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# **Project Completion Report Lebanon Industry Value Chain Development (LIVCD) Project**

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**Project Completion Report**  
***Lebanon Industry Value Chain Development (LIVCD)***

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## Acronyms

CCIAT	Chamber of Commerce, Industry and Agriculture in Tripoli
CCIAZ	Chamber of Commerce, Industry and Agriculture in Zahle
CDCS	Country Development Cooperation Strategy
CODEX	Codex Alimentarius – international system for food safety standards
DAI	DAI Global LLC
DO	Development Objective (USAID)
E2	Engineer and Educate (start-up tech industry)
EDA	Ehmej Development Association
EOI	Expression of Interest
ESS	Electro-Static Spraying
EC	European Commission
EVOO	Extra Virgin Olive Oil
GA3	Gibberellic Acid
GAP	Good Agricultural Practices
GCC	Gulf Cooperation Council
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis Critical Control Point
HORECA	Also HoReCa – Hotel / Restaurant / Catering sector
IDAL	Investment Development Authority of Lebanon
IPM	Integrated Pest Management
IR	Intermediary Result
ISO	International Standards Organization
LARI	Lebanese Agriculture Research Institute
LBP	Lebanese Pound
LIBNOR	Lebanese Standards Institution
LIVCD	Lebanon Industry Value Chain Development
MSME	Micro, Small, and Medium Enterprise
NGO	Non-Governmental Organization
NI	National Instruments
S.A.R.L.	Société à Responsabilité Limitée
UNDP	United Nations Development Programme
UNFAO	United Nations Food and Agriculture Organization
USAID	United States Agency for International Development
VC	Value Chain
VSH	Varroa Sensitive Hygiene
JAZ	Jezzine and Zahrani S.A.R.

## I. Executive Summary

USAID launched the six-year-four months, \$46.2 million Lebanon Industry Value Chain Development (LIVCD) project under the U.S. Government's Feed the Future initiative in September 2012. By facilitating 211 public-private partnerships and generating \$140 million in sales by Lebanese farmers and companies, LIVCD has strengthened the agriculture and agro-processing sectors and supported Lebanese products to become more competitive in both domestic and international markets. The project started with comprehensive and consultative evaluations of potential value chains for project interventions, to identify constraints and pinpoint windows for development opportunities. This process lasted for six months and resulted in LIVCD working in the following nine target value chains<sup>1</sup>:

- Apples
- Avocados
- Cherries
- Grapes
- Honey
- Olive oil
- Processed foods
- Rural basket (oregano, pine nuts)
- Rural tourism

Instrumental to sustainability and partner buy-in, LIVCD held a cost sharing philosophy where prospective partners must be willing to contribute at least a 25-50 percent cost share, often even more. The project used facilitation techniques and targeted in-kind and technical support to craft private sector-led, Lebanese-owned interventions. LIVCD provided \$14 million in technical support and grants across nine value chains that stimulated innovation; generated \$41 million in private sector and farmers' leveraged investments; and trained 1,255 micro, small, and medium enterprises (MSMEs) on ways to access finance and loans, 103 of which successfully obtained bank loans or private equity. LIVCD both raised awareness of financing options and helped individual companies with their loan applications. This support resulted in \$19 million in loans disbursed to LIVCD beneficiaries during the life of the project.

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<sup>1</sup> Floriculture was removed from LIVCD's portfolio in Year 2 after local and regional dynamics were determined to impede successful implementation of interventions in this value chain; too much of the value chain was under the control of a very small number of operators. The decision to eliminate this value chain was made in agreement with USAID and before any technical activities were undertaken.

Through close coordination with its beneficiaries to improve their production, processing, and marketing capabilities, LIVCD altered the value chains in dramatic ways that will be described in this report. With 211 grants and hundreds of technical assistance activities, this report cannot cover the full extent of LIVCD's work in detail, but it highlights the high-level impacts and key accomplishments LIVCD has had on Lebanese agro-industries and rural populations. Following a brief background section, part 3 of this report outlines the strategies LIVCD took to address

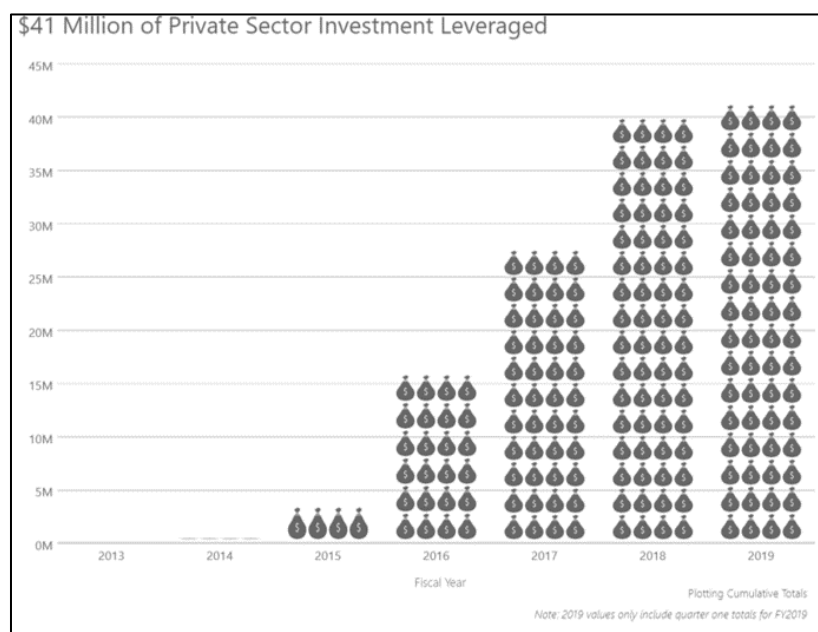


Figure 1: Private sector investment leveraged by LIVCD

constraints and seize opportunities in each value chain. It also describes the project's key interventions and high-level impact in each sector. Report sections 4 – 7 describe the interventions in more detail and are organized thematically using case studies to discuss:

- orchard establishment: Good Agricultural Practices & Introduction of New Varieties
- harvest and post-harvest practices: Adoption of new practices and technologies
- new product and process development, and
- marketing initiatives.

The interventions are organized by the select value chains where these activities were most essential. Because the nature of the rural tourism value chain differs from the agriculture sectors LIVCD targeted, section 8 includes case studies on how the project worked to transform that sector. Section 9 discusses women's participation in LIVCD activities and how this played out in two value chains – processed foods and rural tourism. Next, section 10 describes how LIVCD developed and managed its training programs – a key component in many of the project's activities, paired with grants and technical assistance – and the training priorities in each value chain. Section 11 outlines project outreach and communications activities, notably, public events, awareness campaigns, exhibitions and shows, and increased exposure through TV, radio, newspapers, and social media. Following this, section 12 focuses on the efforts LIVCD made to encourage and help farmers and MSMEs to apply for loans, including teaching partners about available sources of finance, developing feasibility studies for specific investments, and training loan officers in financial institutions about investing in LIVCD's target value chains. It also summarizes the investments LIVCD was able to leverage – an impressive \$41 million. Section 13 provides conclusions and recommendations. It analyzes why and how LIVCD was able to achieve its results and proposes priorities for future value chain projects, based on the opportunities, challenges, and characteristics of each sector. Lastly, annexes A, B, and C provide a list of LIVCD grants, project results by performance indicator, and a project financial report, respectively. Watch the [LIVCD Final Video](#)

## 2. Background

LIVCD approached value chains logically and holistically: it conducted market assessments, identified constraints and opportunities, and designed activities to relieve or address the constraints and take advantage of the opportunities. From project inception, the LIVCD team worked closely with key stakeholders such as input suppliers, farmers, and cooperatives from each value chain to piece together the most comprehensive and up-to-date information on baseline conditions. LIVCD thus understood each value chain's production parameters, key players, market dynamics, consumer habits, and export destinations. For fresh produce, for example, LIVCD focused on domestic, European, and Gulf Cooperation Council (GCC) markets given their geographical proximity. It was clear that relative to its regional competitors, Lebanon has a high cost of production and as such would not be competitive selling traditional products, so the project encouraged and supported producers to take the extra step to focus on high value products and improve their products' quality to meet consumer demand in higher-value market segments. Although there were nuances within each value chain, there were several key constraints common to all the value chains:

- Regional instability that causes market instability and cuts off access to traditional markets
- Massive barrier to entry in export markets stemming from a reputation of Lebanese producers' lower quality products that do not meet international standards, such as acceptable pesticide residue levels on fruit and vegetables
- Lack of mitigation responses to climate incidences (hail, storms, frost, etc.) and pests
- Lack of Good Agricultural Practices (GAP) stemming from the disconnect between agricultural research facilities and farmers
- Lack of service centers that consolidate technical knowledge and provide individual farmers a collective voice
- Traditional, low value varieties/products
- Hesitation to invest in new technology due to being afraid of the unknown, risk averse, and lack of access to finance or awareness of financing possibilities

Over its six and a half years, LIVCD simultaneously addressed the constraints common to all value chains, capitalizing on any opportunity to create a ripple effect when possible by sharing and marketing results of its successes. Although farmers were often hesitant to take the leap and invest in new technology or change their practices, LIVCD found that a breakthrough success with one farmer was sometimes all it took to get several more on board with recommended changes. This chain reaction effect led to transformative impacts in each of the value chains. To spark the change in each value chain, LIVCD often focused on:

- Introducing plant cultivars and varieties to boost production and meet market demand
- Introducing and promoting the adoption of new technologies
- Improving marketing techniques for producers, processors and rural tourism providers to reach new market channels and create market linkages
- Providing access to finance / leveraged investments
- Improving post-harvest practices

Before presenting case studies from each of these themes, the following section will shed light on the nuances of each value chain by detailing baseline constraints and the key interventions LIVCD used to address these constraints. It will also highlight the transformative impact LIVCD had on each value chain.



Baseline  
Conditions,  
Actions  
Taken, and  
Impact by  
Value Chain

### 3. Baseline Conditions, Actions Taken, and Impact by Value Chain

#### **Apples**

Between 20 and 30 thousand Lebanese farmers produce apples. Production occurs throughout the country, with a majority in the northern half of the country at higher elevations. Most apple production units are less than one hectare. In 2012, at the start of the LIVCD project, Lebanese apple farmers produced an average of 20 tons per hectare on about 13,500 hectares of land, which is relatively high by international standards<sup>2</sup>. However, the percentage of high-quality apples only amounted to 15-20% of total production, which was insufficient to ensure a sustainable supply for the higher value markets. For farmers in certain parts of Lebanon, apple production is an integral part of a diversified income strategy. It is not labor intensive, like some other field crops, but provides a low to moderate, however reliable source of income.



LIVCD chose to work in the apple value chain because it offers opportunities to increase income and employment of thousands of rural Lebanese throughout the country. LIVCD envisioned that the apple value chain could become “a competitive and profitable industry that dominates regional markets in terms of quality and value, offering good returns to participants and stimulating reinvestment.”<sup>3</sup>

LIVCD set out to achieve that vision through the following:

- Employ modern agriculture practices that promote healthy, efficient, and profitable production;
- Provide diverse and profitable sales channels for farmers;
- Stimulate investment in rural enterprises with a focus on production and processing leading to increases in income for rural actors;
- Help Lebanese apple producers to be valued as highly competitive, regional players that define the market and can supply every consumer segment.

#### **Strategy**

Production strategy: Support regionally specific programs to improve production and post-harvest handling. One of the most perplexing issues facing the apple value chain is how to

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<sup>2</sup> From the LIVCD Pome Fruit Value Chain Assessment. April 2013

<sup>3</sup> From the LIVCD Pome Fruit Value Chain Assessment. April 2013

provide assistance to the thousands of small-scale apple farmers scattered throughout the country. Finding a means to reach farmers was essential to extend new production techniques and new and more valuable varieties with the goal of producing additional Grade A apples to meet both domestic and export demand. It was also important to lower average production costs. LIVCD sought opportunities to work with lead farmers and cooperatives on business development services, including assisting apple cold storage owners to upgrade their facilities with loans and grants.



Grade A apples

**Market strategy: Expand beyond reliance on Egypt to other regional markets.**

Lebanese apple farmers were highly dependent on the Egyptian market where 50% to 60% of total apple exports were destined for Egypt. This market accepted unsorted apples, that is, low quality and high quality (Grade A) apples shipped in the same containers. The political turmoil in Egypt that was a result of the “Arab Spring” put this market at considerable risk. In addition, Egypt’s consequent currency devaluation reduced purchase prices to values below production costs. Despite the Lebanese Government’s decision to subsidize farmers to compensate them for their losses, the collapse of the Egyptian market has prompted producers to redouble their efforts to access non-traditional markets. With improved production processes that reduce pesticide residues and improve varieties, grading, and consistency, European markets and higher value market channels within Gulf Cooperation Council (GCC) countries are within reach. India, Russia, and various African countries are also new target markets.

