



*Protect and Provide Livelihoods in Lebanon:*

## **Small Ruminant Dairy Value Chain Assessment**

June, 2014



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## INTRODUCTION

To support Lebanese host communities, Mercy Corps is launching a program entitled Protect and Provide Livelihoods in Lebanon (PPLL). The Overall Objective of the action is to mitigate the medium- to long-term impact of the Syrian refugee crisis on Lebanese host communities. The fear is that continued economic instability will lead to political volatility, as the financial pressure that the Lebanese have been placed under due to the Syrian crisis will manifest itself in conflict. The Action therefore has two objectives:

- Objective 1: Small and medium producers protect their livelihoods to adjust to the changing reality of the continuing Syrian crisis, and;
- Objective 2: Targeted Lebanese households and Syrian refugees have strengthened coping mechanisms for livelihood protection.

PPLL will prioritize interventions that allow smallholders to diversify their activities to exploit opportunities across two or more value chains or within a single value chain (e.g. various types of vegetables), thus maximizing income streams to producers over a greater period of time. Due to the focus on small and medium producers, PPLL will focus on cash crops but also include food crops used for household consumption where the surplus can be sold on the local market, but will avoid any crops where the WFP or other aid agencies are importing high quantities from outside Lebanon with the potential to distort the local market and decrease the value of local Lebanese crops.

The following value chain assessment presents an overview of the **small ruminant dairy value chain** in the Bekaa Valley – particularly those market actors and factors that concern vulnerable Lebanese host communities who would be assisted under any PPLL intervention. The assessment includes a value chain map and narrative of the transactions involved. The report also includes a value chain analysis of the dynamic trends identified during field research, as well as the opportunities, constraints and risks facing PPLL as it seeks to intervene in the value chain to boost incomes for smallholders.



## METHODOLOGY

In the first phase of the assessment, we engaged in a desk review of existing reports and projects in the small ruminant dairy value chain. Specifically, we reviewed:

- Documentation of the Lebanese Recovery Fund projects, implemented by FAO and UNIDO
- Lists of greenhouse growers in the Bekaa, maintained by the Chamber of Commerce in Zahle
- Lebanese Ministry of Agriculture's 2010 Agricultural Census
- Background information and best practices for each of the value chains

Based on beneficiary lists from past projects, information from the Chamber of Commerce, and the existing network of contacts of the field team, we assembled a list of key informants for the first round of interviews.

Field teams met with each key informant for a semi-structured interview that took between 45 minutes and two hours. The interview covered topics like production process, production volumes, input prices, market prices, transport and storage of goods, marketing of goods, and challenges faced.

We then used chain referral sampling to expand its informant base. During each interview, informants were asked about their suppliers, customers, and competitors. They were also asked who else they thought should be interviewed in the value chain. Where possible, they provided contact information.

We sought to interview actors from every step of the value chain, including input suppliers, large and small producers, wholesalers, processors, and exporters.

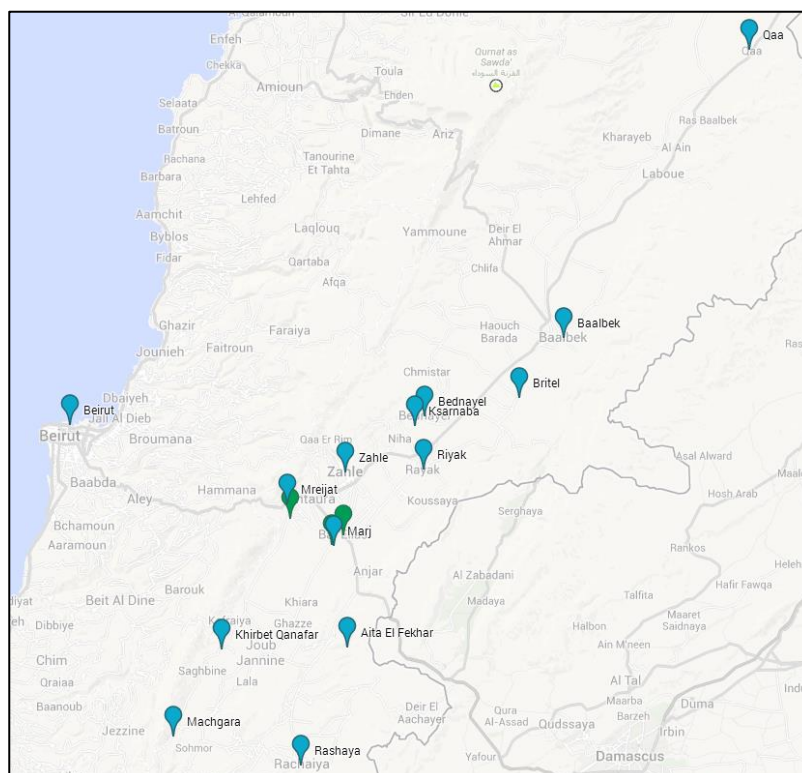
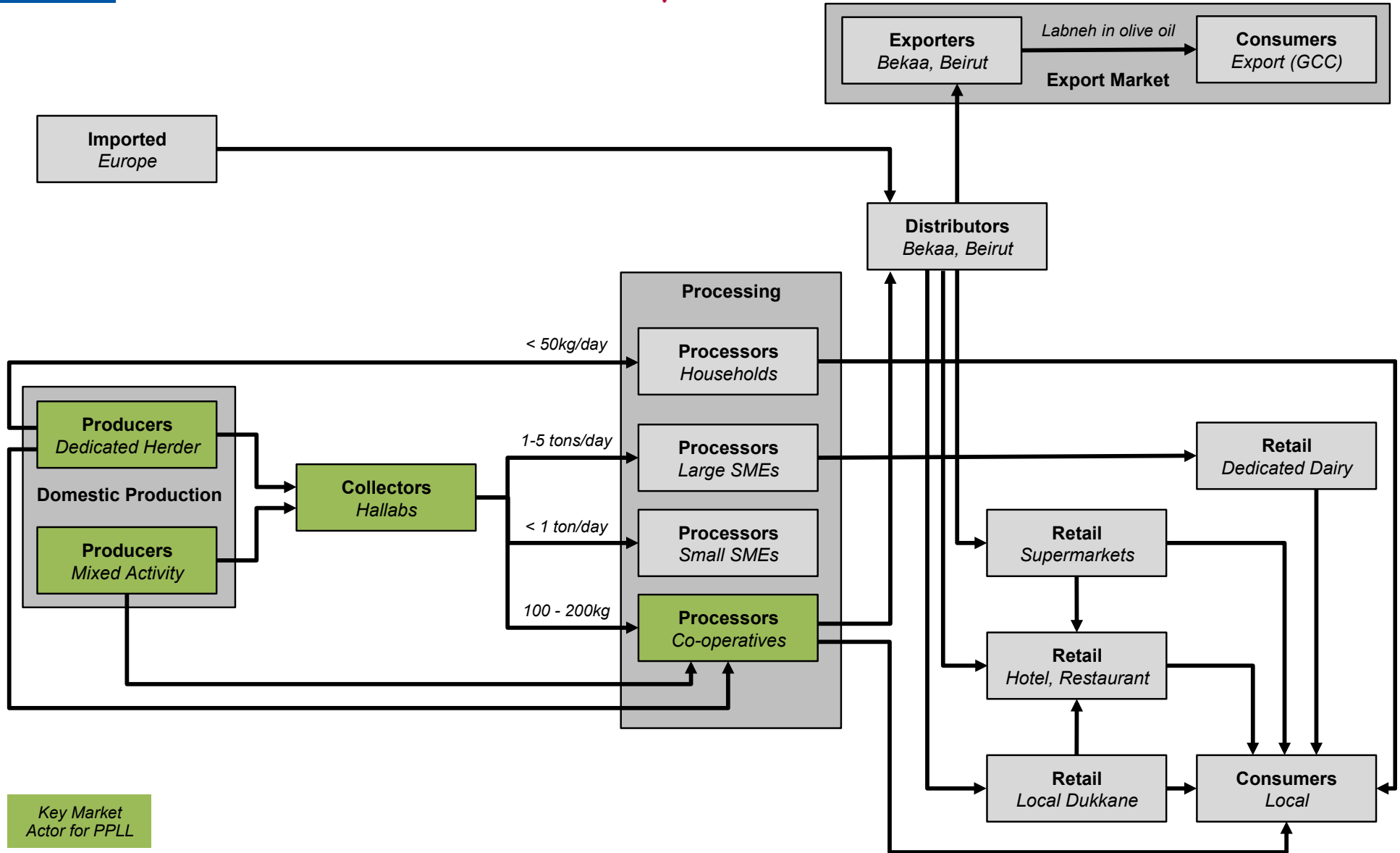


