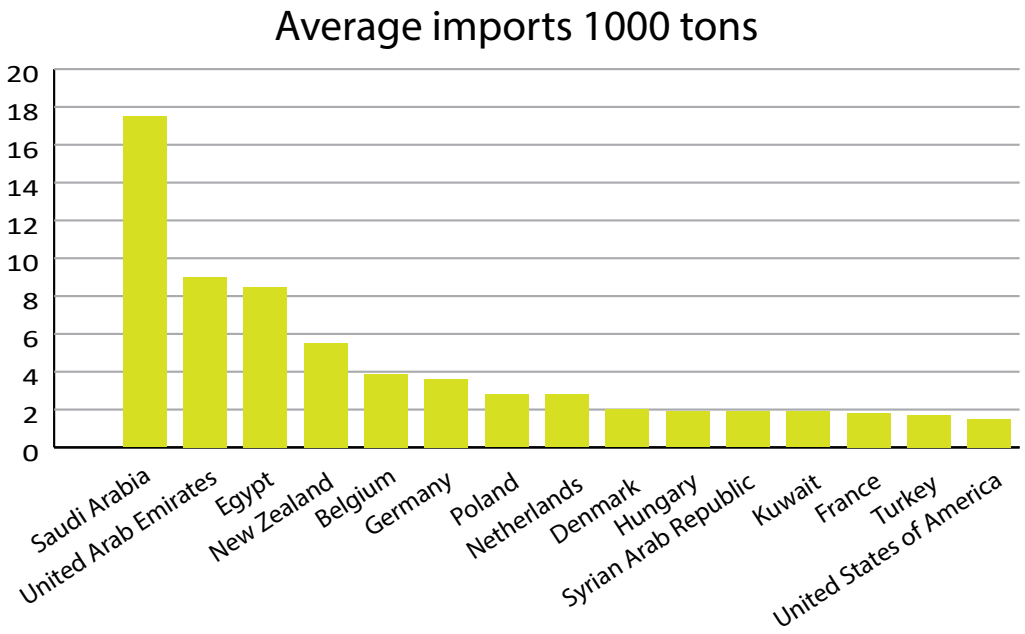

Figure 9. Average dairy imports of Jordan by country 2012-2016 (100 tons).

Source: CBI 2017.

Export demand: Jordan exports few dairy products, only about 2500 tons of skimmed dried milk according to FAO data. Other dairy products are exported in low quantities, but through informal means, such as tourists and visitors. However, there is a demand for jameed from the sizeable Jordanian expatriate community in the Gulf countries, which should be considered as an important market for Jordan's products.

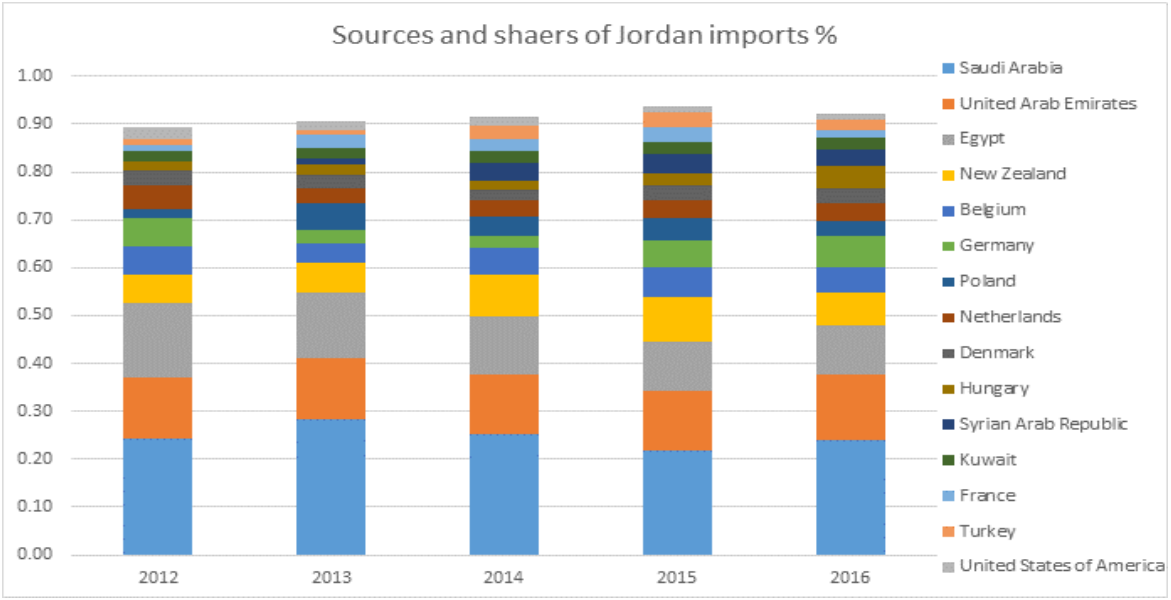

Figure 10. Average shares of dairy imports of Jordan by country 2012-2016.

Source: CBI 2017.

Recommendations

1. Increase forage production and introduce modern feeding management: Livestock production in general and dairy production in particular depend on a good supply of feed and forage products. Given the fact that feed for small ruminants is subsidized by the government, feed also constitutes a political issue. Currently, most feed is imported, which is not only costly, but is also highly unreliable in terms of prices and availability. On the other hand, grown fodder and forage crops are much better and healthier for the animals than imported concentrate feeds. To put this in the wider cropping pattern and policy context, Jordan does not have a comparative advantage in wheat production. However, with government support, wheat is grown on 23,000 ha (2014), but this only produces an insignificant fraction of the country's consumption. On the flip side, Jordan produces 50-80% of its consumption of milk and dairy products. Jordan grows about 39,000 (2014) hectares of barley, which is a major feed grain. However, unlike wheat, it is mainly cultivated in marginal and low rainfall areas. The production of forage legume crops is minimal. Therefore, the policy question is why support a commodity where Jordan does not have a comparative advantage (wheat) and why not shift that support to forage crops and feed grain production, which can support the more competitive dairy industry. In fact, an economic argument can be made that shifting current feed consumption subsidies and wheat production subsidies to forage production will have a substantial economic impact, particularly on the dairy sector. Two actions are proposed towards this challenge. The first action is to establish a dialogue with policy makers and to build the case for this proposed policy change. This will take time and requires significant rethinking of government policy, however, it can shape the country's agriculture in a big way. The second proposed action is to support small ruminant producers, particularly the permanently settled small-scale systems to adopt more advanced feeding regime, based on animal requirements and relying more on forage crops. Furthermore, if possible, contractual arrangements between landowners and livestock keepers should be made to grow and trade fodder crops. This will invigorate the domestic feed market and benefit the livestock sector. This will require knowledge transfer, training, and demonstration of the new feeding management. This farm-level intervention can easily reach out to all small-scale producers who are operating within the farming areas (see description in the production systems section). Regardless of the sources of feed (more grown forage crops or imported feed), small ruminant owners need advice to adopt modern feeding practices that can reduce costs and increase animal productivity. This intervention should be able to increase household income.

2. Improve livestock management: The productivity of the small ruminants depends on good management. This includes obtaining good genetic material, feeding management, veterinary services, removal of unproductive animals, as well as targeted feeding of animals based on individual requirements. The feed part is covered in recommendation 1. Here, we propose that a clear procedure for farmers to get access to improved genetic material should be implemented. Every producer we talk to raises this as a priority issue and producers know the value of improved genetic material. Therefore, we propose to reach out to NCARE and other institutions with improved genetic pools of small ruminants in order to develop this procedure. ICARDA can provide relevant technical expertise. This intervention will select a specific group of producers that demonstrate the impact of the intervention on stock performance. This group will function as a knowledge transfer hub for other farmers. This activity will influence how farmers think about their livestock enterprise and lead them towards a more commercial orientation. Improvement of animal health management will be part of this intervention, enhancing the producers' capacity to monitor animal health and to seek veterinary services. A cost-benefit analysis can be included as part of the overall management and can provide a simple decision-making tool for livestock keepers.

3. Build capacities of farm-based dairy processing units: as reported previously, some small-scale producers are interested in processing their own milk in order to add value and to increase household income. Some of these farmers built home-based processing units with rudimentary equipment and others use the services of commercial processing units. The findings of this study suggest that there is substantial local demand that the commercial sector is currently not reaching. Further development of these home-based units can increase income and make the food more accessible to rural neighbourhoods, which are not served by the commercial sector. The proposed action will first identify specific small-scale producers, like those described in this report, who have shown entrepreneurial skills to process and commercialize their own dairy products. Their physical (necessary dairy processing tools, refrigeration, milk fat separators, solar energy to reduce energy cost, etc.) and human capacities (science-based knowledge of dairy processing, new types of dairy products, standards in processing, hygienic practices, marketing and labelling, etc.) will be

developed to benefit their families and to provide services to others. This is not a collective action or cooperative type of intervention, but a purely market-based operation, where the increased capacity of the producer is utilized by the neighbour as a source of services and as a source of fresh dairy supplies. The idea here is to build the capacity of a dairy-processing unit (physical and human capacity) owned by a small ruminant farmer. This unit will provide processing and (if possible) marketing services to other small ruminant owners so that they can retain the high value added to their milk.