While LIVCD worked with producers and exporters to find new markets, the project also concluded that the local demand for high quality apples was strong and growing. High quality apples in Lebanon were relatively expensive. LIVCD determined that the domestic market would be able to absorb considerable increases in Grade A apples, especially if farmers adopted more efficient production techniques that could reduce apple prices.

**Processing strategy: Identifying new uses for lower-grade apples.** As noted above, the project determined that Lebanese apple farmers produced insufficient amounts of Grade A apples yet produced higher amounts of second-grade fruit, which fetch lower prices and cannot easily be sold as fresh produce in supermarkets. In tandem with efforts to increase the production of Grade A apples, the LIVCD apple value chain team, in cooperation with the processed foods value chain team, determined the need to link farmers with processors of vinegar, apple juice, apple chips and dried fruits who can absorb lower grade apples.

## Key interventions

LIVCD's initial value chain assessment led the project to start with two key parallel interventions: 1) creation of "service centers" to aggregate farmers into unified groups through which the project could provide assistance; and 2) establishment of demonstration plots to promote intensive plantation systems. In later years, LIVCD also made investments to improve post-harvest services such as apple sorting, packing, and cooling, and supported initiatives to increase the utilization of second-grade fruit.

**Service centers:** LIVCD's program to establish service centers was designed to upgrade the capabilities of already well-performing cooperatives to meet the needs of apple farmers. The service centers were a means of reaching members to introduce new technologies, facilitate collective purchase of inputs, and secure direct linkages between farmers and wholesale markets, thereby permitting farmers to secure better prices.



Agriculture center – Ainata, North Lebanon

The four original cooperatives were the Mar Semaan Agricultural Cooperative in Hadath El-Jebbe, the Sannine Cooperative for Sustainable Agriculture in Baskinta, the Global Agricultural Cooperative of Ainata and the Agricultural Association in Brih; and later LIVCD partnered with Agripharm (a private company) in Bcharreh and the Ehmej Development Association (EDA). LIVCD and the management teams of these entities considered the service centers as "one stop shops" for farmers to obtain agriculture inputs, machinery, technical advice, and access to new technology.

The service centers, with assistance from LIVCD, were able to introduce new types of equipment to their members. The Brih, Ainata, and Hadath El-Jebbe service centers introduced *electrostatic sprayers* to local farmers. This equipment allows farmers to reduce their pesticide costs by at least 20 percent and increase spraying efficiency by 50 percent. Improved use of pesticides addresses food safety and environmental concerns, which often hampered Lebanese apple farmers to entering new markets. The service centers also introduced *refractometers and penetrometers*, instruments that indicate fruit maturity and optimum harvest times. Other new equipment popularized through the service centers were soil humidity *tensiometers* (to check soil moisture); *electric pruning shears* (to reduce the time and cost associated with manual pruning); *apple picking baskets* (to maintain fruit quality); and *wood shredders* (to utilize pruned or dead tree branches as organic mulch).

The service centers also implemented collective purchase and marketing schemes. Mar Semaan, Sannine, and Brih service centers conducted programs for collective purchase of fertilizers, seedlings, and pesticides. In addition, they have created brand identities with packaging and logos identifying the apple production location and service center, in order to generate brand loyalty and visibility for each cooperative.

LIVCD also helped to establish a National Task Force that groups cooperatives with foundations, such as the non-profit Frem Foundation, which was able to contribute to the creation of the “National Charter on Good Practices in Pest Control and Traceability of Apple Production in Lebanon” that was later adopted by the Ministry of Agriculture. This program will extend the benefits obtained from implementing improved technologies and practices to hundreds of additional farmers throughout the country.

**Demonstration plots:** LIVCD, in partnership with the above-mentioned service centers and other interested partners, established 13 demonstration plots throughout the country. The demonstration plots introduced vertical and V-shaped intensive production systems, which are much more efficient than conventional apple production. This intervention advanced the use of new varieties, new dwarfing rootstock (which have the added advantage of being very precocious, with high yield efficiency),



V-shaped trellis – Brih, Mount Lebanon

and new agricultural practices resulting in reduced cost, improved apple quality, and increased production per square meter. The results of the demonstration plots are promising. In 2017, the Brih cooperative sold its apples for \$1.33/kg, almost three times the normal selling price of \$0.47/kg, and total yield was more than double the yield of conventional plantations. LIVCD and the service centers expect that the returns to intensive production systems will be \$2.22 for each \$1.00 invested. The demonstration plots led farmers to invest in over 100 hectares of apples using the trellis system.

### **Post-harvest services and**

**processing:** In addition to the service centers and the demonstration plots, the apple value chain worked with investors in apple sorting and storage, and production of apple vinegar and apple juice in addition to establishing in partnership with CCIAT, the first freeze-drying facility in Lebanon. For example, LIVCD partnered with the company Liban Village, and agriculture service center, on a large investment in mechanical sorting and storage using



Apple optical sorting machine – Shapash Bcharre, North Lebanon

solar energy. This innovative investment permitted Liban Village to sell excess energy to the local utility, triple its apple sorting capacity, reduce its sorting cost, and access new market channels with better sorted, higher-quality fruit at lower cost. LIVCD also partnered with Balkis, the largest fresh fruit juice company in Lebanon, to produce fresh apple juice, a product not previously produced in Lebanon. These types of investments provided farmers with additional market channels for both high and lower quality fruit. The Balkis investment and another investment in an apple sorting and packing facility with the company Shapash SARL are highlighted as case studies later in this report.

### **Impact**

LIVCD was able to elevate the apple value chain from a deteriorating value chain to a dynamic one. Overall, LIVCD and partners created the potential for higher profits and improved competitiveness in the apple value chain. High-level achievements are:

- 1,726 micro, small, and medium enterprises (MSMEs), including farmers and other organizations located all over Lebanon, received business development services.
- 113 MSMEs received assistance and training on ways to apply for and access financial services and loans.
- \$2.95 million in loans were disbursed to support MSMEs, resulting from technical assistance.
- 209 women were assisted to improve existing businesses and helped in establishing new businesses.
- 967 farmers and other value chain actors were supported with improved technologies, improved harvesting and post harvesting techniques, and improved handling and storage techniques.
- 456 MSMEs have benefitted from business linkages promoted by LIVCD.
- 906 jobs were impacted
- 1,516 farmers and individuals received training on Good Agricultural Practices.

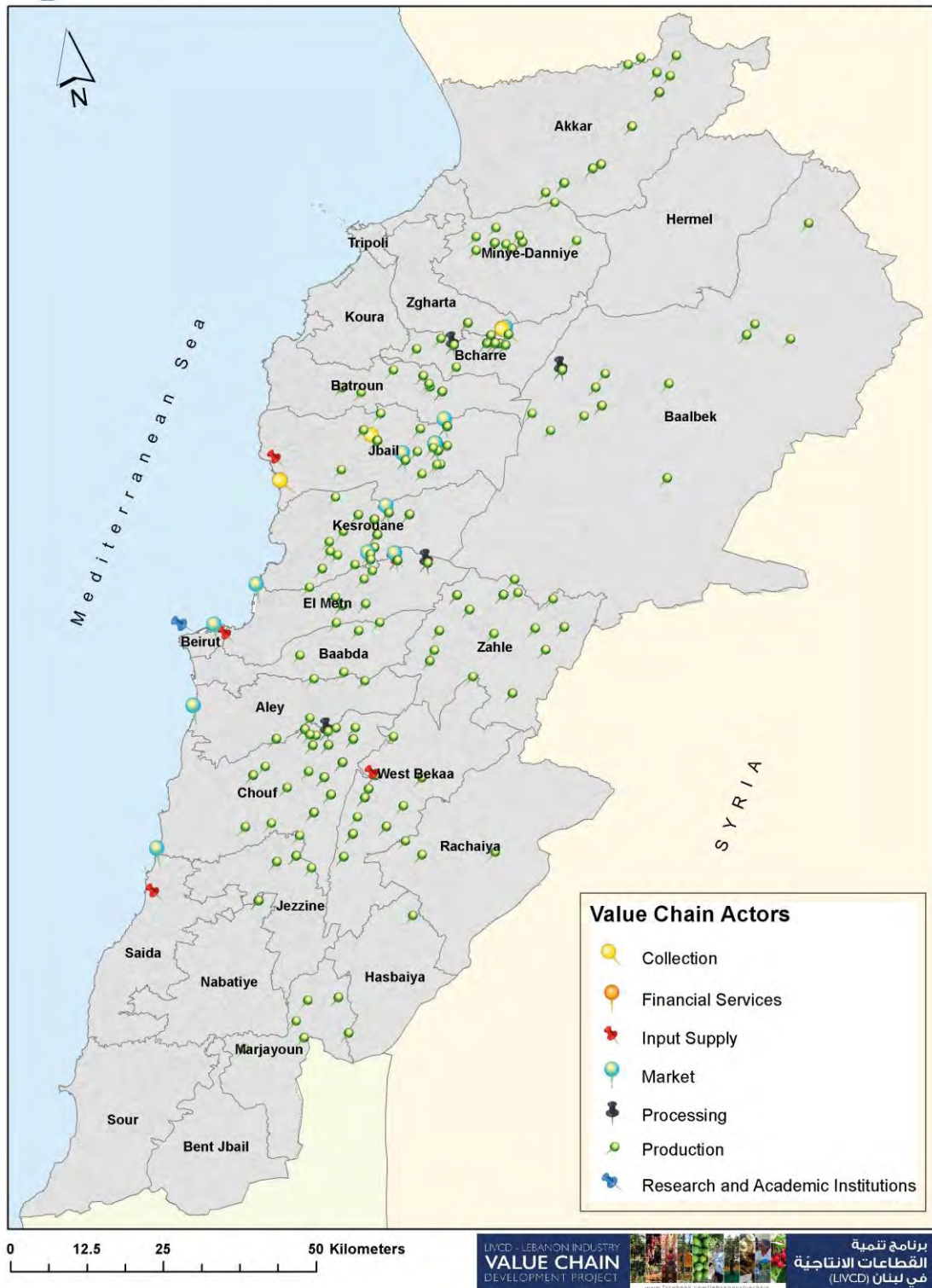
Watch the [LIVCD Apple Value Chan Videos](#)



Mr. Majid el Ali – President of the Agricultural Association in Brih

*“The impact of LIVCD was very positive as we started using new technologies, new varieties and learned about good agricultural practices. Farmers went from being passive to curious, eager to learn and implement new production techniques in their farms!*”

*On a personal level, my wife and I learned how to better manage our farm; and as a result she played a more active role. We have modernized our orchards and production together, all thanks to USAID support, which is the ONLY agency providing direct support to farmers without any intermediate third party!”*





## Avocados

Avocado cultivation is relatively new to Lebanon. Avocado trees were first imported to the country in the late 1960s or early 1970s by expatriate Lebanese living in Africa. In 2012, when LIVCD began, there had been no official recognition or program to improve avocado production in the Ministry of Agriculture. Unlike apples or olives, which



are cultivated by thousands of farmers, there were 3,700 farmers growing avocados, of which nearly 90 percent were considered hobby farmers who cultivated on average less than 0.3 hectares. As of 2011, only 650 hectares of land were under avocado cultivation, most at elevations not higher than 650 meters. In later years, as the crop developed more demand in Lebanon, professional farmers invested in improved rootstock to upgrade orchards and improve yields. South Lebanon is the center of avocado production, though the crop is also cultivated in a few areas north of Beirut.

LIVCD chose to work on avocados because the crop has strong local and export market demand and the potential for high yields, which at relatively high and stable prices created good income for growers. Due to its high returns, even the smallest growers can benefit from avocado production. It is not labor intensive, and it requires relatively few inputs. Many growers, especially the small and professional farmers rent their lands to “wood” damans (aggregators), farmers, and marketers with expertise in avocado production and an understanding of various marketing channels. The vision LIVCD sought to achieve with its work in the avocado value chain was to create “a model of organization and collaboration between nurseries, producers and aggregators to where Lebanon is recognized as a reliable and high-quality source of fresh avocados. In particular, LIVCD recognized the high potential for leveraging private sector investment into this rural value chain to establish public-private partnerships between avocado producers and those organizations that support avocado production and processing.