Figure 1. Map of Interview Locations



VALUE CHAIN MAP



**OVERVIEW**

Small ruminant dairy production is an important part of the agricultural sector in Lebanon, especially in rural areas and among the most vulnerable communities. The Ministry of Agriculture estimated that in 2004, small ruminant milk represented almost one quarter of all Lebanese milk production, or about 57,700 tons. However, independent estimates today are considerably lower, around 20,000 tons annually.

Some 9% of all agricultural producers in Bekaa or 15,800 producers, own livestock, and 7,771 of them own small ruminants. Small ruminant herding is concentrated in the Bekaa. 190,442 sheep, or 72% of sheep nationwide, are located in the Bekaa, mostly in Baalbek and Zahle, with an average of 93 per herd. 206,305 goats, or 51% of goats nationwide, are kept in the Bekaa, mostly in Western Bekaa and Baalbek, with an average of 83 per herd. The majority of goats in Lebanon are traditional “Baladi” breeds, while most sheep are of the “Awassi-Baladi” breeds.

*Table 1. Bekaa Agricultural Operations (Farms) Raising Sheep or Goats<sup>1</sup>*

Caza	Operations with sheep	# Sheep	Avg./herd	Operations with goats	# goats	Avg./herd
<b>West Bekaa</b>	322	36,665	114	343	52,265	152
<b>Zahle</b>	413	49,520	120	279	20,155	72
<b>Baalbek</b>	914	82,856	91	1,150	75,305	65
<b>Hermel</b>	301	17,682	59	515	30,729	60
<b>Rachaya</b>	92	3,699	40	209	27,851	133
<b>TOTAL</b>	<b>2,042</b>	<b>190,422</b>	<b>93</b>	<b>2,496</b>	<b>206,305</b>	<b>83</b>

Herders have been a difficult beneficiary target for past development programs because many were on the move for much of the year. However, 2014 in particular has seen a significant transition. Bekaa herders have become more sedentary as traditional grazing lands are inaccessible or not as productive as before, and many are now forced to buy feed for their animals. While in the past West Bekaa and Rashaya had both highest number of herders and average herd size, the conflict along the border in Aarsal has pushed herders from Syria and Aarsal into Hermel, particularly in mountainous Jord Hermel region, for the summer. They will then winter around the Assi River and Qaa.

According to official data, West Bekaa and Rashaya have the largest average herd size, at 170 and 130 animals respectively. The Baalbek region has the most small ruminant dairy producers with 3,300, followed by West Bekaa with around 1,700 producers. The Baalbek region has an average herd size of around 60 animals.

<sup>1</sup> 2010 MoA Census



## PRODUCTION

There are generally two main small ruminant dairy production systems: a **semi-extensive** system, representing some 90% of small ruminant dairy production in the Bekaa, in which little to no supplemental feed is provided to livestock during the annual grazing period (April to October). During this period, Bedouin herders traditionally migrate along the plains of the Bekaa during this season, setting up temporary settlements to graze their herds at higher altitudes. Local herders are sedentary, returning to their villages each night after grazing. Following the end of this grazing period, both Bedouin and local herders winter their animals in lower altitudes along the Bekaa plain, providing feed bought from input suppliers.

The second system is **semi-intensive**, which involves daily feed supplements during the annual grazing period, although producers generally also send their animals to pasture for limited grazing. This system is normally used by larger small ruminant dairy producers, who also employ other sophisticated production methods including improved breeds, regular health checkups, and use of appropriate milk collection containers (e.g. stainless steel). These producers have well-established relationships with collectors and/or processors with daily milk deliveries.

The relative proportion of semi-extensive to semi-intensive production within the Bekaa (90:10) is reportedly shifting rapidly as a result of both the Syrian crisis and declining winter precipitation. Lack of greenery for foraging and limited access to traditional grazing areas is forcing many semi-extensive herders to adopt a semi-intensive system of production. This is reportedly resulting in a 30% decline in milk production due to poor nutrition and an increase in young animal mortality from water scarcity and diseases like Mastitis and Malta fever. Higher production (chiefly animal management) costs tied to semi-intensive production put extreme pressure on income and livelihoods, and are reportedly forcing culls as producers struggle to feed their animals.

*Table 2. Production Calendar for Small Ruminant Dairy*

Activity	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov
Grazing Period		[Blue bar from April to Oct]							
Supplemental Feed						[Red bar from Jul to Oct]			
Wintering Herds	[Green bar]								[Green bar] Cont. →
Milking Goats	[Red bar from Mar to Aug]							[Light red bar from Sept to Oct] Declining	
Milking Sheep	[Green bar from Mar to Jun]								

*\* X = earliest planting, O = earliest harvest*

The prime milking season for goats is from March to August, and sheep from March to late June. Milk is generally collected in the evening after 6 pm, but can also be done in the early morning, and sold to private collectors (*hallabs*) who work with personal networks of producers. The small ruminant breeds most common in Lebanon (*baladi* goats and *baladi awassi* sheep) produce an average of only ½ kg - 1 kg/day of milk, far below the average production of improved breeds (3 kg - 4 kg/day) bred in neighboring countries like Cyprus, and on a handful of Lebanese farms.





Herd size does not necessarily correlate with wealth or land holdings. In fact, land holdings are in many cases negatively correlated to herd size, as dairy producers with smaller herds are more likely to have diversified income streams from horticulture. Large landholdings of over 100 donums that are exclusively small ruminant dairy farms do not exist. As a general rule, as farms grow in size more sheep are raised, and the largest farms are usually raise around 75% sheep.

According to the 2010 agricultural census, the largest herd sizes (averaging above 110 animals) were found among producers with no land. Traditionally, these are mobile herders that setup temporary settlements as their herds graze throughout the summer. In the winter, they bring their animals into collective shelters that are rented. This group sells their milk to *hallabs*, and produces butter for household consumption.

The next highest average herd size (averaging 90 – 110 animals) is found among producers on 1 – 7 donums of land. For these producers, small ruminant dairy is their primary source of income, although they may also have small agricultural plots with either orchards, or open-field and/or greenhouse production of vegetables. Traditionally, these producers practice a mix of semi-extensive and semi-intensive production, either paying Bedouin herders to care for their animals over the pasture grazing period, or themselves managing grazing and returning the animals to their pens daily. These producers sell their milk to *hallabs*, or directly to processors. Many also produce *baladi* cheeses, *kishk* or *labneh* for household use, although some operate their own processing facilities for local larger sales of dairy products.

Producers on 8 – 25 donums of land average herds about 70 – 90 animals, which while enough animals for a significant dairy operation, have enough land for more diverse agricultural production, including greenhouses. Similar to the above group, these producers practice a mix of semi-extensive and semi-intensive systems, and either sell their milk to *hallabs* or directly to processors. These producers are most likely to be familiar with improved small ruminant dairy production techniques, but do not necessarily have the financial ability or technical knowledge on how to access and incorporate these improvements into their own production.