4. Empower Syrian refugees and poor Jordanian households to benefit from dairy value addition opportunities: Syrian refugees stand to gain the most from getting involved in dairy processing. There are civil society organizations that procure processed dairy products for their feeding programs to both refugees and poor Jordanians. For example, Idoun Community Based Organization, based in Idoun, uses 60 Kg of cheese daily for making popular cheese pastries (fatayir), which are distributed to schools and also used for other catering activities. Other local humanitarian associations conduct similar activities. For example, the humanitarian association (Amal) also procures 20 Kg of cheese per day for similar functions. Syrian refugees and poor Jordanian households without livestock assets can benefit from such opportunities. Specific actions can be taken in building the human and physical capacities of poor Jordanian households and Syrian refugees in dairy processing. They can start by supplying products to the humanitarian organizations, to their neighbourhoods, and then move to the mainstream market. These poor families can be organized in the form of dairy processing units. For instance, one dairy processing unit, with the capacity of 300-400 Kg of milk a day producing 100 Kg of cheese a day, can employ 40 Syrian workers mostly women for 240 days a year (at least 9600 person days of work a year). This will require dedicated space of about 10 X 15 meters with proper ventilation and proper dairy processing equipment (such space can be rented for about 100-150 JD per month). There is significant local demand by Jordanians as well as Syrian refugees, who have no easy access to dairy processing units. For example, there are none in the town of Idoun with 120,000 people (20,000 of which are Syrian refugees). The dairy unit will not only be used for employment and income generation for the Syrian refugees, but also for important capacity development functions. New dairy products can be introduced where both the Syrians and Jordanians can learn to produce these in their homes and in commercial dairy workshops.

Oranges Value Chain

Supply Side

Production: Citrus, oranges in particular, are cultivated in the Jordan Valley. Orange is an important crop for the Jordan valley farmers and a commodity of high economic value. About 40,000 tons of oranges are produced annually in the Jordan valley, most of which is grown in the Northern Jordan Valley in the Irbid governorate. Many varieties of orange are produced including Navel, Shamouti, and Valencia oranges. Citrus statistics are reported in Table 16. Different fruits are produced in the Jordan valley, including citrus, olives, apple, dates and banana on a total area of 9500 hectares. Citrus are cultivated on 5980 hectares, the majority of which is orange and 90% are grown in the northern valley. Citrus accounts for about 63% of the area cultivated with fruits in the Jordan valley. Orange accounts for 44% out of that citrus area, which demonstrates the economic importance of orange for the region's agriculture. The second most important citrus is lemon, covering 1400 hectares or 23% of the citrus areas in the valley. Many different types of oranges are produced. However, the navel variety is the most important, accounting for about 20% of the cultivated orange area. This is followed by red orange or pigmented (or blood) orange. The production of orange is mostly consumed locally and supplemented by imports to meet local demand. The Jordanian oranges are of excellent quality because of the favorable climate conditions and fertile soil in this area. It has a full sun exposure, suitable temperatures (-2^0 C to 38^0 C), and loamy and slightly acidic to neutral soils, suitable for orange orchards. The total annual orange production of about 51,000 tons consists of many different types of oranges, including local type (balady), navel, red orange, sweet orange, sour orange, shamouti or jaffa, and valencia. In order to meet local demand, imports are allowed outside of the main domestic production seasons. The fruit supply calendar and main orange types are presented in Table 17.

Table 16. Area, number and production of fruit trees in Jordan Valley 2015

Crop	Area Dunum	Total Number of Trees	Number of Bearing Trees	Production Tons
Total	95,153.60	4,705,657	3,752,029	0
Lemons	13,982.60	476,274	465,589	30,679
Oranges, Local	607	33,240	33,240	2,048
Oranges, Navel	11,532	385,986	374,343	20,920
Oranges, Red	4,230	137,414	135,035	10,668
Oranges, Valencia	2,724	89,339	87,719	5,177
Oranges, French	1,749	58,209	58,209	3,086
Oranges, Shamouti	5,165	165,397	164,796	9,205
Sour oranges	19	39,000	39,000	0
Clementine	10,237	331,258	330,734	21,031
Mandarins	5,314	170,844	170,844	10,896
Grapefruits	1,637	52,259	51,156	4,047
Medn. mandarins	26	851	851	63
Pomelos	2,603	85,145	85,145	4,638
Olives	2,223	75,021	67,746	1,682
Grapes	1,369	169,806	136,542	4,066
Figs	20	646	544	15
Almonds	0	3	3	0.1
Peaches	7	280	280	8
Plums, prunes	10	1,500	1,500	42
Apricots	43	1,455	1,455	42
Pomegranates	659	24,637	24,637	1,082
Pears	5	200	200	7
Guava	822	30,310	29,901	1,146
Dates	18,632	371,995	246,435	15,879
Bananas	8,835	1,017,106	691,611	46,495
Others	1,693.60	900,969	530,859	17,493

Source: DOS, 2017

The production practices of citrus in Jordan are classified as more traditional when compared to the best practices of international standards. With good crop management practices, average yields of about 30 tons of orange per hectare can be produced annually, whereas the Jordanian yields are about 30% lower or just 20 tons per hectare in the Jordan valley. The cropping system for citrus orchards is based on 300 to 500 trees per hectare and trees are usually spaced between 4-6 meters apart.

Table 17. Crop calendar of oranges in Jordan Valley.

Year\Month												
Fruit Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Main Activity	Harvest	Harvest	Harvest	Harvest	Irrigation Harvest	Irrigation	Irrigation	Fertilizers Irrigation	Fertilizers Irrigation	Harvest Spraying Fertilizers	Harvest Spraying Fertilizers	Harvest Spraying Fertilizers
Orange	x	x	x	x	x					x	x	x
Lemon	x	x						x	x	x	x	x
Grapefruit	x	x							x	x	x	x
Pomelo	x	x	x					x	x	x	x	x

Orange farms in Irbid are mainly medium-scale producers, who own up to 10 hectares. Those farmers are specialized in citrus, but they also grow other crops on about 30% of their land. The orange plantations contain a total of 908,585 orange trees with 760,935 fruit bearing trees, producing 9,000 tons of fruits. Table 18 contains estimated growing area sizes and production yields of different orange varieties in the Jordan valley.

Table 18. Citrus Fruit supply in North Jordan Valley

Oranges Types	Area (ha)	Production (Tons)	Description
Navel	1,153	21,000	Navel is the most commonly grown orange, it is sweet and tangy with a thick, lighter orange peel. It is also seedless and it can be eaten fresh or used for juice. Navel is produced between October and June.
Shamouti	516	9,000	Sweet flavour and minimal seeds with a tough deep peel. It is eaten fresh rather than used for juice. Production is from January to May.
Red	423	11,000	Pigmented (or blood) orange and Succari (Sweet) are produced in smaller quantities.
Valencia	272	5,000	Usually seeded oranges with a thinner peel than the Navel oranges. They are ideal for processing to juice and are produced from October to March.
French	175	3,000	Sweet flavour and minimal seeds with a tough deep peel.
Local	61	2,000	Local (balady) oranges have a sweet and slightly sour taste.

Figure 11 shows the orange production trends during the period of 1961-2012. In spite of the high variability, production has been on an upward trend since 1997. Currently, Jordan produces about 50,000 tons of orange. Production has been growing since the early 1960s. In 1961, Jordan produced just over 10,000 tons. Production has been growing since despite some high fluctuations. From available statistics, it appears that production has dropped since 2006. The fluctuations of production are quite dramatic, for example, in 1965 it reached over 35,000 tons before dropping to 5000 tons in 1971. In 1981, production reached about 32000 tons, but dropped in 1982, and so on. The last major drop was in 2007 when it dropped from over 40,000 to around 30,000 tons. Many factors have contributed to these fluctuations. Some of these were related to socio-political sensitivity and stability in the area, affecting farm activities. Others were related to constraints in natural resources,

including water shortages. In addition, there is a trend of selling farmland to new owners, who have no farming experiences and who use the farm for leisure without commercial considerations. Furthermore, producers are moving toward more profitable cash crops, such as vegetables or high-value products (e.g., dates).

Citrus plantations in the Jordan Valley use surface irrigation systems and only 9% are covered with drip irrigation systems. Although drip irrigation is considered to be best practice for citrus, the majority of farmers are still applying traditional irrigation practices. Many interviewed farmers believe that drip irrigation is inadequate and insufficient for watering the trees due to poor designs of the drip irrigation system.

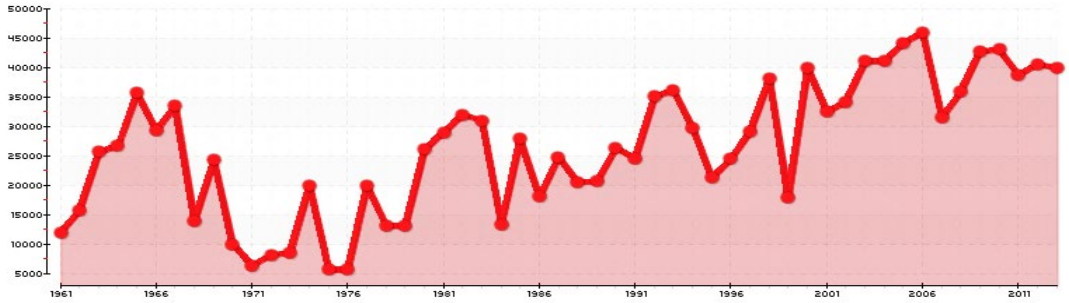

Figure 11. Orange Production in Jordan, tons, 1961-2012, DOS, 2017.

A typical orange plantation requires 5000 m^3 of water per year per hectare. The source of irrigation water is from the Ghor canal in the Jordan Valley, which is described as a low quality and low price (0.07 JD/m^3) water source. However, water supply from this source is available all year round. The most commonly used irrigation system is surface irrigation. However, there is a trend towards drip irrigation, which is more efficient. The high temperatures, high winds, and low relative humidity increase the frequency of irrigation in the summer. Pruning, spraying and fertilization are applied to the orchards to maintain productivity and to protect them from different diseases. Trees need to be pruned once a year. Chemical pesticides are used to spray the trees 5-7 times per year using a small tank with pesticide solutions. These applications are used to control diseases, such as lichens, gummosis, die back, citrus brown spot, aphids, white fly, navel rot, scale, and mealy bugs. Fertilization is usually applied three times a year using manual tools to apply nitrogen (150 kg/ha/season), followed by potassium (150 kg/ha/season) and phosphorus fertilizer (150 kg/ha/season). Improvements are needed in farmer practices, such as irrigation system, fertilizer application, pest management and adoption of new orange varieties. These improved production technologies could substantially improve productivity and the quality of orange produced.