LIVCD intended to achieve this vision for the avocado value chain by concentrating on the following:

- Providing technical assistance to disseminate and scale up innovative agricultural practices and technologies and build capacities through customized training programs for farmers and other value chain operators including nurseries.
- Facilitating access to markets, financing opportunities, and investments by the private sector.

## **Strategy**

**Production strategy: Provide information on best production practices and establish extension centers to reach small and medium scale farmers.** Few farmers in Lebanon had knowledge of good avocado production practices. In addition, as mentioned above, there was no extension program in the Ministry of Agriculture to assist farmers who seek to improve their avocado production. LIVCD developed extension materials for dissemination to growers based on international best practices and sponsored an international study tour to California, U.S. to see best practices first-hand. When LIVCD started its work in avocados, it realized that many farmers were unaware of the varieties that were common in Lebanon, and which of those had the greatest market potential. LIVCD thus sought to educate farmers and the public about avocado varieties, their qualities, and potential uses.

LIVCD also realized early in the project that avocados offered significant opportunity for investment in rural areas. The project thus provided advice to individual farmers and groups of farmers on the technical and financial requirements for investing in avocado plantations.

**Marketing strategy: Provide information on potential markets and market requirements.** At the beginning of the project, avocado farmers had little actionable information on potential markets other than the traditional local retail and wholesale markets. LIVCD's strategy with respect to marketing was similar to its strategy for production, which was to supply information on export markets, especially European and GCC markets, and existing domestic markets. In addition to providing valuable information, LIVCD sought to create linkages between producers, aggregators, and exporters to promote and provide easier access to markets for farmers and provide fruits for sale by aggregators and exporters.

**Processing strategy: Test potential to process avocados for oil and cosmetics.** LIVCD recognized early in the project that the domestic market for fresh avocado was robust. Prices for avocado were stable and provided farmers with good financial returns. Nonetheless, as with most fresh fruits and vegetables, there is always the issue of what to do with second grade produce. LIVCD also recognized that fresh juice outlets that are popular in Lebanon, provided a good market for a large part of second grade avocado. Nonetheless, LIVCD ran experiments to investigate the potential of producing avocado oil with existing olive



Workshop to promote avocado benefits in the cosmetic field – Saida, South Lebanon

mills, and the potential to use avocados in the cosmetics industry. The experiments and studies however showed that both of these markets are not economically feasible.

### **Key interventions**

Based on the initial value chain assessment, LIVCD chose to concentrate most of its resources on improving and expanding production. Though the project also worked on marketing and processing, those interventions were more modest. The reason for this is that marketing was not viewed as an important constraint at the beginning of the project; as noted above, the domestic market was stable and there were regular exports of avocados to the GCC. In terms of processing, the project successfully tested the use of olive mills to process avocado oil, but concluded that this was not economically feasible to warrant additional investments in avocado milling.

Three interventions were key to upgrading the production capabilities of this value chain: 1) introducing grafting to improve production of existing trees and introduce new varieties; 2) investing in organizations to establish extension centers to assist farmers, especially small and medium avocado farmers; and 3) cooperating with investors to develop technical and financial feasibility studies.

**New grafting techniques:** The lack of formal training in avocado production in Lebanon meant that many farmers followed poor agricultural practices. They often had insufficient knowledge about the various avocado varieties and their characteristics and productivity potential. A group of farmers grew avocados from seed, not knowing that doing so compromises fruit quality. Further, some varieties grown were considered “non-commercial”, which means that the trees can take up to 15 years before bearing fruit. To solve this problem, LIVCD implemented a program to introduce proper grafting techniques.

Grafting is when a cutting from one variety is merged with another, thereby transforming the tree from its original variety to the new preferred variety. After grafting, the tree will bear fruit within two years, and that fruit will be in greater demand than the original variety and will be of more consistent quality.

Fifty-four farmers participated in the grafting program. Nearly 16,000 trees were grafted, improving the productivity of 50 hectares. Non-commercial varieties were transformed into

Hass, the most valuable avocado in the fresh market. The grafting program largely eliminated non-commercial varieties in Lebanon. Yields increased greatly, from 15 kg/tree to 40 kg/tree, and the average price of the resulting fruit increased from \$1/kg to \$3/kg. The value of each Lebanese avocado tree, assuming the farmer follows good agricultural practices, would increase from \$15 to \$120. The potential income of the avocado trees that were grafted during the grafting program overall for the sector is nearly \$1.9 million.



Avocado grafting training – Saida, South Lebanon

In addition, the LIVCD avocado-grafting program trained 16 service providers to offer this service to farmers. In 2016-2017, these 16 providers earned incomes of over \$250,000 by providing grafting consultancy and services.

**Investments in organizations to establish extension centers:** LIVCD worked with four partners to establish extension centers to assist small and medium scale farmers to improve their production and marketing of avocado.

The Hariri Foundation provided to more than 150 farmers technical support and training. LIVCD and Hariri together invested more than \$200,000 to establish an avocado demonstration plot and upgrade its subtropical fruit tree nursery. LIVCD's collaboration with Hariri also included training of trainers courses to provide lasting support to farmers. Finally, the co-investment yielded an avocado directory and organization for avocado stakeholders, a valuable contribution to efforts of organizing a fragmented value chain.

The Agricultural Cooperative Association of Menjez in Akkar targeted about 100 farmers under its partnership with LIVCD.

Avocado Varieties		
Fuerte		<ul style="list-style-type: none"> <li>• Pear shaped fruit with a characteristic neck</li> <li>• Thin, green, moderately bight skin</li> <li>• Soft texture with a somewhat grainy surface</li> <li>• Medium size to large (170-500 grams)</li> <li>• Excellent quality flesh, tasty and nutty flavor</li> <li>• Available in Lebanon from November to March</li> </ul>
Hass		<ul style="list-style-type: none"> <li>• Pear-shaped dark green fruit on the tree, turns purple to black when ripe</li> <li>• Medium to coarse skin, rough texture</li> <li>• Small to medium size (140-400 grams)</li> <li>• Excellent quality flesh with a rich, nutty</li> <li>• Available in Lebanon from end of January to June</li> </ul>
Lamb Hass		<ul style="list-style-type: none"> <li>• The fruit is very similar to Hass but has wider shoulders and black skin at maturity</li> <li>• Larger fruit and matures later than Hass (June-July)</li> <li>• Excellent quality flesh</li> <li>• Available in Lebanon from February to July</li> </ul>
Pinkerton		<ul style="list-style-type: none"> <li>• Pear fruit with a very long neck</li> <li>• Medium thick skin</li> <li>• Dark green with protruding granules and easy to peel</li> <li>• Medium size (230-425 grams)</li> <li>• Good quality flesh with a nutty taste</li> <li>• Available in Lebanon from January to March</li> </ul>
Reed		<ul style="list-style-type: none"> <li>• Round fruit with medium to coarse skin, green, coaly, slightly grainy and easy to peel</li> <li>• Medium to large size fruit (270-680 grams)</li> <li>• Rich, nutty flavor, flesh does not blacken after cutting</li> <li>• Available in Lebanon from March to June</li> </ul>
Ettinger		<ul style="list-style-type: none"> <li>• Fruit narrowly obovate, bright green, fine, fairly smooth</li> <li>• Medium size fruit (250-350 grams)</li> <li>• The pulp is buttery and fiber less with a good taste</li> <li>• Available in Lebanon from December to February</li> </ul>
Bacon		<ul style="list-style-type: none"> <li>• Pear-shaped ovate fruit, green even when ripe</li> <li>• Green, thin, bright skin</li> <li>• Medium size to large (170-510 grams)</li> <li>• The taste is mediocre</li> <li>• Available in Lebanon from October to December</li> </ul>

The co-investment of more than \$88,000 helped to establish orchards and provided technical support to 68 farmers. The Emkan for Microcredit and Sustainable Social Development made a slightly larger investment in Akkar to assist about 81 farmers with orchard establishment and provision of technical support. These two efforts were the first significant investments in avocados in northern Lebanon.

The Agricultural Cooperative of Bater in the Shouf and LIVCD invested a total of nearly \$137,000 in a comprehensive program to support farmers through the establishment of a demonstration plot and training in good agricultural practices. The program also assisted small-scale farmers to upgrade their orchards with drip irrigation. The Cooperative in Bater provides on-going technical support to farmers, which includes renting equipment such as orchard sprayers, shredders, and trimmers to farmers.

### ***Technical and financial feasibility studies:***

LIVCD determined that the good financial returns from avocado production meant that the project could assist potential investors to develop bankable feasibility studies to obtain loans. LIVCD identified and developed feasibility studies for 17 new investments using private equity with a value of \$3.8 million, and 27 investments using Kafalat loans for a value of \$4.8 million. These 44 investments resulted in the establishment of 42 new orchards; a new specialized nursery for avocado; and the establishment of a new company, Lebanese Avocado, which specializes in provision of technical support to farmers. The total value of these investments was \$8.6 million.



Avocado plantation

### **Impact**

Overall, LIVCD and its partners in the avocado value chain were successful at organizing a previously chaotic value chain, which will produce real value and wealth in rural Lebanon. The high-level results of LIVCD's work in the avocado value chain are:

- 1,034 micro, small, and medium enterprises (MSMEs), including farmers and other organizations located in different regions of Lebanon, received business development services.
- 263 MSMEs received assistance and training on ways to apply for and access financial services and loans.
- \$7.5 million in loans were disbursed to support MSMEs as a result of technical assistance.

- 157 women were assisted in improving existing businesses and helped in establishing new businesses.
- 276 farmers and other value chain actors were supported to apply improved technologies, improved harvesting and post harvesting techniques, and improved handling and storage techniques.
- 66 MSMEs have benefitted from business linkages established by LIVCD.
- 592 jobs have been impacted<sup>4</sup> (Jobs created and jobs supported).
- 1,017 farmers and individuals have received training on GAP.

As per the “Avocado Impact Assessment”, it is also noteworthy that each \$1.00 of investment from LIVCD generated a combined \$17.74 of direct and indirect economic impact. The value of avocado production increased from \$19.2 million to \$26.1 million between 2012 and 2017, resulting from an increase in volume of 7,936 metric ton (MT) to 10,842 MT and the shift to higher-value avocado varieties. Based on these figures and the significant new plantations, Lebanon can expect continued increases in production and value in the coming years.

Watch the [LIVCD Avocado Value Chain Videos](#)

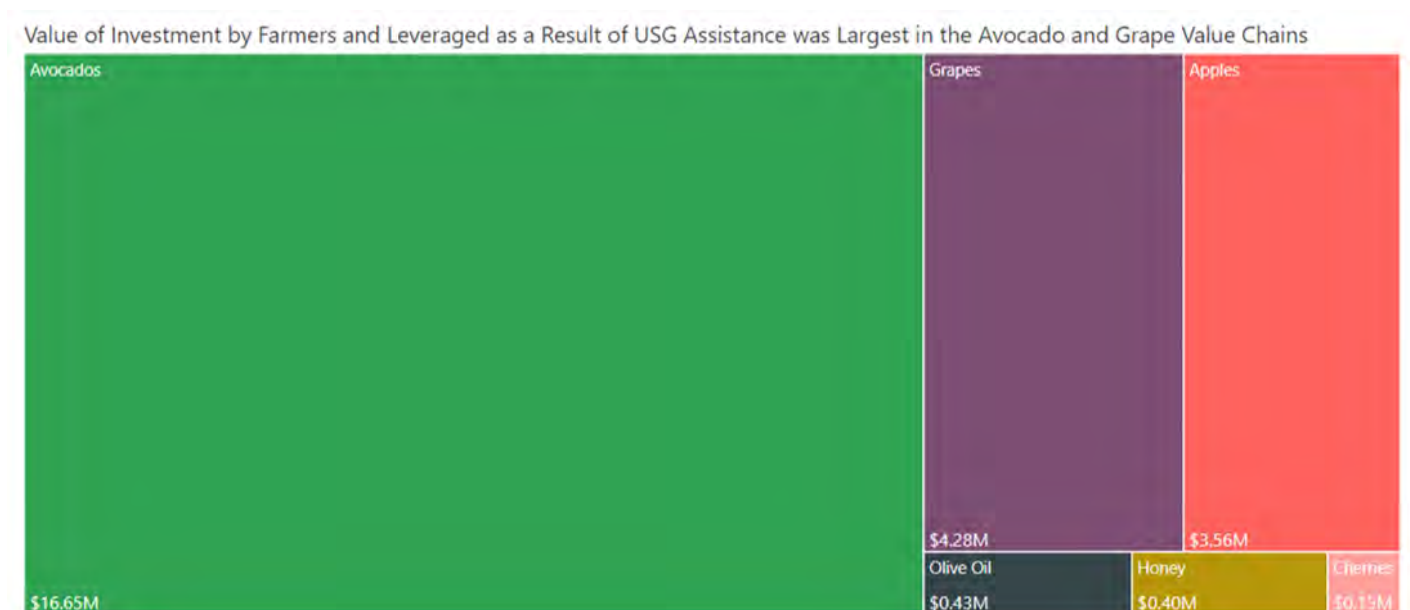


Figure 2: Value of investment by farmers as a result of LIVCD USG assistance

<sup>4</sup> Jobs are all types of employment opportunities impacted (created or supported) during the reporting year in agriculture- or rural-related enterprises (including paid on-farm/fishery employment). Jobs created under LIVCD may include: Food processor hires a Quality Manager hired to implement ISO certification, or additional processing staff to process additional volumes; field labor hired to implement new technologies (for > 1 month); a new micro-enterprise supported for production and marketing of eggs, honey, handicrafts, etc. Jobs supported under LIVCD include those that are directly related to LIVCD assistance. Examples include LIVCD Partner firm employees who receive training or capacity building to increase their ability to do their existing or expanded job description; for example, an existing employee who is trained in quality management or food processing techniques. Also counted would be agricultural producers and micro-enterprises, including those in the Rural Tourism and Handicrafts sectors, who receive support through training and/or equipment to support existing economic activity; examples of this include a farmer trained in new production techniques, a honey producer who receives beehives and equipment, and a rural tourism service provider who receives training and/or equipment to support their business.