Producers with more than 25 donums are primarily horticulturalists<sup>2</sup>, averaging herd sizes of 60 – 90 animals, and use small ruminant dairy to diversify income or produce for local/home consumption. Most of these producers use the same production system mix as their counterparts, however are more self-sufficient, using agricultural waste as feed or allocating their own land to grazing. These producers have a wide range of activities encompassing all parts of the value chain. They are producers, sell or collect milk, process dairy for local, regional or national sale.

### Common cultural practices

Dairy production practices vary widely across the Bekaa, depending on certain regional disparities and local traditions. As a general rule, large, diversified agricultural farms are more likely to use appropriate collection containers, vaccinate their animals, have improved breeds, and hygienic methods of dairy production.

In extensive production, producers release their herds to pasture every day, or migrate with their herds during the prime milking season. They use little to no supplemental feed. In semi-intensive production systems, producers buy grains such as barley, alfalfa, and soy from a local feed mill and have it prepared at a shop, or

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<sup>2</sup> There are a few exceptions in Baalbek region and Masharih il-Qaa.



mix it themselves on the farm. Feed cost ranges for \$550 – \$750 per ton, depending on nutritional quality, and each animal requires about 1 kg – 1 ¼ kg feed per day.

Semi-intensive producers have the best access to veterinarian services, while semi-extensive producers usually seek treatment for their animals in the winter. Veterinarian visits cost 50,000 LL, not including the shots required for any treatment required.

Producers rarely capture the added value that their animals provide in manure and wool. This is especially true with animal manure, where producers suffer from lack of processing knowledge, the availability of land, and adequate storage. The groups that can most benefit from this knowledge are the integrated producer/grower that buy fertilizers, or sell their manure for next to nothing, only to buy the pelletized form back from the input supplier. With the collapse of the Lebanese textile industry, the Syrian crisis and the shift by mattress manufacturers to synthetic materials, wool has lost its market, and farmers simply give it away and pay \$1 per head for shearing.

## COLLECTION

Milk collectors or *hallabs* play a very prominent role in the dairy value chain as the link between producers and processors. In many cases, the *hallab* is also a producer and ensures the collection, transportation and sale of a network of producers.

These collectors generally operate within 50 km of their home at varying capacity. This can range from an individual with a truck collecting 600 liters (.6 ton) from 20 different producers, to a collector running a small fleet of trucks reaching a network of over 100 producers. Collectors in vulnerable communities vary in size, with a capacity of between 1 – 5 tons/day. They pick up either in the early morning, or in the evening after 6 pm, when animals are back in their shelters for milking. Collectors deliver milk to the processors either at night, or the next morning along with any early morning milk.

During the past three years, the Food and Agriculture Organization (FAO) of the United Nations has distributed thousands of stainless steel tanks for milk collection to producers and co-operatives. Most collectors use stainless steel tanks to collect the milk, dropping off empty ones for the next day. Despite this effort by FAO, the use of these tanks is not ubiquitous because of the sheer number of producers and the relatively prohibitive cost (\$130 each). For many small producers and collectors, aluminum or plastic collection jugs are still used, but are weaker and more difficult to sterilize, thus potentially degrading the milk quality.

Co-operatives set up by an ongoing FAO project to promote cow dairy have become important emerging actors in the small ruminant dairy value chain. They were provided milk collection tanks, and some even received refrigerated trucks. While focusing on cow milk collectors, some cooperatives have started expanding their activities to include the collection and processing of goat and sheep milk. The Bar Elias co-operative engages over 100 small ruminant dairy producers and currently sells to Khoury Dairy.

### Payment and prices

Payment to the producers is usually made within two weeks, after the processor who buys the milk pays collectors. Some collectors have long-term relationships with processors, which guarantees supply and quality for the processors, and incentivizes the collectors to promote high quality milk production and transport.



Other, generally smaller, collectors must call around to processors to identify the best price, and this form of collection is riskier for both parties—for collectors who are not guaranteed sales, and for processors who risk milk spoilage as it remains in storage.

*Hallabs* buy goat and sheep milk anywhere from 900 – 1,300LL/kg depending on the quality of milk (mostly fat content) and the transportation involved. On average, they add a 20% markup when selling to processors. Prices are generally the same for good quality sheep and goats milk and range between 1,100 – 1,300LL/kg during the beginning of the season, falling to 900 – 1,100LL/kg as supply increases. However, as the milking season ends, prices can rise to 1,500 – 2,000LL/kg as farmers begin using supplemental feeding with semi-intensive production systems.

Hygiene also plays an important role in determining milk prices. Prices for milk containing traces of antibiotics, penicillin or dirt can drop as low as 700LL/kg. Most producers, especially smaller producers in vulnerable communities, do not test their milk for antibiotics or penicillin before collection. Most collectors also do not have testing strips and do not test for antibiotics, penicillin, bacterial count, and fat content—leaving this responsibility to the processors.

## PROCESSING

Dairy processing is one of the most important agricultural sectors in the Bekaa. Hundreds of small-scale processors are widely distributed throughout the Bekaa, while the largest dairies are mainly concentrated in Zahle Caza in Chtaura, Jdita, Mreijat, Tannayal, and Zahle itself.

The products made from sheep and goat milk include *laban*, *labneh* (mainly goat, with or without olive oil, and *ambriss* type), *kishk*, *halloum* cheese (from sheep), *Akkawi-Checki* cheese (from sheep), and *baladi* cheeses like *double creme*, *bulgari*, and *nabulsi*.

Generally speaking, there are four kinds of small ruminant dairy processors in the Bekaa:

- i. Large SME dairies: These processors capture over 75% of small ruminant dairy milk supply moving through the Bekaa. Production of processed products can range from 1 – 5 tons of milk per day, depending on the size and complexity of operations. At the higher end of the scale, these processors sell directly to retailers (supermarkets, groceries and restaurants) in Beirut and Zahle, engage in private label production for supermarkets, or operate integrated retail stores along the Beirut-Damascus Highway from Mreijat to Zahle. This segment also contains high-end specialty supermarkets such as Goodies and Cigale that process their own products.

Some of these processors have their own farms and buy additional milk to supplement production. They have their own distribution, or make deals with distributors for specific geographical areas. Their products are always branded in high quality packaging. These processors are innovative, where the consumer is most likely to find different goat and sheep products not available in supermarkets. Due to their quality requirements and consumer demand, larger processors are less price-sensitive and are willing to pay the best prices for good quality milk. These processors also have good cash flow and maintain good relationships with collectors, paying within 15 days.



Finally, there are some processors within this segment that have a mixed product line that includes pickles and other foodstuffs. Their primary business is not dairy products. These processors have varied degrees of quality requirements, and are also known to take lower quality milk at around 700LL/kg.

- ii. Small SME dairies: Small dairy processors are widely spread throughout the Bekaa, and exist in almost every village on some scale. They can either have small shops fronts, or allocate some parts of their homes for processing. These processors take anywhere from 200 kg to 1 ton of milk day, and are usually limited by the capacity of storage and processing equipment. They purchase milk from collectors or buy directly from local producers. These processors usually struggle with working capital and have trouble meeting bank loan requirements, which constrains their ability to invest in improved storage and production. They are extremely price sensitive and are more likely to purchase lower quality milk in order to compete with larger producers. These dairies do not typically brand or market their product, selling in bulk or generic ½ to 1 kg plastic containers.
- iii. Co-operatives: Dairy processing co-operatives are a relatively new entrant into the small ruminant dairy value chain and make up about 5% of the total processing. Most were setup in the past five years by a FAO project or other development programs to serve as collectors, and some have now expanded into small-scale processing. Other European and UNDP supported development projects have established co-operatives with a gender focus, with between 11 – 24 female members, which are primarily processing-oriented.