Cost-benefit analysis: Once the basic infrastructure of the land has been established, orange is a profitable crop generating an annual net profit of about JD 8300 per hectare (Table 19). The fixed costs include seedlings for planting and the irrigation infrastructure. This amounts to an annual cost of JD 1600 per ha or about 32% of the total running cost. Chemical applications (fertilizers and pesticides) amount to half (49%) of the running cost. Irrigation water, at the rate of JD 0.7 per cubic meter for about 5000 cubic meters per year, costs JD 350 per hectare, which is only 7% of the total running costs. Ironically, farmers complained about the cost of water but not about the cost of chemical applications. This shows a commonly held perception that, unlike other inputs, water is something that should be free. As noted above, there is a clear opportunity to improve the production and management practices in order to increase productivity and competitiveness of oranges in the study area.

Table 19. Benefits and costs of orange production in the Northern Jordan Valley, Irbid.

Item	Quantity	Prices (JD/unit)	Cost/revenue (JD/dunum)	Cost/Revenue (JD/ha)
Fixed Costs				
Tree seedlings	36	6	200	2000
Irrigation System	6	50	300	3000
Various Tools	3	100	300	3000
Total (over 5 years)			**806**	**8060**
Annualized fixed cost (@ zero interest rate)			**163**	**1600**
Variable Costs				
Manure	1	50	50	500
Fertilizers	4 types	50	150	1500
Pesticides	5 types	25	100	1000
Irrigation water units	500	0.07	35	350
Mechanical work	2	10	20	200
Manual Work	1	150	150	1500
Total			**505**	**5050**
Total running cost			**668**	**6680**
Revenue				**0**
Class A (Kg)	1000	1	1000	10000
Class B (Kg)	1000	0.5	500	5000
Total Revenue			**1500**	**15000**
Net Income			**832**	**8320**

Source: Authors' computation based on field survey

Marketing

Farmers mainly use middlemen to sell their oranges in different markets. There is high demand for fresh citrus fruits at reasonable prices. Middlemen traders, also called contractors, make contractual arrangements with farmers and use their good know-how and trade experience to buy the whole produce in advance. These traders harvest the crop and sell in various markets. The contractors are interested in citrus production, because, for the last four years, citrus has been of good quality and increased production. This is particularly the case for the citrus fruits of the northern Jordan Valley. Another main reason is that the Ministry of Agriculture is protecting the domestic production by limiting imports in specific time windows to allow for the marketing of the local production. This guarantees that the local production fetches a good price in the local market.

The products and their packaging are still traditional. Most of the farmers target the wholesale markets, which do not require high packaging standards. Few farmers use carton packaging with labeling, which is required by many retailers and is attractive to many consumers. However, most farmers use polystyrene packaging without grading or good sorting.

Most of the labourers are Egyptian and farmers require 1 labourer for every 2 hectares in addition to seasonal labourers hired especially during the harvesting period from November to March. Each farm has a field manager who manages labour and assigns tasks. Extension services or other agricultural bodies do not offer much training or crop husbandry guidelines.

Syrians are not allowed to work in the North of the Jordan Valley due to security procedures.

The trends in the various marketing strategies and channels followed by the citrus producers are illustrated in Figure 12.

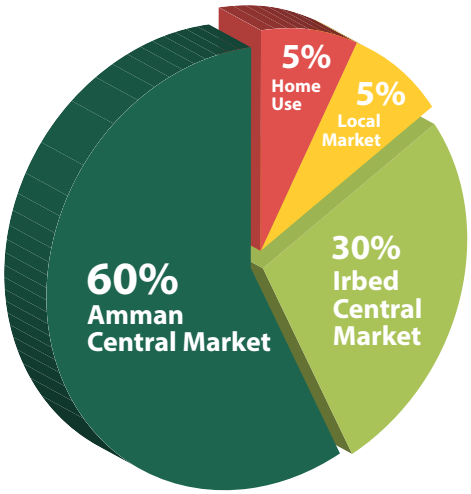

Figure 12. Key Marketing Strategies and Channels for citrus fruits

Citrus value chain map: The orange value chain is characterized by formal and informal market channels. Figure 13 shows the orange value chain map in Irbid, with links between the key actors and their functions, interactions, and service provisions. The actors in this value chain include input suppliers - plants and chemical sellers; producers - farmers and householders; traders - collectors, the processing industry; retailers - small shops, supermarkets and malls; wholesale market and consumers inside and outside Irbid. There are very few connections to export markets.

The orange supply chain can be divided into two main segments. The first is the primary production stage, where famers, mainly smallholders, are the key actors. The second is the trade or marketing segment, which takes the produce from farms to consumers. Different types of producers cultivate oranges and these include smallholder farmers and aggregators, who are large-scale farmers. There are very few vertically integrated producers combining production and processing industry. The orange produce is delivered to consumers through small and medium retail shops, local street stroller retailers, and supermarkets. Naturally, producers do the cultivation, crop husbandry, including tillage, irrigation, fertilizer application, control diseases and pests with chemical spray, pruning, and either harvest on their accounts or sell the fruits on trees to contractors (collectors). Input and service suppliers work very closely with producers, providing inputs such as seedlings, fertilizers, pest control chemicals, and tools that are required for production. Most oranges in Jordan are consumed fresh and there are no major processing activities. Given that Jordan's production only partially satisfies its fresh fruit demand, processing does not have a comparative advantage. In any case, processed orange products are imported in bulk from major international brands, which are very competitive and there is no advantage for Jordanian production. However, the fresh fruit market is quite lucrative and will remain attractive for Jordanian producers.

In the marketing segment of the value chain, the main actors are contractors or collector-traders, wholesale traders and retail traders. The contractors (collectors) collect oranges from farms, aggregate supplies, cool the oranges if required, and transport the produce to the wholesale market or other markets for sale. These contractors form the main marketing channel from the farms to the wholesale markets in Irbid and Amman. The contractors agree a price with the farmer to buy the fruits on the trees and take responsibility for harvesting, packing, transporting, and selling at the wholesale market. At the wholesale markets, the produce is sold in a bidding process by wholesale traders, who have offices at the market. The wholesale traders charge 5-7% commission for their services. Some traders are also contractors who bring their produce to the market. The wholesale traders also sell produce for farmers who prefer to harvest their produce and sell it directly. All retailers (retail shops, street stall vendors, small and grocery shops and supermarkets) send their agents to the wholesale market and procure their supplies through the bidding process managed by the wholesale traders. The process appears quite transparent and prices depend on demand and supply.

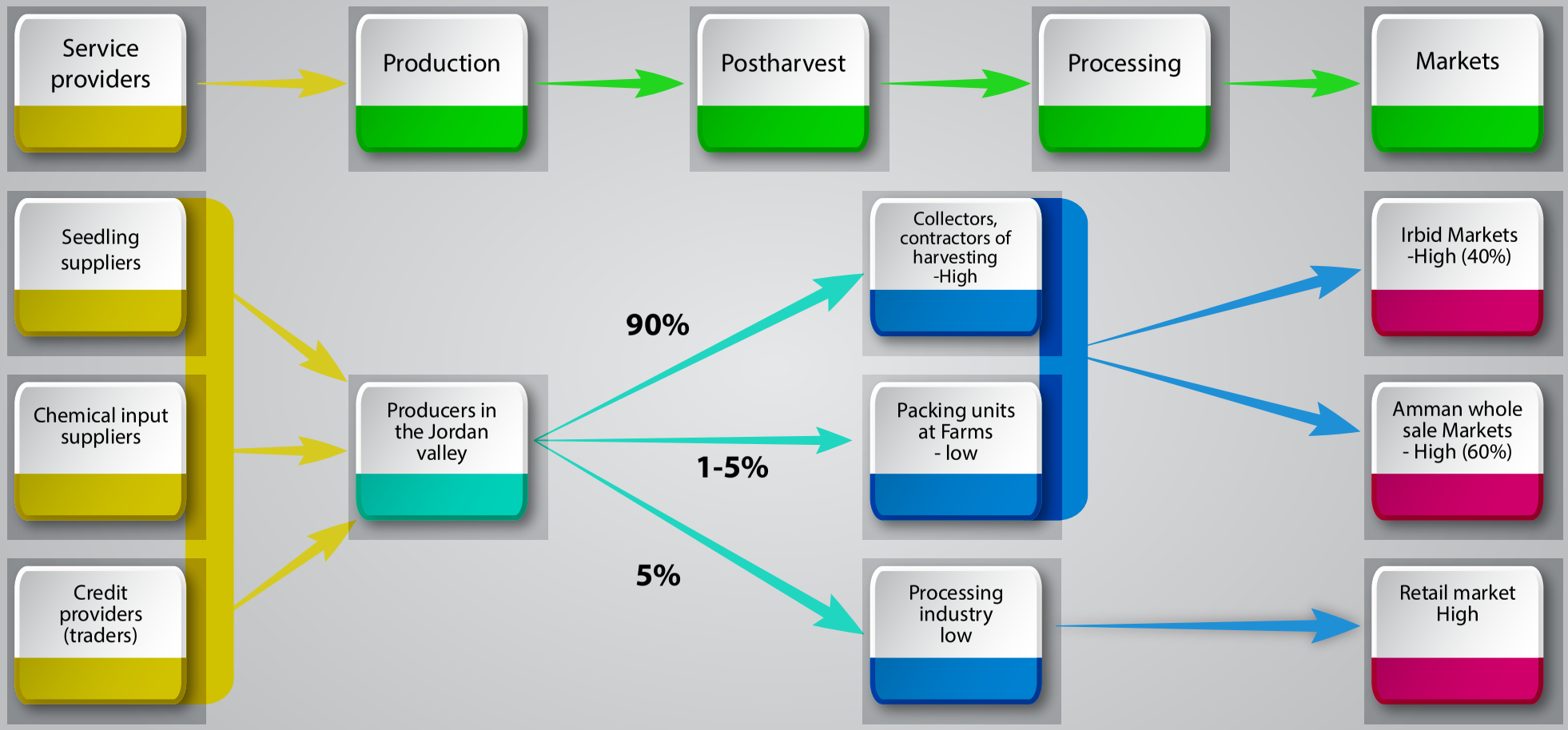

Figure 13. Map of Orange Value Chain in Irbid.