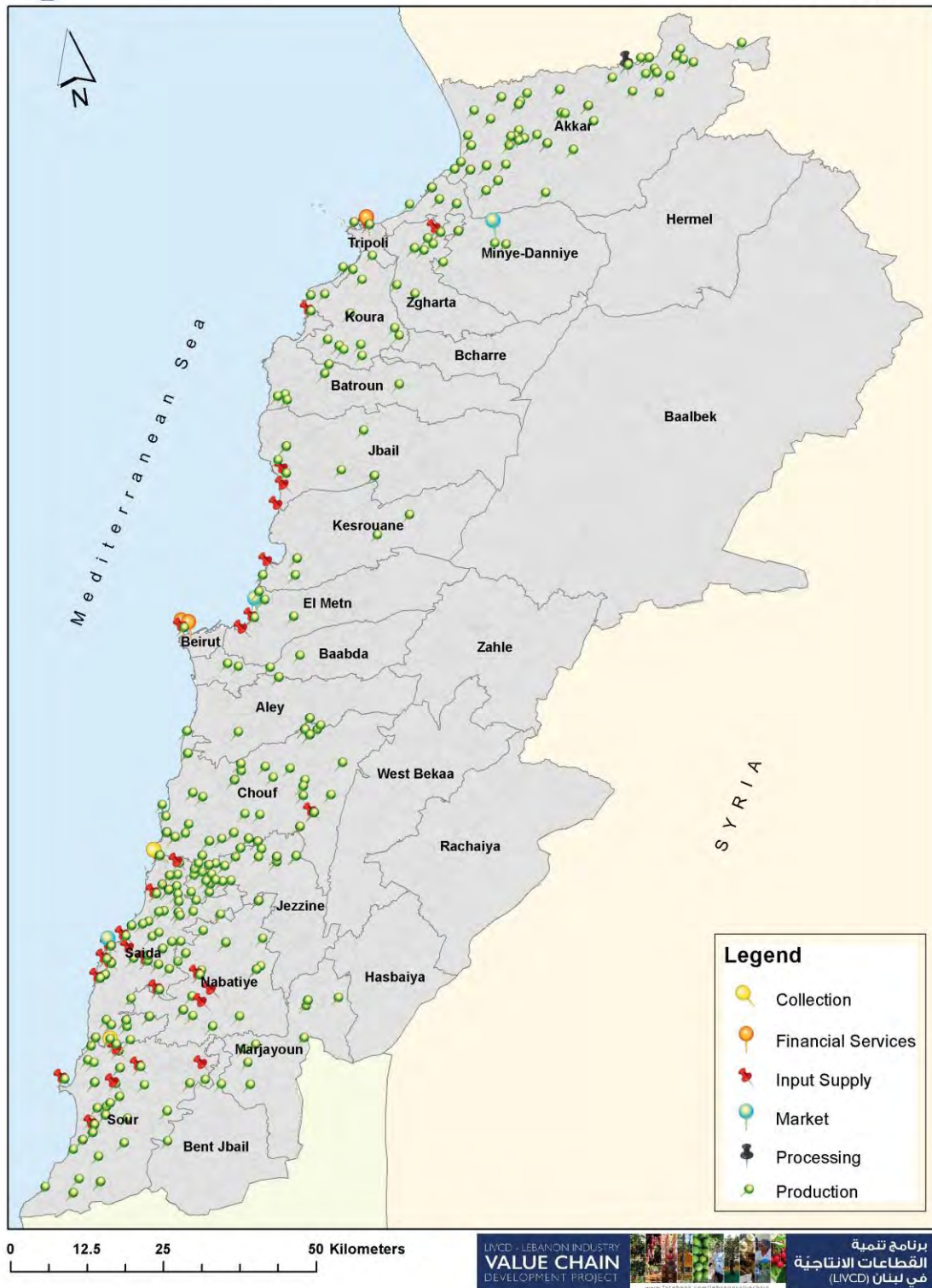
Dr. Hani Bassil – Avocado Farmer

*“The introduction of the soil moisture sensing technology by LIVCD helped fine tune the irrigation cycle during the dry summer months in Lebanon. It was adopted by the farmers as a standard management practice on avocados and on other plantations as well, resulting in an average of 40% water saving and lower costs in plantations where the water is pumped from wells.”*

*“Thanks to the USAID-funded LIVCD project, we were able to plant over 3 hectares of avocado orchards in the village of Bater, which did not seem possible before due to the location and altitude. We have learned so much and gained the respect of other cooperatives in the region, new farmers joined the coop, and showed interest in planting avocados; which they actually did thanks to the LIVCD team whose support and knowledge transfer were fundamental to this new economic activity in our village”*



Mr. Nassef Khattar – Vice President of Bater Agriculture Cooperative





## **Cherries**

In 2012, at the start of the LIVCD Project, the cherry value chain was in trouble. About 10,000 farmers, of which nearly one half were “hobbyist farmers” produced high quality cherries, yet in small quantities, that were consumed in both domestic and export markets. Exports, in the years before LIVCD, increased by gaining access to new markets in Britain and Russia, and the forecasters noted an increased potential for exports to Middle Eastern



markets. Yet, in spite of the high demand for cherries, the value chain was beset with two overriding constraints: 1) cherry orchards were old and many suffered from rapidly expanding root rot and other diseases; this compromised yield and risked the production capability of the entire value chain. There was a discernible divestment in cherries in favor of apples – farmers were giving up on cherries; and 2) there was insufficient cold storage. Because unlike other LIVCD value chains, cherries are highly perishable fruits, the lack of sophisticated aggregation and cold storage meant farmers had only a three-day window from harvest to consumption. Farmers often received lower than optimal prices because cherries deteriorated before reaching consumers.

LIVCD chose to work in the cherry value chain because the constraints identified early in the project could be overcome with well-defined production level interventions providing a large number of farmers the opportunity for income growth. The foundation of the value chain, the cherries themselves, are delicious and have an excellent reputation, especially in the Arab world. LIVCD, working with numerous stakeholders in the cherry value chain, found opportunity to capitalize on the potential new and existing markets to revitalize the value chain through investments in new technologies, including new cherry varieties and improved techniques. LIVCD also found agriculturalists and businesses willing to risk investment funds for improved cold storage.

LIVCD’s vision for the cherry value chain was to work with producers and aggregators to reduce the risks inherent in cherry production to become a more reliable source of high quality cherries in both domestic and international markets. A fundamental element of this vision was to improve post-harvest infrastructure and create linkages between aggregators with modern cooling and storage facilities and producers that have adopted improved technologies and techniques essential to higher yields and better-quality cherries.

From the initial value chain assessment, LIVCD planned for two main types of interventions needed to upgrade the cherry value chain. They were:

- Rehabilitate orchards with new varieties and improve production techniques on existing trees. The purpose of this was twofold: 1) to reduce costs and improve yields; and 2) to reestablish confidence that cherries are a viable value chain that can access markets and provide good incomes to cherry farmers.
- Improve aggregation and storage to extend shelf life to gain even greater access to higher value markets. Improvement of post-harvest infrastructure also motivated farmers to believe again that opportunities existed in this value chain.



Training session on cherry pruning in Aرسال

## **Strategy**

**Production strategy:** LIVCD chose basic production level interventions to halt the deterioration and promote the improvement of cherry orchards. This included introduction of improved varieties and demonstration plots, and training farmers in Good Agricultural Practices (GAP) that covered for example, land preparation, pruning, water resource management, and harvesting. As stated above, one of the goals of the production program focused on convincing farmers who were switching from cherries to apples, that cherries were a viable and sustainable source of income.

**Marketing and post-harvest strategy:** LIVCD focused on establishing vertical linkages between aggregators and owners of post-harvest facilities to improve shelf-life and gain increased access to high value markets. While aggregators had indicated to LIVCD during the assessment phase an interest in investing in post-harvest facilities, they had yet to do so due to economic conditions and associated risks. LIVCD hoped to capitalize on those intentions and help mitigate the investment risk.

## **Key interventions**

LIVCD determined early in the project that interventions to revitalize the cherry value chain were not complicated conceptually, though the project understood that implementation of the interventions would not necessarily be easy. First, the project sought to halt the deterioration of orchards through a wide-ranging program to introduce new production techniques. This was to ensure that sufficient quantities of cherries would be available for aggregators and owners of post-harvest facilities; actors in the value chain that were ready to invest but needed assurances that cherries could be sourced to ensure a good return on the investments. The following are the main interventions in the cherry value chain.

**Direct technical support to cherry farmers:** LIVCD provided direct technical support to 200 farmers who cultivated over 300 hectares of cherries. The support included training in

pruning and introducing new and better varieties. One important element of this intervention was the introduction of soil moisture tools to improve water management in orchards and prevent root rot, a serious problem facing cherry producers. As part of this program, LIVCD sponsored a study tour to the United States for cherry experts to learn international best practices. Following the study tour, LIVCD developed a cherry production booklet that provided details to farmers on application of those best practices to cherry production in Lebanon.

LIVCD estimates that the economic impact of this program to be substantial. For the ten-year period from 2016 to 2025, LIVCD projects that the farmers who attended the different training programs and improved their practices will generate a total cumulative discounted benefit of \$2,271,924. This benefit is derived from an increase in the price of their cherries due to improved quality and enhanced shelf-life and reduced costs of production. The direct economic impact is estimated that for every \$1.00 of LIVCD expenditures on direct technical assistance, the farmers gained \$11.51 due to improved practices<sup>5</sup>.

***Investments with aggregators and owners of post-harvest facilities:***

LIVCD worked with five owners of post-harvest facilities to upgrade the cherry value chain. Those five were Liban Village Cold Storage; Agripharm; Shapash; Al Samad and Grabit/Cherry Good.



Al Samad Cold Storage – Terbol, Bekaa

Liban Village is located in Mount Lebanon. The cooperation with LIVCD sought to renew old orchards through introduction of new varieties and rootstock and provide technical assistance to improve productivity. The investment with Liban Village also established twelve demonstration plots with twelve farmers, 10 of them, using the new trellis system. The demonstration plots totaled 2.54 hectares or over 6,000 trees. In terms of technical assistance, Liban Village worked with 85 farmers in Mount Lebanon and Bekaa cultivating a total of 28 hectares of cherries. Through this technical assistance, guidance on pruning, spraying, irrigation and harvesting, the 85 farmers increased their production by 10 percent in the first year, 15 percent in the second year, and 20 percent in the third year. Farmers working with Liban Village also received higher prices for their cherries, for an average of \$1.66/kg to \$2.33/kg. LIVCD estimates that the direct economic impact of this investment was that every \$1.00 invested (the cost of this activity was shared between Liban Village and LIVCD), resulted in \$1.58 in benefits.

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<sup>5</sup> LIVCD Cherries Impact Assessment

Agripharm provided similar support to 143 farmers accounting for 31.2 hectares of cherry orchards in the Bcharre region of Lebanon. These farmers showed a 20 percent decrease in the costs of production and a large increase in the average price of cherries, from \$1.67/kg to \$2.67/kg. Yields increased by about 10 percent. In addition, this investment established Agripharm as a cherry production service provider.