These co-operatives have had extensive training, received equipment including milk collection tanks and refrigerated trucks. They produce excellent, high quality products—although their experience is limited and their products are marketed poorly, with either unbranded or poorly designed labels. These co-operatives buy mostly from collectors, and suffer from supply disruptions during periods of peak demand.

- iv. Households: Household processors produce for their own consumption and sell extra production locally and directly to consumers. Their products are limited to *laban*, *labneh*, *baladi* cheeses, *ambriss* and *kishk*. These processors own their own goats and sheep, but may buy additional milk from producers in their village but rarely buy from collectors. In general, household level production is unhygienic, and poorly handled. Some household processors do not pasteurize their milk, leading to cases of brucellosis.

### Milk testing

Testing for fat content is crucial part of cheese processing. Some producers, especially during the last part of milking season when animal nutrition is declining due to lack of feed, will add water to their milk to add volume. Fat content testing requires specialized equipment and is usually done by the processor. Likewise, the use of testing strips for medications is a critical part of dairy processing, as antibiotics and penicillin interfere with processing, and processors should reject contaminated milk.

Although a few collectors test milk for medication (using strips available at local pharmacies), testing is primarily done by processors. Large SME processors always test milk for antibiotics, penicillin, bacterial content, acidity, and fat content, and are very hygiene conscious. For smaller SMEs, testing of milk for bacteria and fat content is sporadic, as most processors lack the proper equipment to do so. At the co-



operative level, there is not widespread testing of milk for traces of medications, fat content, bacterial count, or acidity. Such testing is unheard of at the household level.

When milk is rejected, collectors may return contaminated milk to the producer and negotiate a lower sales price, whereupon the milk is most likely sent to small-scale local processors who use it to make substandard dairy products. In this instance the collector usually is happy to break even, as his transport costs are not recouped. The producer loses about 30% - 50% on the price of milk.

## TRADE

Although it is difficult to separate cow milk from small ruminant milk in official consumptions statistics, estimates place Lebanese consumption of dairy at 14 liters of milk (both fresh and powder), 24 kg of cheese and 20 kg of *labneh* annual per capita. Others estimates place Lebanese consumption at almost 189 liters of equivalent milk per capita, which puts Lebanon near the top of global consumption along with the European Union.

The Lebanese market of dairy products is a very a diverse and the consumer is demanding in taste, quality but also price. A niche market of upper price range exists and is mainly supplied by imports of a diverse range of dairy products coming primarily from France.

Dairy products are marketed in two ways: either in bulk (size) or packed in standardized glass or plastic containers, with or without labeling. Both bulk and packed products from the Bekaa are found in supermarkets, mini-markets and groceries throughout the country. Restaurants and hotels mainly buy products in bulk.

Although there is a significant informal sales channel involving household-level producers who sell to their neighbors or small shops in their village, the bulk of small ruminant dairy sales flow through a commercial channel involving well-established wholesaler distributors in Beirut and Zahle. They mostly service smaller dairy processors, as the largest processors manage their own distribution. Wholesalers sell both local and imported products, and distribute a wide-range of products including dairy.

There are a large number of restaurants and “snacks” (cafes) across Lebanon, which represent a primary market for dairy products sold in bulk, especially the “*akkawi*” cheese and *kishk* used for popular baked breads like *manaqesh* and other snacks. Restaurants and hotels also represent a market for *baladi* types of cheese sold in bulk, primarily during the summer tourist season.

There are estimated to be over 25,000 small grocery shops in Lebanon, including traditional groceries (*dukkaneh*) and more modern mini-markets popular in urban areas. These groceries, like local shops in rural areas trading in homemade dairy products, are less demanding when it comes to quality and marketing, and present the best opportunity for smaller processors to sell their products beyond their own geography. However, selling to these groceries can be expensive, as it requires an arrangement with a distributor.

There are ten major supermarket chains in Lebanon, with branches mainly in Beirut and other major cities such as Tripoli. Their market share is estimated be to around 25% to 30% of the food market and is increasing with the development of these chains. The range of dairy products in these supermarkets is very large, and includes both local and imported products. Local products are sold on the shelf (packed and labeled), as well



as at the fresh product counter. There are usually 4 or 5 brands for each type of labeled product, although generally only from the major domestic processors. The range of imported dairy products is very diversified, including many types of European goat and sheep cheeses, as well as many products that compete with Lebanese brands (Greek and Danish Feta, and *kashkaval* from the Czech Republic, Hungary or Bulgaria).

In all cases, these major supermarkets are very demanding in terms of hygiene, quality and packaging, and generally prefer to deal with a single supplier/distributor. The processors who want to access these chains must be able to consistent and stable supply of quality products. Payment schedules are varied with some supermarkets only paying after 6 months. As such, large supermarkets are only open to few domestic processors.



### OTHER DEVELOPMENT ACTORS

Because of the Syrian crisis and refugee influx there are several development programs of various sizes throughout the Lebanese host communities. Most are focused on Syrian refugees, but there is a trend to move towards more livelihoods programming, albeit not necessarily in agricultural value chains.

The main development actor dealing with the small ruminant sector is the Ministry of Agriculture (MofA). Through UKAID, it is providing vaccination for livestock to prevent major diseases, but this service is reportedly limited due to budget constraints.

FAO has a 5 year- project ending in December 2014 that worked to develop the dairy sector and was mainly involving cow milk production. One of their main activities was to create dairy co-operatives, outfit milk collection centers and provide processing equipment to co-operatives and households. They have now shifted their attention to the small ruminant dairy sector, and have been providing feed to producers. In July 2014, they will issue a tender to procure *Shami* goats and *Awassi* sheep from Cyprus for distribution to Lebanese producers.

There are two large projects currently working in agriculture in Lebanon: USAID-Funded Lebanese Industrial Value Chains Development (LIVCD) and the new European-funded Agriculture and Rural Development Program (ARDP).

LIVCD is working primarily on improving and promoting exports of agriculture products focusing on tree fruits, honey, grapes, olive, and processed products. They have a rural livelihoods component that is working in eggs and wild thyme, as well as providing marketing assistance for co-operatives. LIVCD is not working in the small ruminant dairy value chain.

ARDP is a European-funded initiative focused on strengthening extension-like government services within the agricultural sector, providing small farmers access to financing through ultra-low-interest Kafalat loans, and improving agriculture infrastructure, especially water distribution networks. While focusing on infrastructure rehabilitation, the priority for this project is to establish strong local groups and associations to better manage local resources such as water.

### ACCESS TO FINANCE

Due mainly to collateral requirements, small farmers generally do not take commercial loans such as Kafalat, and self-finance their growing operations from past revenues or through credit given by input suppliers that are paid back at the end of the season. Although some microfinance programs, such as USAID-LIM or Al Majmoua targeting poor households exist, no farmers interviewed had taken any assistance from these programs.

Credit sources to the processed food sector in Lebanon take mainly the form of loans in addition to leasing in the case of financing of equipment. The Lebanese government has given the private sector little support to help them access the financial market. The two main supportive instruments available in Lebanon are: (1) a



specific subsidy for interest payments made by qualifying enterprises and (2) the Kafalat loan guarantee program. The interest subsidy is provided through the Banque du Liban for loans granted by commercial banks to SMEs in the following sectors: industrial, agricultural, tourism, handicrafts, high technology and programming. The loan is used to finance a new project or expand an existing one. The loan amount varies between LBP 50 million to 15 billion with a maximum duration of seven years and a grace period maximum of two years. By applying for an interest rate subsidy, the interest rate is reduced by seven percent on loans up to LBP 5 billion and by 5 percent on the part ranging from LBP 5 billion up to 15 billion.