Overall, 90% of the production is delivered to the wholesale market in Amman or Irbid, 5% is processed, and only 5% is delivered to retailers. The advantages and disadvantages of these marketing strategies are discussed below.

Supply of oranges directly by producers to wholesale market in Irbid and Amman: the advantages are high and stable market demand, immediate sales of the produce, input support by traders in the market as advance payments or loans, and reasonably good prices. The disadvantages include high transportation costs, the lack of a cooling chain, the payment of a commission to wholesale traders, and traditional packaging using of polystyrene boxes, which can affect fruit quality.

Supply of oranges to retailers: the advantages include higher prices than wholesale markets, agreements on the delivery of supply, and better quality control. However, the disadvantages include low quantities due to limited daily demand, high competition due to availability of many suppliers, and high transaction and logistics costs of delivering small quantities to many places.

Supply of oranges to processors: there are very few producers (up to 10) who supply to the only local juice factory in the northern Jordan Valley. This is a very small part of the production, however, its advantages are the high added value of the product, prior agreement on quantity of supplies, better quality control, and better prices. The disadvantages, however, are a limited number of processors, limited availability of advanced technology, and high competition from imported products.

Selling production on trees to contractors (collectors). During the last four years and especially after the Syrian crisis, the reduction of Syrian imports has resulted in a greater interest to market Jordanian oranges and to also occasionally export them. In addition, the government has stopped any imports during the local production, which further strengthened the marketing of local orange production. This situation has encouraged many investors (contractors) to buy the orange fruits at the beginning of season before the harvest. This strategy became prominent among many producers and has provided advantages for farmers in terms of early financial return and low market risks as they sell products at the beginning of the season. The disadvantage is that prices may be lower than the market value. Farmers also complain about inappropriate practices used by contractors during the harvest, affecting the farm activities in general.

Post-harvest: Producers do not store the harvest as they transport it directly from the citrus orchards to the packing house. Before packing, a very limited number of farmers clean and wash oranges, removing dirt and pesticide residues. Manual tools are used in harvesting to pick fruits, such as ladders and short or long manual clippers. Plastic crates holding 20 Kg each are utilized for packaging. Quality is a major factor affecting the value of oranges and packaging plays a role in that. The damage resulting from inappropriate containers, such as bruises and skin damage, will affect product quality and consequently its market value.

Cool storage facilities constitute another important issue in citrus fruit production. These facilities are required to enhance the quality attributes of oranges, such as shelf life. Only a very limited number of producers have cooling facilities next to their farms, while other small-scale farmers raised the lack of any cooling storage services located near their farms due to high infrastructure costs and limited know-how. However, such facilities are available at the major wholesale markets and retailers located in Amman and are used to store the fruits under the required conditions (temperature and humidity). The recommended storage conditions for oranges are temperatures of 4-8^{0}C and relative humidity of 88-90% for a period of 8-12 weeks. Storage usually happens for short periods (i.e., weeks) when traders or producers are anticipating higher prices. In addition, they also keep produce for agreed export outlets.

Processing: There is a limited number of orange processors. Only one fresh juice factory is operating in the Northern Jordan Valley. Other juice factories are located in Amman and also in other governorates, such as Zarqa. Limited quantities of the Jordanian oranges are processed (about 5%). However, there is a processing industry producing different kinds of orange juices, available on the market, using imported frozen products to reconstitute liquid juices. One farm, described in (Box 4), has vertically integrated operations with both production and processing. The fresh juice factory is located in the Northern Jordan Valley. The farmer initiated this operation as a way of increasing income from the fruits by adding value to his fruits. Although this specific case may be profitable, Jordan with its low production and high demand for fresh fruits has a much greater comparative advantage in the fresh fruits market than in processing, which is dominated by other more competitive suppliers. All types of juices from different suppliers with facilities and distributors operate highly competitively in Jordan.

Box 5. Vertically integrated orange farm in the Jordan Valley

The owner has 30 hectares of orchards cultivated with 15 different kinds of citrus types. The majority of these fruits are oranges, lemons, grapefruits, and clementines. These orchards have 2888 trees of Valencia oranges, which are produced from January through May; 1016 trees of local oranges; 524 trees of clementine and 3000 trees of lemons. In 2003, the owner started the establishment of a juice factory. The fixed costs were 1.2 million Jordanian Dinars with full cooling and storage facility with a capacity of 0.5 million liters of juice. The production capability is 1,300 tons. Production of 120,000 tons of orange Juices requires 1 million kg of oranges from other farmers with an estimated value of 400,000 JD. In order to facilitate the transportation and market access, the owner has one distribution center in Amman as well as three cooled vehicles. This farmer is innovative and can play a part as a model farmer for other farmers, he has installed drip irrigation on 40% of his land, and has never used chemicals in 10 years. He is proud of his 65-year old and productive orchards. One of the key factors in his success is the smart marketing where he has a distribution center in Amman directly supplying to retails shops, selected hotels such as Intercontinental, and coffee shops such as Starbucks. He also dries orange peels and sells it as animal feed.

Small-scale processing for making jams and other products is also a possibility. One successful case of jam making is presented on Box 5. However, there is limited scope for this type of processing. This case, presented, in box 4 is built on a large social network, strong personal determination, and an institutional buyer, securing a stable market. Such successes cannot be easily replicated.

Demand Side

Domestic demand: There is vigorous domestic market demand for oranges in Jordan. The country has a competitive advantage for citrus production because of the unique production in wintertime in the Jordan valley. There is high demand for oranges in October to March due to consumers' expectation of fresh local oranges, corresponding to the local harvest season. Demands fall in the second quarter (April-June) of the year. Jordanian consumers prefer fresh fruits and some prefer making juice at home. The domestic production of fresh oranges in Jordan satisfies only 65% of the total demand and thus imports are needed to fill the gap. Jordan imported about 36,000 tons of orange in 2012. This has dropped to 26,000 tons in 2016, or by 26%, with the main reason being a precipitous decline in imports from Syria by 20,000 tons, or by 85%, compared to 2012 levels. The gap was partially filled by increased imports from Egypt. Egypt is by far the largest exporter of oranges to Jordan, supplying 81% of the total Jordanian imports in 2016. The Egyptian dominance of the Jordanian orange import market is strengthened by the cessation of imports from Syria. The dominance of Egypt is also due to low transportation costs and the availability of preferred orange varieties, for example, navel orange. Other countries like South Africa, Spain, and the Palestinian Territories are minor players in the Jordanian orange import market. The

rapid drop of the Syrian orange exports to Jordan is another example of the high short-term vulnerability of the region's trade to instability.

Orange prices are affected by production, transportation, and commission costs by marketing agents (usually the collectors), who play a major role in price determination. They sell oranges at different prices in rural and urban markets, in the range of 1-2.5 JD per Kg. The domestic price of orange is expected to increase in the next five years, as perceived by 65% of different stakeholders surveyed for this study. People in Jordan prefer high quality oranges and the majority of people would buy high quality products with good prices and good packaging. Consequently, orange production in the Jordan valley has remained stable in recent years and this production is enough to satisfy domestic demands during the harvest season. However, imports are needed to fill the gap between supply and demand in Jordan. Table 20 shows the imported volumes of oranges from different countries. It is clear that imported quantities from Syria have been precipitously declining since 2014 due to the Syrian crisis. A total of 27,000 tons are imported mainly from Egypt, Syria, South Africa, and Lebanon.

Box 6. Successful Case of Processing Orange Jam

A woman from the Northern Shona started her new orange processing project idea. The idea was to collect large quantities of orange peels from a juice factory in the northern Shona farms to process it into orange jam rather than wasting it. She has been able to produce and create a variety of products, showing the potential of creating job opportunities for local people in the area and particularly for women. The main opportunity is the creation of jam products. However, other products can also be created including cosmetic products, orange essential oils that are used for health and natural flavoring agents. She processes around 1000 units of 1 kg per day and prepares them for sales to contracted retailers and social networks. She gets knowledge and expertise from self-learning and family relatives and also mainly from training courses provided by donors. She is looking to expand her market to cover more areas in Jordan and also to export. However, this will require improving the current factory in terms of machines, cooling area, and distribution system. She is also looking to have pioneer production line for orange oil, orange cosmetics, orange spices. However, this idea lacks the financial and technical support. Suzanne, in collaboration with the Vocational Training Institute, trained the region's girls on the basic skills of the citrus peel industry to start their own businesses and to provide livelihoods for their families.

Consumer demands and preferences are vital parameters in order to achieve a competitive advantage, to increase production, and to improve the quality of oranges. Consumer preferences are expressed in parameters such as taste, color, shape and size attributes, as well as cost. Producers should know which market segments demand what attributes. These market segments include restaurants, small shops, supermarket chains, institutions, etc. Once preferences of different market segments are known, producers can target these markets with the right product.

Table 20. List of supplying markets for fresh or dried oranges imported by Jordan.