Agripharm training in Bcharre

The company provided orchard management services, pruning, spraying weeding and post-harvest activities, to 68 farmers cultivating 15 hectares of orchards. One important innovation was the introduction of gibberellic acid (GA3) and calcium to improve the quality of cherries. GA3 is a growth regulator that when applied under the right time and conditions, results in firmer, crunchier and larger fruits. When used with calcium, the fruits do not crack. Moreover, with the application of these two chemicals, farmers were able to extend the harvest period by about four weeks, which permitted them to take advantage of higher prices at the end of the season. LIVCD estimates that the direct economic impact of this investment was that every \$1.00 invested, resulted in \$4.84 in benefits.

LIVCD and Shapash invested together in a pilot cold-storage facility that included pre-cooling and atmospheric control. This state-of-the-art cold storage facility will increase the shelf life of cherries from four to six weeks. LIVCD determined that increasing shelf life could increase farmers' revenues by as much as 50 percent. The upgrading of the cold storage facility permitted an increase in annual capacity of 50 tons. LIVCD linked local farmers to the Shapash facility resulting in higher prices and greater income. LIVCD estimates that the direct economic impact of this investment was that every \$1.00 invested, resulted in \$2.17.

## Impact

Overall, LIVCD's efforts in the cherry value chain resulted in the following high-level results:

- 1,400 micro, small, and medium enterprises (MSMEs) including farmers and other organizations located all over Lebanon received business development services.
- More than 110 MSMEs received assistance and training on ways to apply for and access financial services and loans.

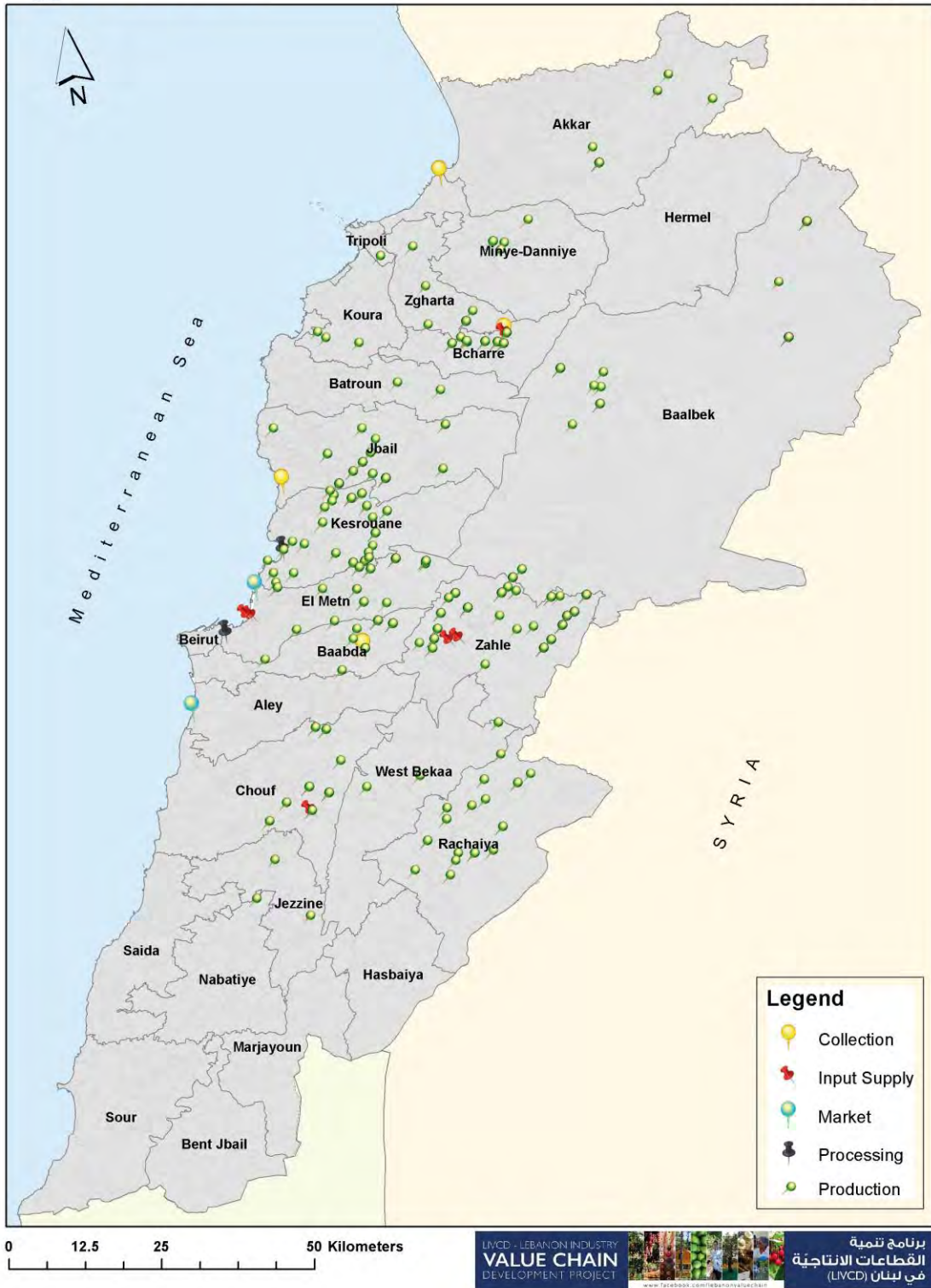
- \$150,000 in loans were disbursed to support MSMEs as a result of technical assistance.
- 103 females were assisted to improve existing businesses and help in establishing new businesses.
- 523 farmers and other value chain actors were supported to apply improved technologies, improved harvesting and post harvesting techniques, and improved handling and storage techniques.
- 49 MSMEs have benefitted from business linkages established by LIVCD.
- 817 jobs have been impacted/created.
- 1,321 farmers and individuals received training on Good Agricultural Practices.

Watch the [LIVCD Cherry Value Chain Videos](#)



Ms. Aida Nabhan – Cherry Farmer- Hammana

*“We lost faith in cherry production and we wanted to stop planting cherry trees because we didn’t know anything about good agricultural practices until the USAID-funded LIVCD project taught us how to handle and take care of cherry trees; Hammana’s main crop and important source of income”*



## **Grapes**

Grapes are one of the most important value chains in Lebanon. Based primarily in the Bekaa Valley, farmers in Lebanon produced about 120,000 tons of table grapes in 2012 with a value of nearly \$110 million. There are nearly 16,000 grape farmers, including about 4,200 farms that are considered commercial-sized enterprises. The grape value chain employs nearly 16,000 full time workers, making it one of the largest agricultural employers.



The main markets are the GCC and other Arab countries. In 2012, when LIVCD started, there was a small number of grape farmers that had achieved high enough standards to export to Europe. These farmers/exporters had some vertical integration that permitted them to control every step of grape production to guarantee quality. In general, at that time, most grapes grown in Lebanon were not produced or packed according to standards required by European or other high value buyers.

LIVCD chose to work on the grape value chain because the project realized that modest investments could upgrade farmers' capabilities to export to higher value markets, particularly markets in the EU to achieve greater incomes. LIVCD hoped to target small and medium-scale farmers to improve production, harvest and post-harvest practice while at the same time educating farmers and other value chain actors on the requirements in new markets in terms of quality, size, and color. LIVCD's vision for the grape value chain was to facilitate through extension training and public-private partnerships a more tightly integrated value chain that would produce greater volumes of grapes flowing to higher quality export markets. LIVCD aimed to provide opportunities to a greater number of small farmers. LIVCD chose three types of interventions to support upgrading the grape value chain. Those interventions are:

- Establishing public-private partnerships to invest in high quality varieties demanded in high value markets, especially Europe. LIVCD envisioned three-way partnerships centered on exporters, who would work with farmers to produce high quality grapes, with technical support from the exporters themselves and LIVCD experts.
- Provide technical support to small and medium-scale farmers to increase yields and quality.
- Establish private-public partnerships to introduce improved production, harvest and post-harvest technologies.

## **Strategy**

**Production strategy: Increase yields and improve quality.** LIVCD deployed a production strategy that focused on technical support to increase yields and improve quality. The program worked with farmers capable to export to higher value markets. The production program also sought to improve both vertical and horizontal linkages between farmers, input suppliers and marketers.

**Marketing strategy: Meet quality standards for high value markets.** An essential element to upgrading the grape value chain was to ensure that Lebanon has sufficient and reliable quantities of high-quality grapes to meet the strict standards of the highest value markets. LIVCD thus worked with exporters who understood market demand and had strong linkages to farmers to improve quality for export.

**Harvest and post-harvest strategy: Improve shelf life and take advantage of market windows.** In addition to the production program mentioned above, LIVCD's strategy included a wide-ranging program of improvements in harvest and post-harvest techniques and technologies for improved yields, better water management, and longer shelf life. The LIVCD post-harvest strategy also included efforts to identify processing opportunities for lower-valued grapes.

## **Key Interventions**

Based on the initial assessment, LIVCD assisted producers, through their relationships with exporters, to enter high value markets. Leveraging the marketing channels already established with exporters, these farmers achieved a better understanding of market requirements in terms of varieties that are in demand in those markets, and quality standards. In addition to improving production for increased export, LIVCD also had technical assistance for small and medium scale farmers to disseminate innovative agricultural practices. LIVCD also spent considerable efforts to facilitate finance for farmers to acquire equipment and promote investments by the private sector.

### ***Investments in new vineyards for export to high value markets:***

LIVCD worked with three large exporters to stimulate investments in grape production for export. The three exporters were Medigardens, Jaber Trading Company, and Middle East Business Company. LIVCD provided small grants to 48 farmers who were linked to these three exporters to establish new vineyards (Medigardens – 19 farmers with 37.1 ha; Jaber – 11 farmers with 13.9 ha; and Middle East Business Company – 18 farmers with 23.1 ha). The new vineyards were planted with Red Globe and



Grape packages ready for export



Crimson variety grapes. The total investment costs for the three groups of farmers was \$1,498,000, of which \$1,113,665 or 76 percent of the total was contributed by the 48 farmers, LIVCD provided \$335,735, or 24 percent. The vineyards were planted in 2014 and 2015, and initial production for export began in 2016 and 2017. The vineyards will reach optimal yields in 2019. In addition to providing investment funds, LIVCD also provided close technical monitoring of production practices.

The results of this program are impressive. These three exporters sold grapes from the new grape vineyards to the following markets in Europe – England, Holland, Germany, and Finland; in the Middle East – Kuwait, Oman, Egypt, and KSA; and Africa – Kenya and Sudan. Kenya and Sudan are new markets for Lebanese grapes. The direct economic impact of this program is noteworthy. The estimated discounted returns to the program, from 2016 to 2025, are \$4,188,022, of which \$1.67 million in increased income to the farmers while the balance \$2.5 million in increased revenue to the exporters. This resulted in a direct economic impact ratio of 2.79, meaning every \$1.00 invested in this program realized a return of \$2.79.

**Upgrade production, harvest and post-harvest techniques:** Through cost-sharing and technical support, LIVCD encouraged the introduction of new varieties harvested in different periods and sold to high value export markets. With these new varieties, farmers were able to take advantage of non-peak season market windows. LIVCD sponsored workshops and trainings attended by more than 861 farmers. In addition, LIVCD trained 12 agricultural engineers involved in grape production in California during the summer of 2018.



ESS machine

LIVCD also worked with a series of partners to introduce the use of electro-static sprayers to reduce the cost of pesticides while increasing output and insuring compliance with international pesticide residue levels. LIVCD partnered with two cooperatives, one in Rachaya Al Foukhar and the other in Kfarmechke, and an NGO in Taanayel, and as well with Natagri, a service center at Kab Elias to invest in electro-static sprayers. The use of these modern sprayers reduced the amount of pesticides used by about 50 percent, and increased yields by 20 percent, resulting in significant gains in income for farmers.



Drip irrigation system

To introduce drip irrigation, LIVCD and the Chamber of Commerce, Industry and Agriculture in Zahle worked with more than 119 farmers to upgrade their vineyards. The improvements in irrigation reduced their costs by 10 percent and increased yields by 20 percent, resulting in a direct economic impact of 4.26, meaning

that for every \$1.00 spent on the irrigation, farmers benefited from an additional \$4.26.

**Assisted farmers gain access to finance for grape cultivation:** In addition to leveraging funds from farmers, cooperatives and NGOs through the LIVCD grants program, LIVCD implemented a program to train loan officers on the risks and the revenue potential associated with grape cultivation. This program helped 31 farmers acquire loans worth over \$4.2 million.