Kafalat is a Lebanese financial company with a public concern that assists small and medium sized enterprises (SMEs) to access commercial bank funding. It guarantees up to 75 percent of the loan amount, based on business plans or feasibility studies that show the viability of the proposed business activity. It also guarantees up to 90 percent of the loan amount for startups. Kafalat targets SMEs and innovative startups that belong to one of the following economic sectors: industry, agriculture, tourism, traditional crafts, and high technology. Since Kafalat does not stipulate a minimum loan amount, the scheme could be accessible to clients whose needs are in the range of micro finance. A characteristic of the program suited to the needs of small businesses is the low reliance on collateral.

#### **ACCESS TO TECHNICAL KNOWLEDGE**

Traditional government extension services are available but very limited within the small ruminant dairy sector, especially for small herders. The MofA programs are mainly focused on vaccinations and treatment of diseases. Generally producers learn about improved techniques and breeds from development programs such as FAO.





## VALUE CHAIN ANALYSIS

### DYNAMIC TRENDS

#### Strong demand from milk processors for goat and sheep milk when quality is assured

Goat and sheep milk have higher fat content than cow milk, and therefore less volume is required to produce equivalent volumes of *labneh* and cheeses. Every collector, SME and co-operative processor interviewed would take more sheep or goat milk if it were available—including some, like Imm Touma, who said they were willing to double production—and indeed many complained about shortages, especially between July and September when grazing lands start to thin. However, some processors, such as Massabki, said they do not use sheep milk due to poor hygienic conditions of small herder production.

The end-of-season supply crunch results in 50% - 100% increases in prices, and lower quality milk due to poor nutrition and some herders diluting the milk with water. As milk production starts to dwindle, cooperatives are the first to have their supply cut, as collectors prefer to ensure deliveries to their larger SME processors.

#### Extremely low milk production for local goat and sheep breeds when compared to improved breeds

According to the FAO, 95 % of goats and sheep are the Baladi breed. Although well adapted to the Lebanese climate and geography, this breed only produces about ½ - 1 kg of milk per day or 135 liters per season, as compared to 4kg – 5kg/day from the improved *shami* goat and *awassi* sheep breeds found with some larger, sophisticated farmers in Lebanon and other countries.

#### Lack of quality grazing pastures, due to weather-related issues and Syrian conflict, resulting in rising feed prices and herd culls

Traditionally, feeding of goats and sheep is done through grazing in natural woodlands, pastures and rangelands, and to a lesser extent through feeding crop residues, purchased barley or other forage crops. The lack of precipitation over the 2013-2014 winter has severely affected spring grazing areas throughout the Bekaa. In addition, the conflict on the Aarsal plain, a traditional prime grazing area for thousands of sheep and goats, has displaced herders putting more pressure on grazing areas in Jord Hermel and Rashaya. Herders are now purchasing supplemental feed early in the milk production season, putting a strain on household income, and causing some small herders to sell off their animals. It is critical to note as well that the Syrian conflict and water scarcity is encouraging and accelerating a transition from extensive to intensive herding across the Bekaa.

#### Cramped and poorly constructed goat and sheep pens on small farms

While herders made efforts to keep goats and sheep pens clean, some pens were generally found to be cramped, poorly constructed and not weatherproof. Generally, roofs are covered with canvas that is held down by rubber tires. During strong winter storms pens can be damaged and need to be repaired, putting additional financial strain on herders. These poor conditions also negatively affect the health of animals, contributing to young animal mortality and the incidence of diseases, which altogether result in low milk production.



Despite increased use of high-quality stainless steel tanks for transportation, plastic jugs and low-quality stainless steel tanks are still used in vulnerable areas

Stainless steel tanks provide a hygienic way of transporting and tracing milk from herder to processor. The tanks are secure, easily washed, protect the milk from light, and better retain a constant temperature throughout transportation. Past dairy improvement programs have distributed thousands of milk containers to herders, collectors and processors, but despite this many small producers and collectors, especially in marginal communities, still use cheaper plastic jugs to collect and transport milk. Plastic jugs are not completely opaque and allow the sun's UV lights through affecting the milk's chemical composition. They are poor insulated against high daytime temperatures, which promotes bacterial growth in the milk. Finally, plastic is slightly porous and not perfectly smooth like stainless steel, which might harbor bacteria even when using detergents to clean.

High incidence of on-farm disease such as mastitis and foot and mouth (FMD) resulting in antibiotic- and penicillin tainted milk

Mastitis and FMD are very common on Lebanese dairy farms, especially among small herders. There have been recent widespread vaccination programs implemented by FAO and Lebanese Ministry of Agriculture (MoA) to help treat these diseases. However, many producers do not wait the required time between application and milking before selling their milk to processors, resulting in tainted milk that cannot be used to make labneh or cheese. Processors test milk for these contaminants and if found return the milk to the collector or producer. The collector loses money from the transportation, and the producer from the sale of milk.

Inefficient use of animal manure for agricultural activities

Generally, small livestock producers are also vegetable farmers with greenhouse or open-field production systems. While aware of the benefits of manure for agriculture, small herder farmers are not knowledgeable on the proper application methods and have no knowledge of composting. Some herders sell 40 - 50 kg bags of manure for as little as 500LL to input suppliers, then buy back the pelletized manure for around 30,000 LBP for 50 kilos to use on their plants. Others simply throw fresh manure on their crops, which ends up burning the roots, or requires the application of pesticides to kill the resulting worms. Furthermore, manure is often stored improperly in open-fields, attracting flies that can affect broader public health in the area.

Unhygienic production of household artisanal cheeses

Household dairy production is a longstanding tradition in Lebanon using artisanal methods to produce yoghurt and cheese products such as *labneh*, *shanklish*, *fermented cheese*, *arayish* or *salted milk whey*, and *ambriss* (also called *jebnet el fokhara* or *sardale*.) Artisanal methods of production use raw milk that is often stored and processed in unhygienic conditions, and may contain high amounts of bacteria including *E. coli*.

Past dairy sector development programs (e.g. FAO) have distributed hygienic production equipment to household producers of artisanal *labneh* and *baladi* cheese production, but have not addressed the production of the artisanal cheese *ambriss*. *Ambriss (sardale)* is widely produced in small rural communities throughout the Bekaa, mixing raw goat milk and salt in clay pots, draining the resulting whey, and repeating daily for one month, usually in July and August. It's popular in rural communities, particularly at the household level, but



consumption is limited by consumer fears over unhygienic production. Those producers who have a reputation for cleanliness have orders placed months in advance, and routinely sell out their supply.

#### Strong consumer demand for small ruminant dairy products such labneh, kishk, and baladi cheeses

Lebanon continues to be one of the highest per capita consumers of dairy products globally. However, Lebanon's population has some of the highest prevalence of lactose intolerance in the world, affecting almost 78% of population<sup>3</sup>. Goat and sheep milk products, while still containing lactose, are more easily digestible and are therefore less problematic for the average Lebanese consumer.

In interviews with SME processors, all cited an increased demand for goat and sheep dairy products in the past couple of years, and are interested in diversifying their product line away from the traditional products like *labneh*. Due to higher fat content, goat labneh production is labor intensive and time consuming, taking about 8 days to prepare when compared to 1 day for cow's milk.

#### Lack of product marketing by processing co-operatives

Dairy processing co-operatives have enjoyed years of technical and financial support from various development projects in Lebanon, therefore do not generally need basic equipment or further production training. For many, their products are considered high quality, and are in high demand among consumers who know them. Some co-ops, such as Imm Touma in Aita Fekhar, private label part of their production to reputable distributors such as Fair Trade Lebanon. However, outside of such private label brands, most co-operatives have extremely poor or no labeling, package in the same type of jars—not allowing for product differentiation—as well as poor marketing, all resulting in low consumers awareness, under utilized processing equipment capacity, low product sales, and under-employed staff (part time versus full time).