Exporters	2012 Imported quantity (tons)	2013 Imported quantity (tons)	2014 Imported quantity (tons)	2015 Imported quantity (tons)	2016 Imported quantity (tons)
World	36485	35435	50852	31913	26982
Egypt	10321	20179	17416	19194	21788
Syrian Arab Republic	24448	13441	32120	10997	3640
South Africa	512	1141	916	1331	1190
Lebanon	808	526	384	142	139
Spain	159	118	4	245	83
Greece	0	0	0	0	75
Turkey	0	0	0	4	46
Palestine, State of	53	31	12	0	21
Argentina	184	0	0	0	0

Export demand: Recently, small amounts of citrus fruits have been allocated for export. However, importing countries have drastically reduced their demand for oranges from Jordan. For example, orange exports to the world have dropped from $ 10,649 to $ 4068 within one year (2014-2015). Table 21 presents orange exports to different markets. The export demand of the Jordanian orange has reduced significantly in the last five years. Exports were mainly going to Iraq and Syria. However, in 2016, there were no exports to these two important markets. This is clearly related to the increased security concerns and active conflicts in these countries. In any case, there is sufficient domestic demand to absorb all the local orange production and more. In addition, there is no economic rationale for exporting while farmers and traders can get better returns in the domestic market than in the export market. Furthermore, countries exporting to Jordan are competing in the Jordanian market, meaning they are also strong competitors in the same export market.

Table 21. The Jordanian orange export markets by country and volume of exports.

Importers	**2012 Exported quantity (tons)**	**2013 Exported quantity (tons)**	**2014 Exported quantity (tons)**	**2015 Exported quantity (tons)**	**2016 Exported quantity (tons)**
World	2855	6896	11382	4605	386
Kuwait	23	33	59	339	88
United Arab Emirates	81	15	23	112	84
Bahrain	36	20	64	103	75
Qatar	13	6	31	72	54
Oman	0	4	12	61	50
Saudi Arabia	75	224	273	353	36
Iraq	1418	6186	9356	2538	0
Lebanon	45	18	0	0	0
Russian Federation	0	0	1	0	0
Syrian Arab Republic	1165	391	1562	1028	0

Recommendations

Jordan has a limited but profitable orange production with high local market demand for good value. Jordan orange is competitive because of the proximity to the market, good quality, and climatic conditions of the Jordan valley that enables earlier production than competing producers. The government of Jordan also provides limited protection for the Jordanian farmers with a specific time period, when imports are restricted, allowing the local production to clear the market. However, there are important challenges that should be considered in order to maintain this competitiveness. The opportunities created by these challenges are proposed here as livelihood interventions.

1. **Build capacity of Jordanian farmers in Good Agricultural Practices in citrus production:** The productivity of Jordanian oranges is low, which is about 20 tons per hectare compared to 30 tons under optimal management. Surface irrigation is mostly used and is inefficient. The application of fertilizers and pesticides can also be more efficient with proper timing and calibration. Farmers are selling the crop in the field ("fruits on trees") to traders and are not engaging in any marketing efforts beyond that. The proposed intervention is to focus on water saving as an initial entry point and to develop a mechanism to shift the whole irrigation system to localized irrigation, such as drip or subsurface drip systems. This will require demonstrations of the benefits and micro-loans or grants to help farmers acquire and install the necessary drip equipment. This will be expanded to all agronomic practices and lead to a better use of fertilizers and pesticides. For example, fertigation should replace manual application. Farmers would also be trained in the available marketing options and would be empowered with information and knowledge to make their own marketing decisions. The intervention includes training of farm workers and farmers in modern agronomic methods. This would require the establishment of model farms for demonstration purposes, where participating farmers illustrate the impacts of the new production technologies. Integrated pest management (IPM) techniques can also be introduced to reduce chemical pesticide use, thus reducing environmental damage and food safety risks. Learning groups for farmers can be established to promote the exchange of knowledge and to increase the acceptance rate of new technologies and practices. These changes could lead to more changes, such as the adoption of organic production and targeting the organic produce market, a niche market (currently this last point is only a potential but not a priority). The National Center of Agricultural Research and Extension (NCARE) can implement these actions in collaboration with extension services. With regard to marketing, the post-harvest handling of the fruits is also important to ensure good fruit quality at the market. Therefore, post-harvest management of the fruits will be part of this intervention in order to maximize the benefits of the investments and to reduce waste. Obviously, this will be a holistic integrated intervention, but it will start with water saving and will gradually expand as the acceptance of farmers increases. Overall, these integrated technological improvements will sustain the competitiveness of the Jordanian orange production. This expectation is supported by the view that competitiveness is based on the embeddedness of the value chain into the local conditions (see Tilman, 2007).

2. **Enable poor Jordanian and Syrian refugee to engage in orange marketing:** There is a widely held view that Syrian refugees are not officially allowed to work in the Jordan valley and that limits their potential to benefit from the orange value chain. The opportunities for the Syrian refugees are in the trade and marketing sector of orange, specifically in the retail sector using street vendor stands, which are often operated by low income people but with good entrepreneurial skills. The proposed intervention is to train less educated youth who are eager to experience trade activity, but who lack the resource and experience to start. After screening for their willingness, determination, and commitment, poor Jordanian and Syrian youth will be given small grants to establish fruit and vegetable street vendor stalls in Irbid city. These youths will benefit from this intervention, which requires monitoring over time until these stalls are successful and profitable.

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Annexes

Annex 1: Surveyed Key Informants of the Three Value Chains

A.1. Names of the surveys VC actors in round one.

Role of Key informant	Citrus	Cucumber	SR dairy
Producers	1– Sawsan Saeed Al-Ghazawi 2 – Ahmed Hassan Mfazi 3 – Fatima Al Ali Abdul Rahman 4- Radi Dhirat 5- Suleiman Saeed Al - Ghazawi	1 – Jamal Al Zu'bi 2- Faisal Abu Siam 3 –Hussein Pakistani 4-Hussein Abu Salem 5-Walid Ibrahim Abu Salem	1-Ibrahim Al-Salti 2-Shaher Mehdat 3-Fayez Abu Shakoush 4-Atef Mustafa Al Omari 5-Jihad Mahmoud Shakoush
Traders	1-Mohamed Qandil 2-Jamal Abu Shumer 3-Hamzah Alttahtumuni 4-Jihad Al-Muqsas 5-Khaled al-Kee 6-Ibrahim Mohamed Saleh 7-Jihad Abu Saraya 8-Alssibaei 9-Ibrahim Al Qawasmeh 10-Sati Aekh	1-Mohamed Qandil 2-Jamal Abu Shumer 3-hamzah Al-Tahtumuni 4-Jihad Al-Muqsas 5-Khaled al-Kee 6-Ibrahim Mohamed Saleh 7-Jihad Abu Saraya 8-Alssibaei 9-Ibrahim Al Qawasmeh 10-Sati Awkha	1- Salih talal dhanibat 2- Abdullah Muhiedat 3- Ahmed Radwan Omari 4-Tariq al-Omari 5-Hamam Ibrahim Mahaydat 6-Abdul Mohsin Al Omari 7-Qassim Najib 8-Hazem Ali Al Salem 9-Mohammed Yousef Muhiedat 10-Mashhur alwidyan
Processors	1-Susan Al Omri/J* 2- Sabah Abdul Hafiz Tradat/J* 3- Remal Ahmed 4- Marwa/J* Hisham/J* 5- Khalidiya Mohamed Mounir/S* 6- saytuah ahmad abu khshryf/S* 7- Sabah Abdul Hafeez/S*	1-Majd Abdel Basset/J* 2- Nima Mohammed Al - Nusan/S* 3- Mona Mohammed Al - Nansan/S* 4-Ola Moh.Rahal/J* 5- Aisha Yassin Hamd/S* 6-Tagred Rahal/J* 7- Samah Jahmani/S*	1-sabah taradat/J* 2-Aisha Yassin/S* 3-saytuah ahmad abu khshryf/S* 4-Khalidiya Mohamed Mounir/J* 5-Kholoud Adnan Arar/J* 6-Youra Omari/J* 7-Tahani Tradat/J* 8-Enas Tail/J* 9-Eklas Tlal/J*
Retailers	1-Rakan Mall Mall/Irbid 2-Abu Rashid Mall/Ramtha& Many Re. from different area 3-al-Forgan Store 4-Aswaq Al-Basha 5-Kerat Baldna 6-Bab al Sharq	Mall/Irbid 2-Abu Rashid Mall/Ramtha& Many Re. from different area 3-al-Forgan Store 4-Aswaq Al-Basha 5-Kerat Baldna 6-Bab al Sharq	1-Sameh Mall/Irbid 2-Albashabsha Mall/Ramtha& Many Re. from different area 3-Najeb Dairy 4-Ala&sons 5-Al-wastea
Consumers:	20 from rural and urban areas were interviewed		

*Al – Ramtha ,Irbid, Al- Wastea Region **Urban Consumer, Rural Consumer J* = Jordanian S* = Syrianian

A.2. Names of the surveyed VC actors in round two

No	Name	Location	Value chain role	Telephone
1	Aminah Muhammad	Kufer Assad	pickling	0796391526
2	Ahmed Ali Al-Wedian	Al Karaj	dairy processing	----------
3	Firas Ali Moussa	Al Karaj	sheep producer	0792773923
4	Abdullah Salem Al-Wadeyan	Al Karaj	Sheep, Cow	0776459142
5	Hazem Al Omari	Kufer Assad	dairy processing	0772534188
6	Ahmmad Al Hazameh	Irbid	Pickling	0785757332
7	Hussein Hassan Abu Salem	Al - Ramtha	cucumber Farmer	0795667533

A.3. Summary number of interviewed key actors in the small ruminant dairy value chain