To insure proper dissemination of knowledge, LIVCD developed a comprehensive manual that covers grape orchard management in seven separate topics: Root and soil management, irrigation management, nutrient management, canopy and crop management, pest diseases and control, pruning principles and practices, and harvest and post-harvest practices. The project also produced a tutorial video on each of these topics.

Overall, LIVCD and its many partners in the grape value chain were able to make significant progress in improving the competitiveness of this value chain. Many more farmers are now able to access foreign, high value markets, and LIVCD and partners introduced modern equipment and improve techniques to cut costs, improve yields and produce greater incomes.

### **Impact**

The high-level results of the grape value chain are as follows:

- 1,162 micro, small, and medium enterprises (MSMEs) including farmers and other organizations located all over Lebanon received business development services.

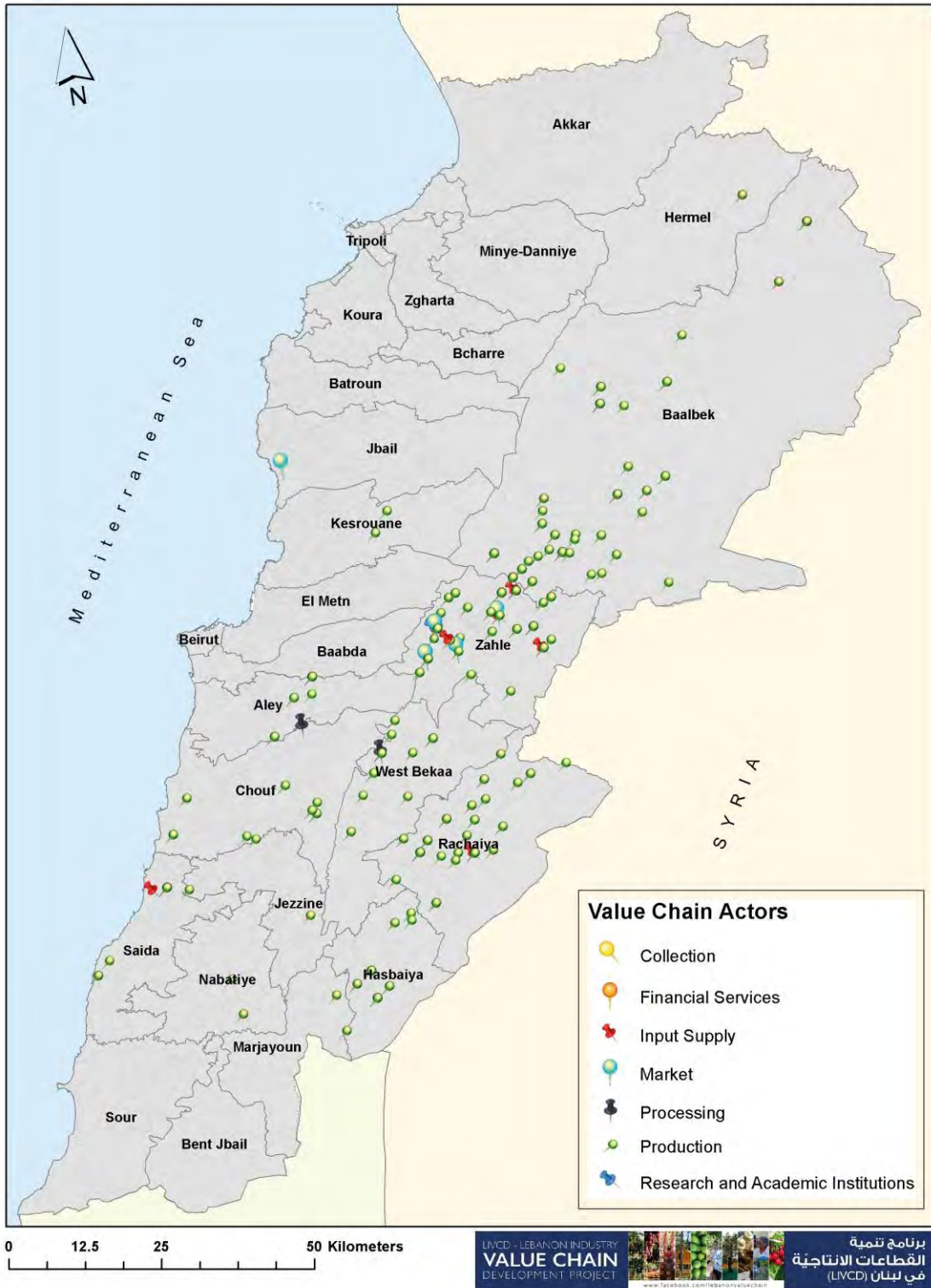
- More than 255 MSMEs received assistance and training on ways to apply for and access financial services and loans.
- \$4.2 million in loans were disbursed to support MSMEs as a result of technical assistance.
- 185 women have been assisted by LIVCD to improve existing businesses and help in establishing new businesses.
- 876 farmers and other value chain actors were supported to apply improved technologies, improved harvesting and post-harvesting techniques, and improved handling and storage techniques.
- 258 MSMEs have benefitted from business linkages established by LIVCD.
- 491 jobs were impacted.
- 993 individuals and farmers received training on Good Agricultural Practices (GAP).

Watch the [LIVCD Grape Value Chain Videos](#)



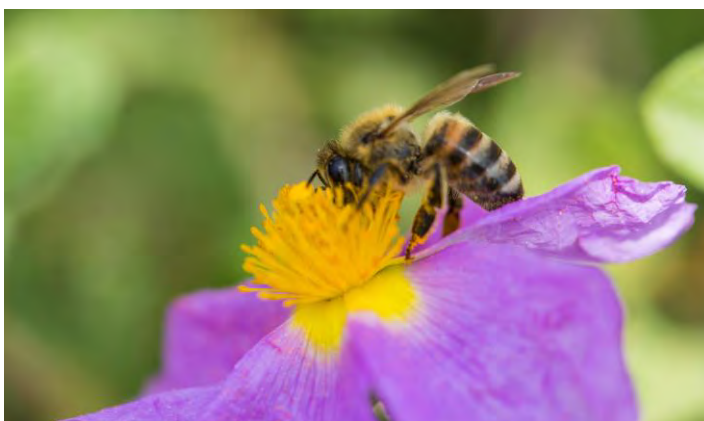
Kamal el Saykali – Grape Farmer, Kfarmechke

*“The business of owning grape orchards has been far from interesting in the past years, with their cost being almost a burden. It all changed with the LIVCD intervention, which had an impressive direct impact on the farmers who benefited from project’s assistance. What is interesting is the indirect impact it had, with 12 hesitant farmers in Kfarmechke, who engaged in replicating the exact same fruitful work, resulting in more than 200 dunams of renewed orchards; and many more are currently working on doing the same”*



## **Honey**

At the start of the LIVCD project in 2012, Lebanese beekeepers produced low volumes of honey, between 1,100 and 1,400 tons annually. The market value was between \$21 and \$26 million. In spite of these low numbers, this value chain appeared to be on the cusp of far-reaching change. In the few years preceding the start of LIVCD, honey exports to the GCC



and the US were increasing. Those exports moved beyond bulk sales to Saudi Arabia and the Lebanese diaspora in the US, to branded sales. This trend was in part facilitated by other donor investments in this value chain, especially investments in quality testing facilities, which bolstered to some extent consumer confidence in Lebanese brands and retail markets.

LIVCD chose to adopt honey as one of its value chains for a number of reasons. First, the project saw opportunity in working on parallel but linked tracks: 1) with small scale beekeepers, most of whom are members of honey cooperatives and had the potential to improve yields through training and to increase output with investments in additional hives; and 2) with commercial scale honey producers who had the wherewithal to procure additional honey from small scale beekeepers to take advantage of domestic market and export opportunities. A second reason that LIVCD chose to work on honey is that during the assessment phase, LIVCD also determined that there were significant opportunities to leverage funds for investments in the “infrastructure” needed to support a thriving honey value chain. This included investments in additional quality control laboratories, queen bee production facilities, as well as wax recycling to reduce disease and improve yields. Finally, and perhaps more importantly, LIVCD opted to work on honey because success in this value chain translates into greater incomes and better lives for thousands of rural families in all parts of Lebanon.

LIVCD’s vision for the honey value chain was to build on the dynamism of the commercial honey market segment for greater brand recognition leading to increases in domestic and international sales of Lebanese branded honey. The vision also included strengthening the linkages between the commercial sector and small-scale producers to funnel additional profits to rural communities.

LIVCD developed three types of interventions to achieve its vision for the honey value chains:

- Sustain and increase production flowing into the branded honey market channels through improved linkages between commercial honey producers and small beekeepers.
- Strengthen key actors in the commercial honey sector to create a strong market-pull.
- Identify key investment opportunities for the private sector to build businesses to support the development of the value chain.

## **Strategy**

**Production strategy: Improve yields of existing beekeepers and expand production capability to additional beekeepers.** The backbone of the honey value chain in Lebanon are the thousands of small-scale beekeepers scattered throughout the country, many of whom are members of cooperatives. The project sought to work through cooperatives to expand the number of hives available to existing members and potential new members in conjunction with a training program to improve production practices for increased yields.

**Marketing strategy: Improve branded domestic sales and exports.** LIVCD worked with honey exporters to enter new overseas markets and expand in existing markets. This included efforts to improve branding and merchandising of honey.

**Aggregation, processing and input supply strategy:** LIVCD used its Technical Assistance and grant funds to leverage significant private sector investments in improvements in queen bee production, wax recycling and a professional center for beekeeping in Lebanon. In addition, the project worked with cooperatives to improve their extraction and processing capabilities. This strategy focused greatly on linking small scale beekeepers to commercial honey producers and exporters.



HOSCO Wax Center

## **Key interventions**

Based on the initial LIVCD honey value chain assessment, it was clear that the Lebanese market for honey was healthy and able to absorb significant increases in the volume of honey without negative price affects. Moreover, large scale imports of honey from Saudi Arabia and Europe portended the potential for improved domestic retail marketing. In terms of exports, exporters noted that there were opportunities to export additional quantities to overseas markets if additional supply were available. At the same time, to

place the value chain on a firm foundation required investments in training, improved queen bee production, and processing capability. Following are some of the most noteworthy LIVCD interventions in the honey value chain:

***Investments in additional hives and training of beekeepers to improve yields and increase production:*** LIVCD worked with honey cooperatives around the country to invest in additional hives for small scale beekeepers. The program required that an individual beekeeper invest in one beehive while LIVCD invested in three beehives. Nearly 1,500 beekeepers participated in this program, some of them new beekeepers. As a result, a minimum of 8,000 additional beehives were injected into the honey value chain. LIVCD's co-investment in hives will yield approximately a total 3 years' value of honey of around \$4,480,000<sup>6</sup>.

In addition to more beehives, LIVCD developed a new curriculum in beekeeping on five separate topics: hive management; treatment of bee diseases; queen breeding; new technologies in beekeeping; and increasing honey production. The project also produced a tutorial video on each of these topics. The 1,500 beekeepers who participated in the hive distribution program were required by LIVCD to receive training in hive management and treatment of bee diseases. More than 2,000 additional beekeepers also attended the LIVCD training. Overall, about 50 percent of all beekeepers in Lebanon took the training. The training program had a significant impact on yields. The volume of honey produced increased by a minimum of 30 percent, and some beekeepers reported a nearly doubling of yields, from 8 kg/hive to 15 kg/hive. LIVCD also conducted training of trainers of NGOs, cooperatives, university faculty to sustain the training program into the future. Seventy beekeeping experts participated in the training of trainers in the five topics.

It is noteworthy that the spin-off effects of the LIVCD program to distribute hives and conduct training were enormous. In 2011, the Ministry of Agriculture reported 168,214 hives in Lebanon. In 2016, the MOA reported that the number of hives more than doubled to 360,179. The number of beekeepers increased from 5,545 to 10,057, and those increases are distributed throughout the country.

***Improving the quality of queen bees:*** At the start of LIVCD, a number of important stakeholders in the sector noted a significant problem with queen bees. Beekeepers had difficulty obtaining high quality queen bees, and often what was available was expensive and of uncertain quality. Local queen bee breeders had little control over the purity of the bee strains, and the majority of the drones had genetic impurities. This compromised honey yields and quality and produced aggressive bees. Further, bee breeders who import queens were unable to access a reliable and consistent source of supply or reliable documentation.