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<sup>3</sup> <http://www.ncbi.nlm.nih.gov/pubmed/484518>



## OPPORTUNITIES

### Distribute improved goat breeds to increase milk production

Lebanon's neighbor Cyprus is the world leader in rearing improved breeds of *shami* goats. Specifically bred for milk production, these goats produce between 4kg – 5 kg/day on average, compared to just ½ kg – 1 kg/day average for Lebanese breeds. The *shami* breed is easily adapted to harsh conditions and has excellent potential for high fertility, growth and milk production. For many small herders, goats are seen as preferable to sheep because of their longer milking season. Goats are hardier animals than sheep, and can roam farther in search of food.

Purebred *shami* bucks could be provided to semi-intensive herders with the capacity to manage breeding and/or crossbreeding. These bucks would be cross-bred with the existing herd, improving milk production for next year, or can be used as a stud, offering the buck for rent to area herders. Pregnant purebred does can be supplied to vulnerable households for an almost immediate improvement in income through increased milk production. This approach has been successfully tested in southern Lebanon under the FAO project LRF-702. Mating local goats with imported *shami* bucks under that project saw a 30% increase in milk production for their offspring. FAO is preparing to issue a tender in July 2014 to source improved breeds from Cyprus. In discussion with Dr. Kayouli/FAO, he offered the opportunity for PPLL to jointly procure improved breeds and with FAO helping provide guidance on the beneficiary selection process. The estimated cost per animal is \$600 - \$1,000.

### Distribution of feed to lower rearing costs and improve milk production

A feed distribution program would greatly reduce production costs, reduce the need for herders to cull their herds and improve milk production.

Feed needed to sustain herds during winter months (October to March) is a significant portion of animal rearing costs, at about \$.60/head per day, or \$150 - \$200/head annually. This is a heavy burden on those small herders with flocks of around 60 – 70 animals. The decrease in available grazing land due to drought and the Syrian conflict has caused herders to start buying animal feed earlier, threatening to increase feed costs by as much as 50% (to cover three months), and creating strong incentives for herd culls to minimize costs.

Better nutrition directly correlates to better milk production and healthier animals. Nutritious feed improves the quantity and fat content of milk, making it more valuable to processors. It makes animals stronger, helping them resist disease, and reduces young animal mortality through stronger, healthier offspring.

PPLL can work through milk collectors to identify the most vulnerable producers. Collectors have existing relationships with producers and can quickly provide initial information on each individual's production quantity and problems with production, which is important for verification of the each individual producers situation.

### Improve wintering animal shelters to reduce animal mortality and disease, and reduce production costs

Small ruminants (especially goats) require well-ventilated shelters with at least 2 square meters of space per animal in order to prevent sickness and disease, and reduce injury from fighting. Generally, many of the most



vulnerable SR dairy producers have cramped and rudimentary shelters for their animals ranging from tin walls haphazardly fixed together with canvas roofs held down by rubber tires to cement block walls with leaking tin roofs. Substandard animal shelters negatively affect animal health; promoting disease, increase animal stress which contributes to young animal mortality and abortions, of up to 25% this year.

Herders settle on the Bekaa plain in the winter, strong storms can damage animal pens, putting financial strain on vulnerable households especially when there is no income from milk production. Constructing sturdier pens, with permanent, sealed roofing that keeps precipitation out of animal enclosures is an important intervention to improving animal health, and subsequently production.

#### Subsidize vaccinations, tests and treatments to vulnerable small ruminant dairy producers

Diseases are very common within herds owned by small ruminant dairy producers, contributing to such negative outcomes as 20-25% young animal mortality rates reported for 2014, and traces of antibiotics in milk that render it unfit for human consumption. While Lebanese government animal health campaigns are ongoing, these campaigns are concentrated in Baalbek, and not all small herders receive treatment for their animals, and very few practice adequate prevention measures. Aside from the cost of lost animals and milk production, a veterinarian visit costs about 50,000LBP, plus the price of the vaccination per animal. This is out of reach for some of the most vulnerable herders, who could otherwise benefit from improved animal health and greater milk production.

Subsidized treatments to small dairy producers could include vaccinations against enterotoxaemia, brucella (Malta fever), endoparasites and sheep pox; screening (for both humans and animals) for ectoparasites and endoparasites, and/or using milk-testing strips to detect mastitis, which would reduce the need for antibiotics and subsequent veterinarian visits.

#### Capture value currently lost at producer level by upgrading collection and processing of small ruminant byproducts, such as manure and wool

Many small ruminant dairy producers currently discard potentially valuable byproducts of goat and sheep rearing, such as manure and wool. Some herders simply give away manure due to lack of storage space, or sell 40 kgs – 50 kgs bags of it for as little as 500LL for processing into fertilizer pellets by local agricultural input suppliers, which in some cases are sold back (at a much higher prices) to those producers who also farm. Similarly, sheepherders pay a \$1 per head shearing fee, and the wool is then dumped or otherwise discarded as traditional mattress stuffing with wool has declined.

There may be opportunity to convert this existing wastage into an additional revenue stream for producers or help minimize associated costs, either by identifying new sales channels for wool and manure, or by developing new activities for small farmer/herder communities such as bio-composting. Bio-composting, especially on small integrated farmers, is an effective way to reduce production costs associated with fertilizers and reduce pesticide residues on crops. The opportunity exists to develop instructional composting plots for small farmer/herder communities either through renting small plots of land, or engaging a small lead farmer/herder with ample land allowing herders to sell their compost to area farmers, or using it on their own agricultural land.



### Subsidize milk testing, storage, and processing equipment for cooperatives, collectors, and small-scale processors to improve hygiene, product quality and traceability

Some small ruminant dairy producers do not have adequate containers for collecting milk, relying instead on plastic jugs or substandard metal (aluminum or stainless steel) tanks. Distribution of stainless steel collection tanks would improve quality, hygiene and traceability of milk during the collection and transportation of milk to processors. 20 or 30 liters stainless tanks are used in Lebanon, and cost around \$100 - \$135 each, and if combined with improved nutrition programs could improve milk value by 20% - 30%. These distributions could be organized in cooperation with the milk collectors (*hallabs*) who would deliver new containers during their regular visits to producers.

Milk with excess water content or traces of antibiotics is either less desirable or not suitable for dairy processing. Milk testing equipment that analyzes milk for fat and water content and traces of antibiotics and penicillin is therefore essential for dairy processors. Processors who detect deficiencies return the milk to collectors, who in turn either find a new processor who will accept the milk, or negotiate its return with the producers. Tainted or otherwise rejected milk represents additional operating costs for collectors and lost income for producers.

While SME processors generally have such equipment, many smaller co-operatives and collectors cannot afford the added cost. Subsidizing the cost of testing strips and equipment to collectors for on-farm testing would reduce transport costs and the risk of losses associated with tainted milk.

Likewise, some small-scale processors, such as Sawsan al Faraj in El Rashid, are very adept at making traditional cheese and yoghurt products, and enjoy strong consumer demand. However, their production is limited by their capacity to store refrigerated milk, and the required equipment represents a significant investment for market actors who have difficulty accessing finance and face high business risks. Providing equipment such as refrigerated storage tanks would allow small processors to expand production during periods of peak demand, and improve operations more broadly.

### New product development and marketing support for dairy processors and co-operatives to increase demand

Small ruminant processors see strong demand for goat and sheep dairy products. They are experts in making traditional products such as *labneh*, *baladi* cheeses, and *kishk*, but have little knowledge of new products. Massabki, for example, is a leading producer of goat *labneh*, producing 150 tons annually, and while they see a strong demand for more goat *labneh* in the market, they are reluctant to expand production because goat milk products are more labor-intensive than cow milk products (e.g. goat *labneh* requires 8 days of production time versus 1 day for cow *labneh*), and would require significantly larger production facilities.