Type of VC actor	Locations interviewed	Dates interviewed	Interview number
Producers	Alwasadiyah	26-3-2017 & 3-5-2017	5
Traders	Alwasadiyah, Irbid, Al-Ramtha	3-5-2017	10
Processors	Alwasadiyah	26-3-2016; 6-5-2017	7 Syrian & 7 Jordanian
Retailers	Alwasadiyah	6-5-2017	10
Consumer	Alwasadiyah, Irbid, Al-Ramtha	Different Time	10 Rural & 10 Urban

A.4. Summary number of interviewed key actors in the cucumber value chain

Type of VC actor	Locations interviewed	Dates interviewed	Interview number
Producers	Al- Ramtha	26-3-2017 14/15-5-2017	5
Traders	Wholesale Markets	16-5-2017	10
Processors	Alwasadiyah; Irbid	26-3-2017	5 Syrian& Jordanian
Retailers	General Market	16/17-5-2017	10
Consumer	Different Location	Different Time	10 Rural & 10 Urban

A.5. Summary numbers of interviewed key actors in the orange value chain

Type of VC actor	Locations interviewed	Dates interviewed	Number
Producers	North (Ghor) Jordan valley	14-5-2017	5
Traders	Central Market	16-5-2017	10
Processors	Irbid	3-5-2017	5 Syrian& Jordanian
Retailers	General Market	16-5-2017	15
Consumer	Different Location	Different time	20 (Rural & Urban)

Annex 2. Methods for the in-Depth Value Chain Studies and Question Checklists for Key Informants

Value chain structure

1. **Value chain structure:** Fully describe the structure of the value chain from production to consumption, with detailed descriptions, i.e., who is involved in production, transport, regulation, processing, whole sales and retail. Develop a flowchart describing this structure, which is not a general frame but rather a chart, which is relevant and specific to the context of Irbid in Jordan. This will also include the locations the major players so that there is geographical dimension to the above structure.

2. **Supply side:** Describe the current supply, estimate quantity, trends, technology, seasonality, and constraints. Production of specific and unique products that is differentiated form the common products. Imports should be included which are a major source of supply and compete with local production.

3. **Processing sector:** Describe the processing sector; who are the main players; what are the seasonality aspects, what are the typologies of processers, large, medium and small and micro; and what are the different challenges they face.

4. **Cost-benefit of the enterprise:** Describe the costs and benefits of the production and processing sectors for different operators (note some value chains are focusing on the processing side and others on the production side, so this section will be done accordingly).

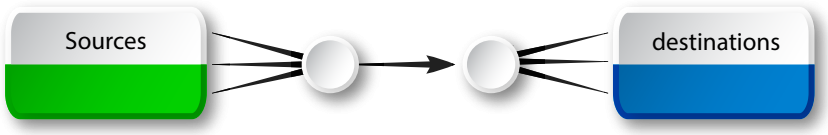
5. **Demand side:** Gather data to estimate average household consumption, weekly consumption for rural and urban population and using populations statistics, seasonality, trends, demand can be computed and projected; export should be covered which can be a major source of demand.

6. **Standards and Regulations:** How is food processing industry regulated and how are quality and standards controlled - this is important to ensure that proposed interventions take this into account.

7. **Enabling environment:** Availability of finance, existence of effective community organizations, training capacities, local successful experience at different scales (at large scale or small scale) to learn from in capacity development.

8. **Interventions:** Describe the opportunities for the poor Jordanian communities and Syrian refugees. Describe what are the main constraints that these target groups may face to participate in these value chains. Identify specific interventions (or package interventions) in the value chain that allows these target groups to engage in and benefit from the market. Describe the feasibility and sustainability of these interventions after the project ends.

Note for each of these VC nodes; The source of supplies and destinations should be explicitly asked to complete the full map.



Section	Data and methods
Value chain structure	Literature, secondary data and statistics; survey of different actors across the VC (producers, traders, wholesalers, processers, retailers).
Supply side	Secondary data, statistics, number of current producers, sizes of different producers; import data and trends; survey producers, wholesalers, processors, exporters, customs officials.
Processing sector	Secondary data, statistics, number of current producers, sizes of different producers; import data and trends; survey producers, wholesalers, processors, exporters, customs officials.
Benefit-cost of the enterprise	Complete full cost of production data; producer surveys; for large-scale industry we can get the cost of production per unit and use that to contrast small-scale producers.
Demand side	Estimate from the wholesalers the total daily disposals per quarter, consider the seasonality and with the number of the wholesalers- total disposed quantity can be estimated, but this may be under-estimating the real demand given that in some cases the supply may run out while there are still willing buyers. Another way is to get average HH weekly consumptions (considering seasonality) and use population and income level data to estimate, consider seasonality; survey of wholesalers, retailers, and sample of consumers by income category and ask weekly consumption by seasons (q1, q2, q3, q4).
Standards and regulations	Regulations of the food processing industry, standards of different regulations, frequency and process of control, penalty of violation, awareness of producers about these regulations, procedures they take to comply; survey of the regulatory body, survey of producers, processors, wholesalers, retailers.
Enabling environment	Survey formal and informal institutions (line ministries, farmer associations, etc.) that provide support in finance, capacity development, and market access
Interventions	This will be based on the analysis of the information above and technical information from specialists and different stakeholders on the opportunities in these VCs that the target groups can benefit from.

I. *Stakeholder profile*

1. Name/function: _____
2. Address and coordinates: _____
   Phone/Fax: _____
   Email: _____
   Web: _____
3. Value chain(s)/Sector(s): _____
4. Producing or trading since (or years of operation): _____

I.5. Target market(s): Local National International

II. *Common questions*

II.1 What do you understand by value chain?

II.2 Do you consider yourself integrated in the value chain you work in?

II.3 What are the major problems and challenges of your value chain on the following levels?

Input supply:

Production systems:

Post-harvest/collection:

Processing:

Distribution:

Market:

II.3 What could be done to improve your value chain on the following levels?

Input supply:

Production systems:

Post-harvest/collection:

Processing:

Distribution:

Market:

III. *Specific list of questions for different actors*

Producers

1. Production systems ----------
2. Input levels and input use ----------
3. Costs ----------
4. Productivity (yields) ----------
5. Prices ----------
6. What prices do they get at the wholesale market? ----------
7. Marketing strategies? ----------

a. Where they sell? Farm gate, wholesale market, retail, producer, direct sales ----------
b. Sorting and packing facilities they have? ----------
c. Kind of Sorting and packaging they do on farm? ----------
d. Use of cold storage ----------

8. Relationships: What relationships do they have with:
   a. traders? ---------- exporters? ---------- retailers? ----------
   b. What fees they pay to traders after the sales? ---------- what taxes they pay? -------- what other costs they pay at the market?
9. Problems they face in inputs, production and marketing?
10. Quality:
    a. Consciousness about god agricultural practices? ----------
    b. What qualities standards do they use?
11. Challenges/constraints of the whole value chain ----------

Traders and exporters

1. Arrangements between traders and producers:
   a. What arrangements are there between farmers and traders (sales, input supplies, loans, etc)?
   b. What is the relationship between traders and exporters ------ farmers-------retailers ------?
2. Prices:
   a. What prices do they pay at the wholesale market? From -------- to ----------
   b. What prices do traders sell to retailer, malls and restaurants?
   c. In which seasons are prices lowest? ---------- and highest? ----------
   d. How prices are set by publicly announced bids or auction?
3. Market practices:
   a. How do the traders operate buying, selling, commission?
   b. How the auction works? Who manages the auction (independent body, municipality?)
   c. Is the auction seen as open and competitive?
4. Quality issues:
   a. What qualities do exporters require?
   b. What is the relationship between exporters and producers?
   c. Who sets the standards?
   d. How do they verify that quality standards are met?
5. What is the major challenges facing the Value chain?
6. What is the overall market outlook?

Processors

1. What quantity do they require? Daily? Monthly, yearly? By season?
2. How do the procure:
   a. contractual farming
   b. from who open market via auction
   c. from traders

d. from farmers?

3. What quality standards do they apply and what quality do they look for?
4. What is the purchase price? How much is the premium for the good quality?
5. What is the selling price?
6. Trends in the demand?
7. Challenges/constraints in the supply of raw materials?
8. Challenges/constraints to marketing?

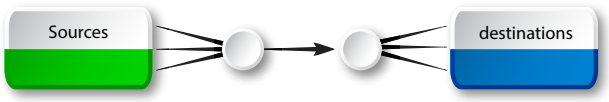
Questionnaire for VC studies

Supply: Supply of raw material (milk, vegetables for pickling)	
Who to survey (n)	Major producers (3)
	Ministry of agriculture and extension staff (3)
	Leaders of farmer associations /cooperatives (3)
	Review statistics and earlier studies
Questions	
1. Total production in the Irbid governorate?	
2. Production district?	
3. Production by season? Q1, Q2, Q3, and Q4.	
4. Different quality of the production by season or by district or by production technology?	
5. Cost of production per Kg? (see cost of production survey below)	
6. How production is disposed? Who are the buyers?	
7. Shares (%) of production by category of buyers? Retailers, wholesalers, processors, traders, restaurants, consumers,	
8. For which markets is the production destined? Specify shares of production destined to each market?	