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<sup>6</sup> LIVCD - Honey Impact Assessment

To solve this problem, LIVCD invested with a commercial scale beekeeper to establish the first artificial insemination laboratory in the Arab region. This investment included the importation of Varroa Sensitive Hygiene (VSH) queen bees, which are resistant to the Varroa mites. These queen bees were developed by the United States Department of Agriculture Bee Breeding Laboratory.

This intervention, in collaboration with Afif Chedid Enterprise, a commercial honey production company, also built a professional center for beekeeping. Known as the Golden Queen Center Jbalna Apiary, the center is a training facility, acts as an information center, and is a place for existing and potential beekeepers to learn and test beekeeping-related technologies. As of June 2018, the center has produced 6,000 queen bees, of which 250 were artificially inseminated. Beekeepers in Lebanon, Jordan, Egypt and Syria have purchased 4,000 of these highly productive queen bees.



Artificial insemination – Golden Queen Center- Hosrayel, North Lebanon

**Marketing and quality control:** To expand branded honey in both domestic and export markets, LIVCD worked with commercial brands in strategic marketing activities, labeling and branding. For example, early in the project, LIVCD assisted an exporter to enter Carrefour Hypermarkets in the GCC. The technical assistance and cost-share interventions were accompanied by a national multi-media honey awareness campaign in partnership with the Syndicate of Lebanese Dieticians and private sector companies to encourage consumption of Lebanese honey.



Training on FT – NIR spectroscopy held at Saint Joseph University in Taanayel, Zahle

To address concerns of quality control, LIVCD and the University of Saint Joseph- Faculty of agriculture (ESIAM), introduced high-tech spectroscopy capabilities to test honey for quality, purity and botanical origin. The new equipment, including a first of its kind FT-NIR spectrophotometer can detect honey adulteration (which is the addition of other sugars, syrups, or compounds into honey to change its flavor or viscosity) and botanical origin.



LIVCD also partnered with the Tripoli Chamber of Commerce, Industry and Agriculture, CCIAT establish a pre-testing collection and bottling center for honey. The purpose of these investments is to provide consumers with confidence that the honey available in the market is indeed Lebanese, and is pure and of the highest quality. The results of the marketing and quality control interventions were significant. Exports of honey doubled between 2011 and 2016, reaching nearly \$700,000 in 2016.

Year	# of Beekeepers	# of Beehives	Productivity/Hive (Kg/hive)	Honey Production (Tons)	Market Size (Value in 1,000 USD)	Average farm gate price (USD)
2011	5,230	168,214	11	1,850	\$27,755	\$15
2012	5,230	198,000	11	2,178	\$32,670	\$15
2013	6,100	227,000	11	2,497	\$37,455	\$15
2014	6,200	257,000	11	2,827	\$45,232	\$16
2015	6,500	328,832	8	2,631	\$52,613	\$20
2016	7,500	360,000	9	3,240	\$64,800	\$20

Figure 3: Data from the Ministry of Agriculture (MoA)

### **Impact**

Overall, the high-level results of LIVCD's efforts in the honey value chain are as follows:

- LIVCD estimates that honey production increased about 75 percent between 2011 (the year before the project started) and 2016. According to the MoA, the market value of the 2016 volume of honey was \$64.8 million.
- 4,496 micro, small, and medium enterprises (MSMEs) including farmers and other organizations located all over Lebanon received business development services.
- More than 80 MSMEs received assistance and training on ways to apply for and access financial services and loans.
- \$1.1 million in loans were disbursed to support MSMEs as a result of technical assistance. More than \$2 million was leveraged by businesses and cooperatives to improve quality including wax recycling, obtain ISO certification, establish the artificial insemination center, marketing and upgrading laboratories. Small-scale beekeepers and cooperatives invested more than \$500 thousand in new hives.
- Honey producers began selling their products in 65 new market channels, including export markets.
- 498 women were assisted to improve existing businesses and help in establishing new businesses.
- 2,534 beekeepers and other value chain actors were supported to apply improved technologies, improved harvesting and post harvesting techniques, and improved handling and storage techniques.
- 430 MSMEs have benefitted from business linkages established by LIVCD.
- 1,345 jobs have been impacted.
- 4,150 beekeepers and individuals have received training on Hive Management, Disease Management, Queen Rearing and Breeding.

Watch the LIVCD [Honey Value Chain Videos](#)

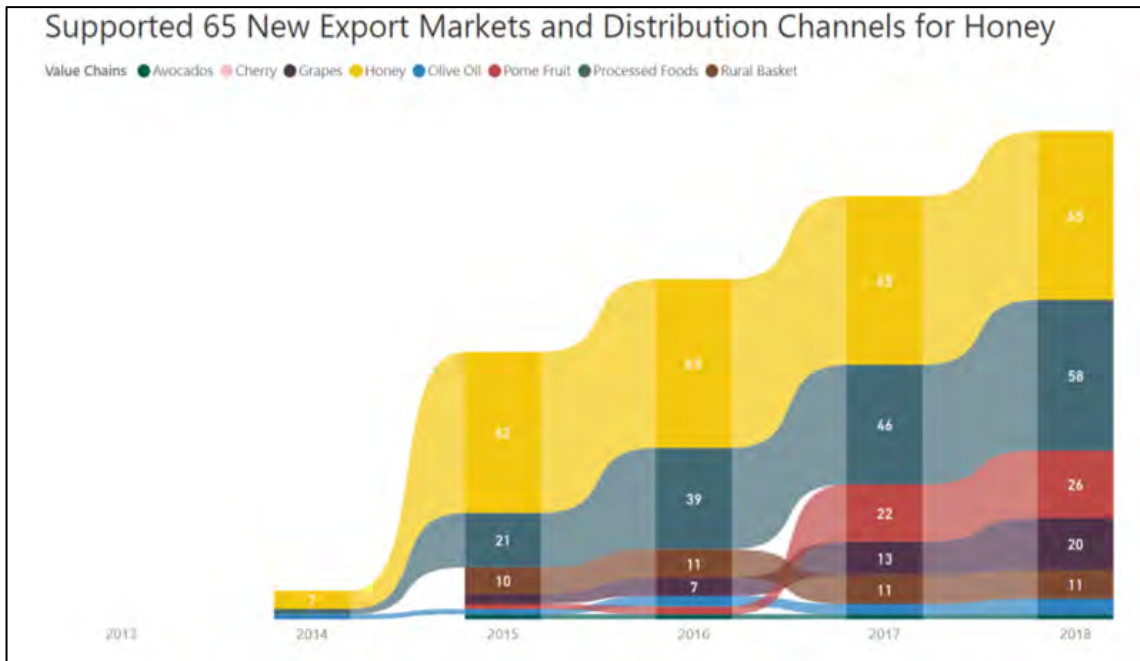
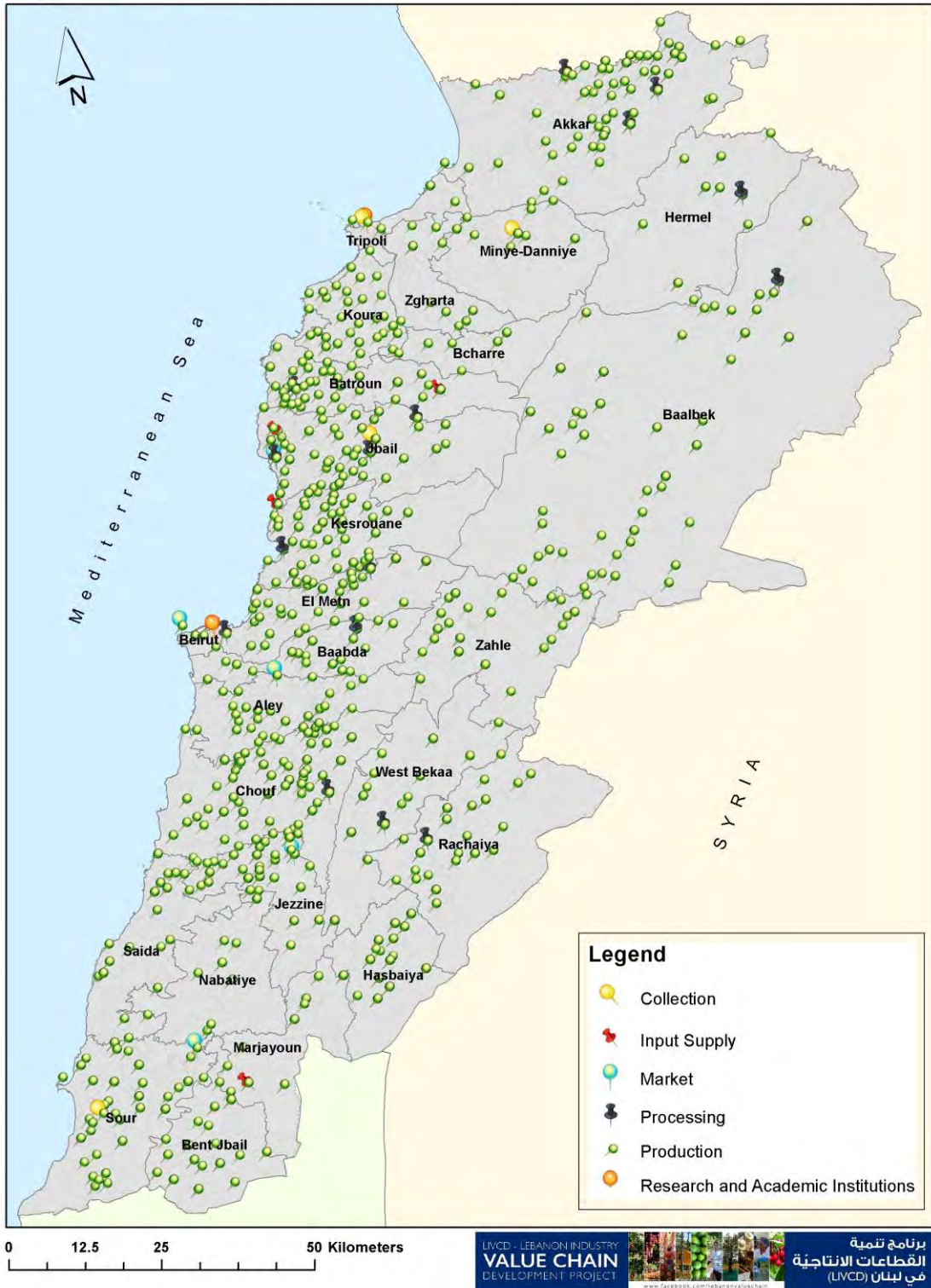


Figure 4: New export markets and distribution channels for honey



Mr. Afif Abou Chedid - Beekeeper and General Manager at Afif Abi Chedid Enterprises

“I was introduced to the LIVCD project, which supported my biggest dream of expanding the honey sector in Lebanon. We collaborated together and explored opportunities, set goals and objectives for the honey value chain. We decided to focus on improving the quality of queen bees in Lebanon. This achievement is not only a major breakthrough, it will also have a positive impact for future generations of beekeepers”



## **Olive Oil**

Olive production occurs in all parts of Lebanon. Olives occupy about 20 percent of total agricultural land, and most orchards are small, less than 0.5 hectares. Many owners utilize the services of a “wood” Daman, a farmer to cultivate, harvest and mill the olives into oil, paying the owners a portion of the oil as compensation.



LIVCD determined from its initial assessment of the olive oil value chain that high costs of production handicapped its growth. Lebanon exports slightly more than 3,200 tons of olive oil per year, mostly to the United States and GCC countries. Yet, despite its export orientation and the fact that olive oil occupies a high percentage of Lebanon’s agricultural GDP (estimated at about 7 percent), the country still relies on imports of cheap oil, especially from Syria, for domestic consumption. A further constraint to the olive oil value chain is poor quality resulting from widespread use of traditional milling methods.

LIVCD chose to work on the olive oil because improvements in this value chain will positively impact thousands of people in rural Lebanon. Upgrading the value chain, especially through reduction in the cost of production and better milling, would offer additional income to rural producers and increase exports in a highly competitive global olive oil market. The vision that LIVCD had for the olive oil value chain was to increase competitiveness and sales domestic and international sales through improved quality, which could be certified through labeling schemes, and lower costs of production using modern techniques.

LIVCD intended to accomplish this vision by focusing on the following three main areas of work:

- Improve olive tree productivity.
- Facilitate investments and improvements in milling and storage to increase volumes of extra virgin olive oil.
- Create market incentives favoring Lebanese olive oil both domestically and internationally.