Assisting in the development of new dairy products could overcome some of these constraints, especially introducing new cheeses that are less labor-intensive. This approach has been successfully adopted in the past by the USAID Action for Sustainable Agro Industry in Lebanon (ASAIL) project, which trained processors on the manufacture of cheeses such as feta and capricious (a parmesan-like cheese made from goat milk), and allowed local businesses such as Jaber and Jaber Sons, Dairy Khoury, and Akl Dairy to significantly expand production. Training on these and other new products (such as French-style *chevre* cheeses) would strengthen the small ruminant dairy sector, and ensure strong demand for milk.



While a select number of rural co-operatives produce exceptional products, thanks in part to significant training and assistance on food production from donor projects since 2006, many of these co-operatives lack the marketing skills needed to expand their business beyond their current customer base. For example, Imm Touma in Aita Fekhar produces about 20 tons of goat *labneh* and is regarded as one of the best small producers in the country by her private label customers, but has no marking or labels on her product. Despite having production capacity of up to 60 tons annually, her product is now sold chiefly through word-of-mouth, which limits demand.

[Provide improved household dairy production materials to vulnerable households to improve hygiene and public health, and marketing support through co-operatives](#)

*Ambriss* is very popular artisanal goat cheese, mostly produced in households and under unhygienic conditions that contribute to public health risks including E. coli. An opportunity exists to distribute improved production materials, including stainless steel containers to replace traditional clay pots, to households producing *ambriss*, along with training on ensuring cleanliness and minimizing risks of contamination.

The opportunity also exists to engage artisanal *ambriss* producers through larger trusted producers, such as Josephine Adib Neim, president of the women's craft co-operative in Kerbet Qanafar. Mrs. Neim has successfully replaced traditional production materials with a more modern production line (including stainless steel vats) to better regulate temperatures and ensure a hygienic product. Mrs. Neim expressed willingness to train women in vulnerable households on more modern processing and production techniques, as well as market their *ambriss* through the co-operative as a tested hygienic product.



## CONSTRAINTS

### Large numbers of vulnerable households will complicate beneficiary selection

Development programs are intrinsically inclined to selecting the poorest, most vulnerable populations for their interventions. This is usually done through a carefully formulated selection criteria to categorize beneficiaries by wealth. In the small ruminant dairy sector, herd size does not directly translate into wealth, meaning that those herders with fewer animals are not necessarily poorer than those with more. This should be taken into account when formulating beneficiary selection criteria to avoid marginalizing the poorest herders.

Additionally, small ruminant dairy producers are among the Lebanese communities most negatively affected by the Syrian crisis. They face reduced access to grazing lands and increased competition over resources including water. This means that there are a large number of vulnerable people that would benefit from any type of assistance by PPLL. Unfortunately, the program has a set budget and cannot assist everyone. Careful selection criteria must be established to avoid political and social conflict over assistance.

### Improved breeds for milk production should be imported, have different animal rearing requirements

Improved breeds of *shami* goats and *awassi* sheep are available in Lebanon through ICARDA and LARI. However, these sheep are not bred for milk, rather for a “Roman” (or elongated) nose, which is preferred by consumers in the Gulf. Improved breeds for milk production are available in Cyprus and should be sourced from there through a tendering process or in collaboration with FAO. While improved breed of Shami goats are acclimated to the Lebanese geography and climate, they do require additional care including adequate shelter from cold and rain. Generally, production systems utilizing improved Shami goats do not use extensive grazing (like Baladi breed), therefore full genetic potential can be best realized under the semi-intensive system.

### Limited herder technical knowledge and experience outside of traditional activities, lack of resources

Generally, small herders lack of experience outside of herding and milking; or management and treatment of disease. Interventions designed to help herders capture added value through composting, on-farm milk testing may be difficult and will require significant supervision. In addition, surveys by past development programs, showed relatively high illiteracy rates, of about 34% among producers which forces program to revise their training materials and methodology.

A major issue with some small farmer holdings is the lack of space to allocate for composting activities. In villages like Bednayel, a herder/farmers literally give away their sheep manure due to the lack of storage space, and do not see the benefit of renting additional land for keeping their manure for agriculture activities. Potential interventions should take look into possible rental of land for to encourage common composting between small farmers, or enlist a lead farmer as a demonstration site.

### Limited processed product packaging options

An important part of marketing is differentiating a product from its competitors. Unfortunately in Lebanon, packaging for small producers is extremely limited both in design and volume. Bottles and jars come in the standard 250 ml, 350ml, 500ml, 1,000 ml size, in one shape with green or white lids, therefore providing little





design options for producers to make their products stand out. This is compounded by generally poor label design, or non-existent label design, and the lack of product promotion and marketing.



## KEY RISKS

### Political interference in beneficiary selection

Any move to improve production techniques or otherwise upgrade the value chain would be very popular, and therefore potentially very politically sensitive, so it would be necessary to establish well-defined selection criteria for beneficiaries. The relatively high value of the assistance, and the fact that individual farmers do not have resources to source high value inputs (such as equipment or improve genetic stock) directly make assistance especially politically sensitive. The small ruminant dairy sector is more rural, and therefore engages Lebanese poor more directly. The FAO reported significant political interference in their distributions by political figures, especially around Baalbek.

### Lack of demand for increased production (whether milk or processed products) without integrated intervention

Any increased production of milk would likely be supported by strong latent demand identified among processors. However, while the key for ensuring high prices to producers is a consistent focus on quality (fat content, hygienic production environment, lack of contaminants, etc.), the key to ensuring broad increases in demand for either milk or processed milk products will be an integrated approach across the value chain. There is a risk that interventions designed to improve yield of goats will stall because collectors are not able to ensure timely and hygienic collection of milk or, further along the value chain, because processors are not able to find markets for their value-added products like yoghurts and cheeses. Any intervention would do well to focus on the entire value chain, stretching from improved production techniques to improved marketing.

### Potential harm to small collectors by picking winners and losers

All producers sell their milk in some form, either through a collector or directly to a processor, and free equipment or related subsidies may distort this market. Supporting certain milk collectors, or channeling assistance through their operations, while an efficient means of program design and reach a broad network of producers, may encourage some producers to switch collectors in order to secure benefits offered under PPLL. This assistance might negatively impact other (possibly more vulnerable) collectors, lowering their income, and resulting in a net neutral impact. It is important for PPLL to mitigate this risk by focusing efforts at the producer level, and allow them to decide how to allocate their milk to collectors or processors.



**TABLE: TRENDS, OPPORTUNITIES, CONSTRAINTS, RISKS**

Trends	Opportunities	Constraints	Risks
Strong demand from milk processors for goat and sheep milk when quality is assured	Distribute improved goat breeds to increase milk production	Large numbers of vulnerable households will complicate beneficiary selection	Political interference in beneficiary selection
Extremely low milk production for local breeds compared to improved breeds	Distribution of feed to lower rearing costs and improve milk production	Improved breeds for milk production should be imported, have different animal rearing requirements	Lack of demand for increased production without integrated intervention
Lack of quality grazing pastures, due to weather-related issues and Syrian conflict, resulting in rising feed prices and herd culls	Improve wintering animal shelters to reduce animal mortality and disease, and reduce production costs	Limited herder technical knowledge and experience outside of traditional activities, lack of resources	Potential harm to small collectors by picking winners and losers
Syrian conflict and water scarcity is encouraging and accelerating transition from extensive to intensive herding	Subsidize vaccinations, tests and treatments to vulnerable small ruminant dairy producers	Limited processed product packaging options	
Despite increased use of high-quality stainless steel tanks for transportation, low-quality tanks are still used in vulnerable areas	Capture value currently lost at producer level by upgrading collection and processing of small ruminant byproducts, such as manure and wool		
High incidence of on-farm disease such as mastitis and foot and mouth (FMD) resulting in antibiotic- and penicillin tainted milk	Subsidize milk testing, storage, and processing equipment to improve hygiene, product quality and traceability		
Strong consumer demand for small ruminant dairy products such labneh, kishk, and baladi cheeses	New product development and marketing support for dairy processors and co-operatives to increase demand		
Lack of product marketing by processing co-operatives	Provide improved household dairy production materials to improve hygiene and public health, and marketing support through co-operatives		