Cost of production and returns data collection sheet Green Houses (survey 5 operators)					
Category	**Inputs**	**Units**		**Price**	**cost/ revenue**
Fixed cost					
Establishment of the Green house frame	Size of the green house (width, length, height)	m, m, m	---,---,---		
	Frame				
	Plastic sheets				
	Labour				
	Life of the structure to be replaced				
	Annualized replacement cost				
	Annual repair costs				
	Other costs				
Land rent	Cost of land rent				
Irrigation system (make detailed itemized list)	The cistern establishment (well)				
	The pump motor (type-------)				
	Basic water infrastructure pipes				
	The main plastic pipes that covey & distribute water to GH				
	Drip system network, pipes and nozzles				
	Life of the structure to be replaced				
	Annualized replacement cost				
	Others				
Operational costs					
Crops grown in the GH & number of plants each	Crop 1----------	plants			
	Crop 2----------	Plants			
	Crop 3----------	plants			
Inputs					
Detailed inputs	Seeds				
	Fuel				
	Water				
	Fertilizer1: Name----------				
	Fertilizer2: Name----------				
	Fertilizer3: Name----------				
	Pesticides1: Name----------				
	Pesticides2: Name----------				
	Pesticides3: Name----------				
	Total Labour of production (exclude harvesting) H=hired, F=family	Person days	H Fa	H Fa	H Fa
	Total Labour of production (exclude harvesting) M=Male, Fi=Female	Person days	M Fi		
Other costs	Specify----------				

Cost of production and returns data collection sheet Green Houses (survey 5 operators)					
Category	**Inputs**	**Units**		**Price**	**cost/ revenue**
Harvesting	Harvest crop 1: starts---/---/17; ends ---/---/17				
	Harvest crop 2: starts---/---/17; ends ---/---/17				
	Harvest crop 3: starts---/---/17; ends ---/---/17				
	Labour for harvesting; H= Hired, Fa=Family	Person days	H Fa	H Fa	H Fa
	Labour for harvesting; M= male, Fi=Female	Person days	M Fi	M Fi	
Post harvesting	Packing and sorting: labour				
	Packing and sorting: material				
	Transportation				
Sales	Location of sales (where do you sell?)				
	To whom do you sell				
	Revenue from Crop1				
	Revenue from Crop2				
	Revenue from Crop3				
Home consumption	H. Consumption Crop1				
	H. Consumption Crop2				
	H. Consumption Crop3				
Other items missed					

Ask sources and destinations of the product



Food safety regulation/ standards that you have to follow?

1=yes

2= no

If Yes, explain what regulations/standards?

What measures you take to comply?

How easy is it to access the market?

How do you finance this operations: sources?

Cost of production and returns data collection sheet home-based pickling and dairy processing (survey 5 operators each)									
Category	Inputs	Units	Quantity				Price	cost/ revenue
Fixed cost								
Equipment used in the processing	Equipment1 ----------							
	Equipment2 ----------							
	Equipment3 ----------							
	Equipment4 ----------							
	Equipment5 ----------							
	Other fixed costs							
	Other fixed costs							
	Who manages the operation	1= woman, 2=men; ----------						
Duration of the operation	How many months per year do you run the operation (from procurement to sales)?	months						
Inputs								
Space rent	Cost of rent (if home based =0)_							
Detailed inputs	Raw product1 processed per week per year?	Kg	q1	q2	q3	q4		
	Raw product2 processed per week per year?	Kg						
	Raw product3 processed per week per year?	Kg						
	Raw product4 processed per week per year?	Kg						
	Water							
	Electricity							
	Fuel							
	Other inputs							
	Total Labour of processing:	Person days	H					
	H=hired, Fa=family	Fa						
	Total Labour of processing:	Person days	M					
	M=Male, Fi=Female	Fi						
Other inputs	Specify----------							
Suppliers	Who are your actual suppliers of raw material? Codes: 1= producers, 2=traders, 3=purchase from market	S1	S2		S3		S4	
	What are the shares of these suppliers cover you needs?							
	What quality and standards do you prefer your suppliers to adhere to?							
Post-harvest	Packing and sorting: material							
	Transportation							
	Location of sales (where do you sell?)							

Sales	What products do you produce and how much in each week during?	1.----------	2. ----------	3. ----------	4. ----------
		----------Kg	----------Kg	----------Kg	----------Kg
	To whom do you sell? Buyer 1----------, Buyer 2----------, Buyer 3----------; Buyer 4-------				
	Location of these Buyers? Location1 --------; location 2---------, location3-------, location 4---- Use codes; 1=consumers in the neighbourhood, 2=consumers in Irbid city, 3= consumers from other towns; 4=traders				
	What quality do buyers prefer?				
	H. Consumption product 1				
Home consumption	H. Consumption product 2				
	H. Consumption product 3				
	H. Consumption product 4				
Other items missed					
Check if this is covered					

Food safety regulation/ standards that you have to follow? 1=yes; 2= no: ----------
If Yes, explain what regulations/standards? ----------
What measures do you take to comply? ----------
Did you ever get loans for your operations? 1= yes, 2= no; ----------
If yes what are the sources of loans? ---------- ---------- ----------
How easy is it to sell your products?

Demand

Demand for the finished products (dairy products –Cheese, Lenah, jameed, yoghurt, ghee; pickled products; and vegetables and herbal plants)	
Who to survey	Major Food grocery retailers in Irbid
	Small-scale grocery shops
	Restaurant and sweat shops
	Institutions, ex. Universities
	Consumers-urban
	Consumers-Rural
	Statistics: we need estimated urban and rural populations

Traders survey (10 traders, 2 wholesalers; and 4 stalls owners (retailers) in each of all major markets in Irbid and Ramtha)

1. Total quantity received in one week per quarter in a year (Q1-Q4) ?

   Quantity bought and sold Kg per week in Q1----------; Prices----------JD/Kg

   Quantity bought and sold Kg per week in Q2----------; Prices----------JD/Kg

   Quantity bought and sold Kg per week in Q3----------; Prices----------JD/Kg

   Quantity bought and sold Kg per week in Q4----------; Prices----------JD/Kg

2. Most important sources of the supplies?

   Source 1----------; Source2----------, Source 3----------; Source 4----------

3. Shares (%) of supplies form different sources?

Source 1---------	Source 2----------	Source 3----------	Source 4----------
Percent ----------	Percent ----------	Percent ----------	Percent ----------
Price-------JD/kg	Price-------JD/kg	Price----------JD/kg	Price----------JD/kg
Quality----------Kg	Quality--------Kg	Quality--------Kg	Quality--------Kg

Quality codes for question 3: 1=Excellent grade, 2= average grade, 3=low grade

4. Explain reasons for low quality:

5. Sources preferred to get supplies? Source 1---------- Source 2----------

   Reasons---------- Reasons----------

6. What marketing strategies used to secure supplies from different sources?

7. Logistics of delivering the supplies: own and by the supplier?

8. Experiences on procuring supplies form small-scale farmer group or home-based producers?

9. Willingness to procure small-scale farmer group or home-based producers?

10. Conditions for procuring small-scale farmer group or home-based producers?

11. Their perceptions of the trends in supply and prices on the next 5 years?

12. Total quantity they sell in one week per quarter in a year (Q1-Q4)? Q1 Q2 Q3 Q4

13. Selling prices JD/Kg? per quarter Q1 Q2 Q3 Q4

14. Their perceptions of the trends in demand and prices on the next 5 years?

15. Who are the major buyers of their production?

    Buyer 1----------; quality --------Kg/week; Buyer 2---------; quality ------Kg/week; Buyer 3---------; quality ----------Kg/week

    Add more description of buyers and their locations

16. Any other points related to supply and demand?

Questions for Grocery shops, restaurants, sweat shops, institutions, etc. (3 large stores and 10 small stores in different parts of the city)

1.	Total quantity received in one week per quarter in a year (Q1-Q4)?	Q1	Q2	Q3	Q4
2.	Sources of the supplies? Supplier 1----------Supplier 2 ---------- supplier 3---------- Supplier 4 ---------				
3.	Shares of suppliers? Supplier 1------- %; Supplier 2 -------%; Supplier 3----------%, Supplier 4 ------%				
4.	Prices of suppliers? JD/Kg Supplier 1-------; Supplier 2 -------; Supplier 3----------; Supplier 4 ------				
5.	Preferred quality: Specify----------				
6.	Quality differences of different sources? S1-S4=Supplier 1-4. Codes: 1=excellent, 2=good, 3=moderate, 4= poor	S1	S2	S3	
7.	Preferences of different sources?				
8.	Reasons for stated preferences from different sources? Codes: 1=high quality, 2=timely deliver, 3= good price, 4= others-----, 5= 1&2, 6=1&3, 7=3&4. Response:---------- (use code)				
9.	What marketing strategies used to secure supplies from different sources?				
10.	Logistics of delivering the supplies: own and by the supplier?				
11.	Experiences on procuring supplies form small-scale farmer group or home-based producers?				
12.	Willingness to procure small-scale farmer group or home-based producers?				
13.	Conditions for procuring small-scale farmer group or home-based producers?				
14.	Their perceptions of the trends in supply and prices on the next 5 years?				
15.	Total quantity you sold in one week per quarter in a year (Q1-Q4)?	Q1	Q2	Q3	Q4
16.	Selling prices JD/Kg? per quarter				
17.	Their perceptions of the trends in demand and prices on the next 5 years? 1=increasing, 2= declining, 3=steady				
18.	Major buyers of your supplies? Buyer 1----------, Buyer 2----------, Buyer 3----------, Buyer 4----------				
19.	Food safety regulation/standards that your suppliers?				
20.	How easy is it access market?				
21.	How do you finance this operation: sources?				
22.	Any other points related to supply and demand?				