## ANNEX I : ORIGINAL VALUE CHAIN SELECTION MATRIX

Value Chains	Vulnerability & Beneficiary Profiles Criteria					Market Structure Criteria				PPLL Design Constraints Criteria					VC Upgrade Strategy Criteria					Score
	Existing/stable VC in vulnerable communities	Opportunity to benefit poor households	Potential to engage women	# small producers (< 2 ha.)	Potential to bundle / group producers	Current unmet demand	Potential sales to local market(s)	Activity across Bekkaa	Potential for contract farming / private label	Length of growing (prod.) season	Potential for low-cost intervention(s)	Potential to bundle activities across VCS	Multiple activities possible within VC	Complementary linkages with other programs	High-value product	Potential for value-added products	Low input requirements	Low water requirements	Local availability of improved production methods	
<b>Dairy (Small Ruminants)</b>	High	High	High	High	High	High	High	High	High	High	High	Med	High	High	High	High	Low	High	Med	<b>53</b>
<b>Cucumbers and gherkins</b>	High	High	High	Med	High	Med	High	High	High	Med	High	High	Med	Med	Med	Med	Med	Med	High	<b>48</b>
<b>Eggplant</b>	High	High	High	Med	Med	Med	High	High	High	Med	High	High	High	Med	Med	Med	Med	Med	High	<b>48</b>
<b>Tomato</b>	High	High	Med	Med	Med	Med	High	High	Med	Med	High	High	High	Med	Med	Med	Med	Med	High	<b>46</b>
<b>Honey</b>	High	High	Med	Med	High	Med	High	Med	High	Med	High	Low	High	Low	High	Med	Med	High	Low	<b>44</b>
<b>Chilies and peppers (capsicum)</b>	High	High	Med	Med	Med	Med	High	Med	Med	Med	High	High	Med	Med	Med	Med	Med	Med	High	<b>44</b>
<b>Eggs in shell</b>	High	High	Med	Med	High	High	High	High	Low	High	High	Low	Med	Low	High	Low	Med	High	Med	<b>44</b>
<b>Herbs and Spices</b>	Med	High	High	Med	High	Med	Med	Med	High	Low	High	Med	Med	Low	High	High	Med	High	Low	<b>43</b>
<b>Medicinal Herbs</b>	Low	Med	High	Med	High	High	Med	Med	Med	Low	High	Med	High	Low	High	High	High	High	Low	<b>43</b>
<b>Berries</b>	Med	Med	High	Low	High	Med	Med	Low	High	Low	Med	Med	Med	Med	High	High	Med	Med	Med	<b>40</b>
<b>Legumes</b>	High	High	Med	Med	Med	Med	Med	High	Med	Med	Med	Med	Med	Low	Med	Med	Med	Med	Low	<b>39</b>
<b>Pumpkins, Squash, and Zucchini</b>	High	High	Med	Med	Med	Med	Med	Med	Med	Low	Med	Med	Med	Med	Med	Med	Med	Low	Med	<b>38</b>
<b>Stone Fruits</b>	High	Low	Med	High	Low	Med	High	High	Med	Low	Med	Med	Med	Low	Med	Med	Med	Med	Med	<b>38</b>
<b>Pome Fruits</b>	High	Low	Med	High	Low	Low	High	High	Med	Low	Med	Med	Med	Low	Med	Med	Med	Med	Med	<b>37</b>
<b>Dairy (Cow)</b>	Med	Low	Med	Low	Med	Med	High	Med	Med	High	Low	Low	Med	Med	High	High	Low	Low	Med	<b>36</b>
<b>Live Poultry</b>	High	Low	Low	Low	Med	Med	High	Med	Low	High	Low	Low	Low	Low	High	High	Med	High	Med	<b>36</b>
<b>Fresh Grapes</b>	High	Low	Low	Med	Low	Med	High	Med	Med	Low	Med	Low	Med	Low	Med	Med	Med	Med	Low	<b>33</b>
<b>Watermelon &amp; other melons</b>	High	Med	Low	Med	Low	Med	Med	Med	Low	Low	Med	Low	Low	Low	Med	Low	Med	Med	Med	<b>31</b>
<b>Olive Oil</b>	Med	Low	Low	Low	Med	Low	Med	Med	Med	Low	Low	Low	Low	Low	Med	High	Low	High	Med	<b>30</b>
<b>Nuts (Almonds, Walnuts, Chestnuts)</b>	Med	Low	Low	Low	Med	Med	Med	Med	Low	Low	Low	Low	Low	Low	Med	High	Med	High	Low	<b>30</b>



<b>Leafy Greens</b>	Low	Low	Low	Low	Low	High	Low	Low	Low	Med	Med	Med	Med	Low	Med	Low	Med	Med	Med	<b>29</b>
<b>Potatoes</b>	High	Low	Low	Low	Low	Med	Med	Med	Low	Med	Med	Low	Low	Low	Low	Med	Med	Med	Low	<b>29</b>
<b>Floriculture</b>	Low	Low	Med	Low	Low	High	Low	Low	Med	High	Low	Low	Low	Low	High	Low	Low	Low	Low	<b>27</b>
<b>Onions</b>	High	Low	Low	Low	Low	Low	Med	Med	Low	Med	Med	Low	Low	Low	Low	Low	Med	Med	Low	<b>27</b>



## ANNEX II : LIST OF INTERVIEWEES

### Value Chain Interviewees

Interviewee Name	Location	Occupation
Mr. Sajii Karam	Mashghara	Goat herder
Mr. Issam Karam	Kherbet Anafar	Small producer with livestock
Mr. George Tohme	Qaa	Small producer with livestock
Mr. Deeb Kaddour Kanjo	Brital	Small producer with livestock
Mr. Chafiq Maacaroun	Riyak	Large producer with livestock
Hajj Kassem (Ibrahim Ali Younes)	Brital	Large producer with livestock
Mr. Razzouk El Gharib	Aita el Fekhar	Milk Collector
Mr. Bassem Kabalieh	Bednayel	Milk Collector
Mr. Mesaab Kanaan	Al Marj	Head of Village Dairy Cooperative
Mr. Abbas Mazloun	Brital	Head of Village Dairy Cooperative
Mr. Samir Dirani	Ksarnaba	Dairy Processor
Mr. Bassem Hajjar	Mashghara	Dairy Processor
Mr. Bernard Mechaalany	Mreyjat	Dairy Processor
Mrs. Sawsan Faraj	Rashaya	Women's Processing Coop
Mrs. Linda El Feyek	Rashaya	Women's Processing Coop
Dr. Ali Raad	Baalbek	Veterinarian
Dr. Jad Maacaroun	Riyak	Veterinarian
Dr. Jamal Khazaal	Zahle	Veterinarian
Dr. Chedli Kayouli	Zahle	FAO Project Manager
Mr. Philip Adaimy	Beirut	Marketing for Fair Trade Lebanon

### Municipality Interviewees

Interviewee Name	Location	Occupation
Mr. Saadeddine Ibrahim Mayta	Bar Elias	Municipality head
Mr. Mohamad El Sarout	Bar Elias	Deputy municipal head
Mr. Fadi Shibli	Bar Elias	Municipal contracts manager
Mr. Nazem Youssef Saleh	Marj	Municipality head
Mr. Walid Abdullah Darwish	Marj	Deputy municipal head
Mr. Dergham Touma	Qab Elias	Deputy municipal head
Mr. Mohamad Abi Nassif	Qab Elias	Agricultural Development manager at the municipality