Questions for consumers (Dairy products) (50 from 3 different economic classes)

1. Quantity of dairy products consumed every week by quarter Q1, Q2, Q3, Q4 in a year?

Fresh Cheese	Lebnah	Yoghurt	Jameed	Ghee (Semnah)
Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg
Q1----------	Q1----------	Q1----------	Q1----------	Q1----------
Q2----------	Q2----------	Q2----------	Q2----------	Q2----------
Q3----------	Q3----------	Q3----------	Q3----------	Q3----------
Q4 ----------	Q4 ----------	Q4 ----------	Q4 ----------	Q4 ----------

2. List most important sources of the supplies?

3. Percent of supply by source and by product:

Chees	Lebnah	Yoghurt	Jameed	Ghee (Semnah)
Source1---------- Percent----------	Source1---------- Percent----------	Source1---------- Percent----------	Source1---------- Percent----------	Source1---------- Percent----------
Source2---------- Percent----------	Source2---------- Percent----------	Source2---------- Percent----------	Source2---------- Percent----------	Source2---------- Percent----------
Source3---------- Percent----------	Source3---------- Percent----------	Source3---------- Percent----------	Source3---------- Percent----------	Source3---------- Percent----------
Source4---------- Percent----------	Source4---------- Percent----------	Source4---------- Percent----------	Source4---------- Percent----------	Source4---------- Percent----------

4. What are the prices of different sources for each product? JD/Kg

Cheese	Lebnah	Yoghurt	Jameed	Ghee (Semnah)
Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg
Source 1----------	Source 1----------	Source 1----------	Source 1----------	Source 1----------
Source 2----------	Source 2----------	Source 2----------	Source 2----------	Source 2----------
Source 3----------	Source 3----------	Source 3----------	Source 3----------	Source 3----------
Source 4----------	Source 4----------	Source 4----------	Source 4----------	Source 4----------
Source 5----------	Source 5----------	Source 5----------	Source 5----------	Source 5----------

Reasons for using these sources? Codes; *1= good quality, 2=low price, 3= good quality with good piece, 4= availability all times, 5= regular customer.*

Source 1----------	Source 2----------	Source 3----------	Source 4----------	Source 5----------

5. Different qualities of the produce in the market?

6. Preferred qualities?

7. Preferred prices?

8. Your perceptions of the trends in demand and prices on the next 5 years?

9. What should producers do to ensure high quality?

10. Do you buy directly from producers?

11. If no in 10, why not?

Consumer questions continues (pickled products)

12. Total quantity of pickled products consumed every week by quarter Q1, Q2, Q3, Q4 in a year?

Product 1----------	Product 2----------	Product 3----------	Product 4----------	Product 5----------
Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg
Q1----------	Q1----------	Q1----------	Q1----------	Q1----------
Q2----------	Q2----------	Q2----------	Q2----------	Q2----------
Q3----------	Q3----------	Q3----------	Q3----------	Q3----------
Q4 ----------	Q4 ----------	Q4 ----------	Q4 ----------	Q4 ----------

List most important sources of the supplies?

13. Percent of supply by product and prices by source:

Pickled product 1	Pickled product 2	Pickled product 3	Pickled product 4	Pickled product 5
----------	----------	----------	----------	----------
Source1----------	Source1----------	Source1----------	Source1----------	Source1----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------
Source2----------	Source2----------	Source2----------	Source2----------	Source2----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------
Source3----------	Source3----------	Source3----------	Source3----------	Source3----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------
Source4----------	Source4----------	Source4----------	Source4----------	Source4----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------

14. What are the prices

Pickled product 1	Pickled product 2	Pickled product 3	Pickled product 4	Pickled product 5
Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg
Source 1----------	Source 1----------	Source 1----------	Source 1----------	Source 1----------
Source 2----------	Source 2----------	Source 2----------	Source 2----------	Source 2----------
Source 3----------	Source 3----------	Source 3----------	Source 3----------	Source 3----------
Source 4----------	Source 4----------	Source 4----------	Source 4----------	Source 4----------
Source 5----------	Source 5----------	Source 5----------	Source 5----------	Source 5----------

15. Reasons for using these sources? Codes; *1= good quality, 2=low price, 3= good quality with good piece, 4= availability all times, 5= regular customer.*

Source 1----------	Source 2----------	Source 3----------	Source 4----------	Source 5----------

16. Different qualities of the produce in the market?
17. Preferred qualities?
18. Your perceptions of the trends in demand and prices on the next 5 years?
19. What should producers do to ensure high quality?
20. Do you buy directly from producers?
21. If no in 21, why not?

Consumer questions continues (Fresh vegetables)

1. Total quantity of fresh vegetables consumed every week by quarter Q1, Q2, Q3, Q4 in a year?

FVeg 1----------	FVeg 2----------	FVeg 3----------	FVeg 4----------	FVeg 5----------
Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg	Weekly consumption Kg
Q1----------	Q1----------	Q1----------	Q1----------	Q1----------
Q2----------	Q2----------	Q2----------	Q2----------	Q2----------
Q3----------	Q3----------	Q3----------	Q3----------	Q3----------
Q4 ----------	Q4 ----------	Q4 ----------	Q4 ----------	Q4 ----------

2. List sources of the supplies?

Source 1----------, Source2----------, source 3 ----------, source 4----------, Source 5----------

3. Percent of supply by product and prices by FVeg and by source:

FVeg 1 ----------	FVeg 2----------	FVeg 3----------	FVeg 4----------	FVeg 5 ----------
Source1----------	Source1----------	Source1----------	Source1----------	Source1----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------
Source2----------	Source2----------	Source2----------	Source2----------	Source2----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------
Source3----------	Source3----------	Source3----------	Source3----------	Source3----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------
Source4----------	Source4----------	Source4----------	Source4----------	Source4----------
Percent----------	Percent----------	Percent----------	Percent----------	Percent----------

4. What are the prices?

FVeg 1 ----------	FVeg 2 ----------	FVeg 3 ----------	FVeg 4 ----------	FVeg 5 ----------
Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg	Price by source JD/Kg
Source 1----------	Source 1----------	Source 1----------	Source 1----------	Source 1----------
Source 2----------	Source 2----------	Source 2----------	Source 2----------	Source 2----------
Source 3----------	Source 3----------	Source 3----------	Source 3----------	Source 3----------
Source 4----------	Source 4----------	Source 4----------	Source 4----------	Source 4----------
Source 5----------	Source 5----------	Source 5----------	Source 5----------	Source 5----------

5. Reasons for using these sources? Codes; *1= good quality, 2=low price, 3= good quality with good piece, 4= availability all times, 5= regular customer.*

Source 1----------	Source 2----------	Source 3----------	Source 4----------	Source 5----------

6. Different quality of the produce in the market?
7. Preferred quality?
8. Your perceptions of the trends in demand and prices on the next 5 years?
9. What should producers do to ensure high quality?
10. Do you buy directly from producers?
11. If no in 21, why not?

Second round survey

Producers:

How is the produce transported to market and at what cost?

What kind of sorting and packing is done on the farm?

For local buyers? ---------- for exporters? ----------

Transportation cost from farm to market?

Kind of Sorting and packaging do they do on the farm? ----------

Sorting and packing ***facilities*** do they have? ----------

What qualities standards do they use?

What relationships do they have with traders? ----------

with exporters? ---------- with retailers? ----------

What prices do they get at the wholesale market? ----------

What fees they pay to traders after the sales? ----------

What taxes they pay? ----------

What other costs they pay at the market? ----------

Yields per greenhouse? ----------cartons per season? ----------

Traders:

How many traders are here? ----------

How do the traders operate? What kind of companies are they? ----------

Buying from wholesale market? ----------

Selling to who? ----------

What arrangements are there between farmers and traders (sales, input supplies, loans, etc)? ----------

What prices do they pay at the wholesale market? From -------- to --------

During which seasons are prices lowest? ---------- and highest? ----------

How are prices set (how does the auction work)?----------

How does the auction works? Who manages the auction (independent body, municipality?)

Is the auction seen as open and competitive? ----------

At what prices do traders sell to retailer, malls and restaurants? ----------

How much do traders buy per week? ----------

What is the relationship between traders and

Exporters ------ farmers------retailers ------?

Exporters:

How do they procure their supplies? From Wholesale market? ------ directly form specific farmers? ------

What quality do exporters require? ----------

What is the relationship between exporters and producers? ----------

Are traders also exporters? ----------

Retailers (malls, shops, restaurants)

How do they procure their produce? (from traders, from wholesale market through the auction, or from farmers directly?) ----------

From who open market auction or form traders or from farmers? ----------

What quality standards do they look for/

What prices do they pay? ----------

What are connections between retailers and producers? ----------

What prices do they pay? ----------

Quality standards:

What are the quality standards set by different markets? ----------

Who sets the standards? ----------

How do you verify that you adhere to the required standards? ----------

Who are the exporters?----------

Where is cucumber is exported to? ----------

What quality are the exporters looking for? ----------

ICARDA

Science for resilient livelihoods in dry areas

Established in 1977, ICARDA is one of the 15 centers supported by the CGIAR.

ICARDA's mission is to improve the livelihoods of the resource- poor in dry areas through research and partnerships dedicated to achieving sustainable increases in agricultural productivity and income, while ensuring efficient and more equitable use and conservation of natural resources.

ICARDA has a global mandate for the improvement of barley, lentil and faba bean, and serves the non-tropical dry areas for the improvement of on- farm water use efficiency, rangeland and small ruminant production. In Central Asia, West Asia, South Asia, and North Africa regions, ICARDA contributes to the improvement of bread and durum wheats, kabuli chickpea, pasture and forage legumes, and associated farming systems. It also works on improved land management, diversification of production systems, and value-added crop and livestock products. Social, economic and policy research is an integral component of ICARDA's research to better target poverty and to enhance the uptake and maximize impact of research outputs.

CGIAR

CGIAR is a global agriculture research partnership dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources. It is carried out by the 15 centers who are members of the CGIAR Consortium in close collaboration with hundreds of partner organizations and the private sector.
www.cgiar.org

CARITAS Schweiz Suisse Svizzera Svizra

Caritas Switzerland (CACH) is an independent aid organization committed to a world without poverty, which is guided by solidarity, justice and peace and in which the inviolable dignity and the rights of every human being are respected. CACH works in 30 countries worldwide to ensure that every person not only has access to food, water, shelter, health, work and education, but is able to expand his / her capabilities and opportunities to lead the life she / he values. CACH's International Cooperation is characterized by a holistic understanding of the roots and causal factors of poverty and with a focus on six thematic areas, including disaster risk reduction and humanitarian assistance

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