## **Strategy**

***Production strategy: Lower costs with improved technologies and techniques and establish service centers.*** An essential element to upgrading the olive oil value chain was to reduce the costs of production. This could be done through improved techniques and the adoption of modern technologies. Reduction in costs will provide more revenue to olive producers and increase the competitiveness of olive oil in both domestic and international

markets. LIVCD realized early in the project that despite extensive olive production throughout the country, most olive farmers relied on traditional methods of production.



Extra Virgin Olive Oil

**Milling and storage strategy: Facilitate investments in modern milling and storage to increase the percentage of extra virgin olive oil, and link millers to small and medium scale farmers.** Lebanese olive oil has unique characteristics that are in demand in both domestic and international markets. Yet, modern milling that brings out these qualities, had yet to play a dominant role in the olive oil value chain. Storage of Extra-Virgin Olive Oil (EVOO) was also inadequate. Many mills stored olive oil in plastic containers in which the quality of the oil deteriorated rapidly.

**Marketing and branding: Labeling to capture EVOO's true value.** Lebanese olive oil was rarely labeled properly, which leads to undervaluing EVOO or overvaluing lower quality oil. LIVCD sought to design programs to guide value chain actors and public authorities to consider various labeling and certification options to spur demand for Lebanese origin olive oil that is able to meet international quality standards with clear accurate labeling according to the type and origin of the oil.

### **Key interventions**

Based on the assessment, LIVCD chose to concentrate resources in the area of reduction of costs of production and in improved milling. The project worked on marketing and labeling and promotion of exports but determined that the greatest impact in the value chain could be achieved through extension of techniques and technologies to improve oil quality and reduce costs. The two main interventions are:

- 1) Introduction and extension of mechanical harvesting to reduce harvesting costs; and
- 2) Investments in modern mills and establishment of service centers to extend improved technologies.

**Mechanical harvesting:** Before LIVCD, the majority of olive farmers harvested their olives using combs and nets or beating trees with sticks. Harvesting olives with combs, nets and sticks yielded between 5 to 10 kg per hour. Moreover, these practices destroy new shoots which would bear fruit in the next season, thereby negatively affecting olive oil quality and quantity. According to studies<sup>7</sup>, the volume of olives can be reduced by as much as 80 percent in subsequent years.



Mechanical harvester – Darbehtar, North Lebanon

In the first year of the project, LIVCD conducted an analysis of olive cost of production. It concluded that manual harvesting of olives represented between 40 and 60 percent of total production costs, including all agricultural practices and milling and storage. The project decided that reducing this single cost factor would not only increase incomes from olive production, but would have positive impacts in terms of both quality and quantity of olives and olive oil in future years.

LIVCD invested with 63 agricultural cooperatives on “harvesting bundles”, and 66 individual farmers and 10 cooperatives invested in the bundles without LIVCD grant funds. The bundle consisted of a mechanical harvester, plastic crates and harvesting nets for a total value of approximately \$1,800. The total investment in harvesting bundles was nearly \$1 million. The harvesting bundles became a revenue stream for the cooperatives resulting in income of \$435,000 in the first four years. In the four years of this program, mechanical harvesters reduced harvesting costs by \$1.4 million. With a 50 percent reduction in harvesting costs, the gross margin of olive production increased from \$8,862/ha to \$11,950/ha.

### **Modern milling and storage:**

Traditional olive mills produce a low percentage of EVOO. Poor storage leads high quality olive oil to deteriorate quickly. To overcome these constraints, LIVCD worked with olive cooperatives and private companies to facilitate investments in modern milling and storage. The Kobayat Cooperative in the northern district of Akkar is a good example of this



Kobayat Mill

<sup>7</sup> The Italian cooperation projects

type of intervention. LIVCD and the Kobayat Cooperative established a public-private partnership for the investment. First, LIVCD worked with Kobayat to develop a bankable feasibility study which led to the cooperative receiving a \$60,000 bank loan to finance an automatic continuous line to produce EVOO. Milling capacity increased by 100 percent.



Willani labeling machine

LIVCD helped entities like Kobayat for two reasons. First, by providing additional capacity which will produce higher quality oil, the cooperative and other organizations are able to serve far more olive farmers. Kobayat was able to extend its services to 500 farmers in the region, instead of the previous 200 farmers. This reduced milling fees for farmers and increased milling revenues for the cooperative. The cooperative's revenues increased by about 80 percent after installing the modern milling line. Second, strengthening the cooperative permitted LIVCD to reach more farmers with cost-reducing technologies. For example, Kobayat also invested in mechanical harvesters, nets, and crates which produces higher quality olives at significantly reduced costs.

In addition to the Kobayat Cooperative, LIVCD also helped the following partners to improve their olive oil quality:

- Al Rachid Mill in Hasbaya, through providing a new separator for their automatic mill and technical assistance on Good Manufacturing Practices to improve their facilities.
- Nicolas Fares and Sons (NFS) in Lebaa, through the provision of olive oil storage tanks and several pieces of equipment complementing the 3-phase automatic milling line.
- Willani SARL, Tripoli cooperative and JAZ, through storage and filling equipment to preserve the quality of their olive oil products.
- Darbehtar cooperative, which already owns an automatic milling line, benefited from equipment to improve their service center and improve farmers' orchard productivity and therefore also their olive oil quality.

LIVCD supported additional stakeholders through technical assistance through investing in new automatic milling lines and facilitating good manufacturing practices, yielding more high-quality extra virgin olive oil.

**Marketing, labeling and public awareness of the importance of Extra Virgin Olive Oil (EVOO):** LIVCD's partner, Willani SARL, following LIVCD's assistance, increased its domestic and export sales, where in the local market a total of 125,067 liters of olive oil was sold across 20 local markets totaling \$643,134 in sales and in the export market a total of 46,340

liters of olive oil was exported to 6 markets (US, Venezuela, France, London and Germany) totaling \$243,036 in sales.

These figures represent a large increase in domestic and export sales for Willani and were made possible by the processing improvements under the grant such as the automatic self-adhesive labeling machine for bottles.

Darbechtar cooperative, through LIVCD's grant, upgraded their product labels and was able to export 18,000 liters of olive oil, collected from 20 farmers, to Australia.

After LIVCD support and assistance, Olea Cooperative, started its first olive oil export to USA, where 1.4 tons of Extra Virgin Olive Oil were bottled in 4,000 bottles (250ml and 500ml) valued at \$14,000.

Following the USAID-sponsored National Extra Virgin Olive Oil Contest 2017, LIVCD provided marketing assistance to Bustan el Zeitoun, the winner of the Silver Medal. The brand, which produces Extra Virgin Olive Oil in Abra, South Lebanon, from Italian cultivars, was launched in the marketplace in 2016. LIVCD provided support to develop new promotional and visibility tools. Bustan El Zeitoun continued its successes, by winning the first prize for premium extra virgin olive oil at the National Contest of the best Lebanese extra virgin olive oil in March 2018 during HORECA (Hotel/Restaurant/Café) event, and then it received a Gold Award at the 2018 New York International Olive Oil Competition (NYIOOC) in April 2018. Bustan El Zeitoun was the only Lebanese olive oil to receive an award at this competition.

To improve the marketing strategies of LIVCD's partners, throughout the lifetime of the project, LIVCD supported promotional events such as HORECA (every year from 2014 to 2018), Beirut Cooking Festivals (every year from 2014 to 2018) and other exhibitions/festivals with the collaboration of several partners including Darbechtar, OLEA, Chamber of Commerce, Industry and Agriculture of Tripoli (CCIAT), and Nature by Marc Beyrouthy. During these events, LIVCD partners had the chance to promote and export their olive oil products.

LIVCD partnered with the Bcheale Association through a grant to determine the age of the Bcheale olive centennial tree (the oldest one in Lebanon), which was found – after the analysis conducted at Arizona State University – to be **2045 years old**. This verified information helps market the location as a tourist destination.

Through a partnership with the CCIAT, LIVCD established a new organoleptic panel test room, composed of 10 booths, where a jury of 10 qualified experts trained by an Italian



Bcheale olive tree – Bcheale, North Lebanon



expert will conduct monthly evaluations of olive oil samples provided by farmers/stakeholders.

Two grants agreements with universities, to the Holy Spirit University of Kaslik (USEK) and the Saint Joseph University (USJ), were implemented to introduce new technologies for the improvement of the olive oil sector. The quantitative Polymerase Chain Reaction machine (qPCR) granted to USEK is used to detect and identify plant pathogens (including viruses, viroids, and bacteria) on olive trees for controlling plant diseases, and the infrared spectrophotometer (FT-NIR) purchased for the USJ is used for olive oil analysis.

LIVCD's olive oil value chain team conducted a series of trainings and technical assistance to partners/ farmers/ olive oil stakeholders on:

- Good agricultural practices for olives
- Integrated Pest Management
- Olive oil quality assessment and evaluation (chemical and organoleptic techniques)
- Olive pruning techniques

### **Impact**

Overall, LIVCD helped cooperatives, companies and individual farmers transform the olive oil value chain from one, which utilizes traditional and inefficient techniques and technologies to a modern value chain that produces a much higher percentage of high quality olive oil at reasonable prices. The result has been improved competitiveness in both domestic and international markets. The high-level results of the olive oil value chain are:

- 6,124 MSMEs including farmers and other organizations located all over Lebanon received business development loans.
- More than 340 MSMEs received assistance and training on ways to apply for and access financial services and loans.
- \$430,000 in loans were disbursed to support MSMEs as a result of technical assistance.
- 1,444 women were assisted to improve existing businesses and help in establishing new businesses.
- 5,687 farmers and other value chain actors were supported in applying improved technologies, improved harvesting and post-harvesting techniques, and improved handling and storage techniques.
- 3,601 MSMEs have benefitted from business linkages promoted by LIVCD.
- 3,305 jobs were impacted
- 3,494 farmers and individuals received training on Good Agricultural Practices, use of Mechanical Harvesters, and on how to assess and evaluate olive oil quality.
- Regarding the export, more than 3 partners increased their exports by 40,000 liters of olive oil at a cost of \$230,000.

Watch the [LIVCD Olive Oil Value Videos](#)

The Largest Number of Horizontal & Vertical Linkages were in the Olive Oil and Apples Value Chains

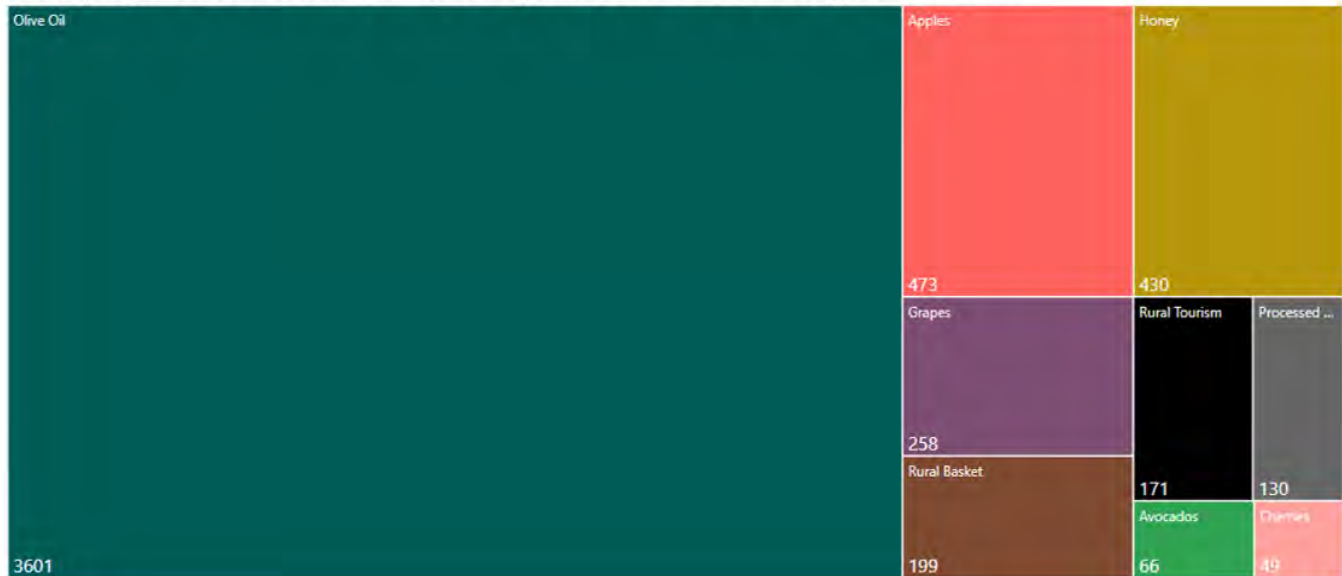
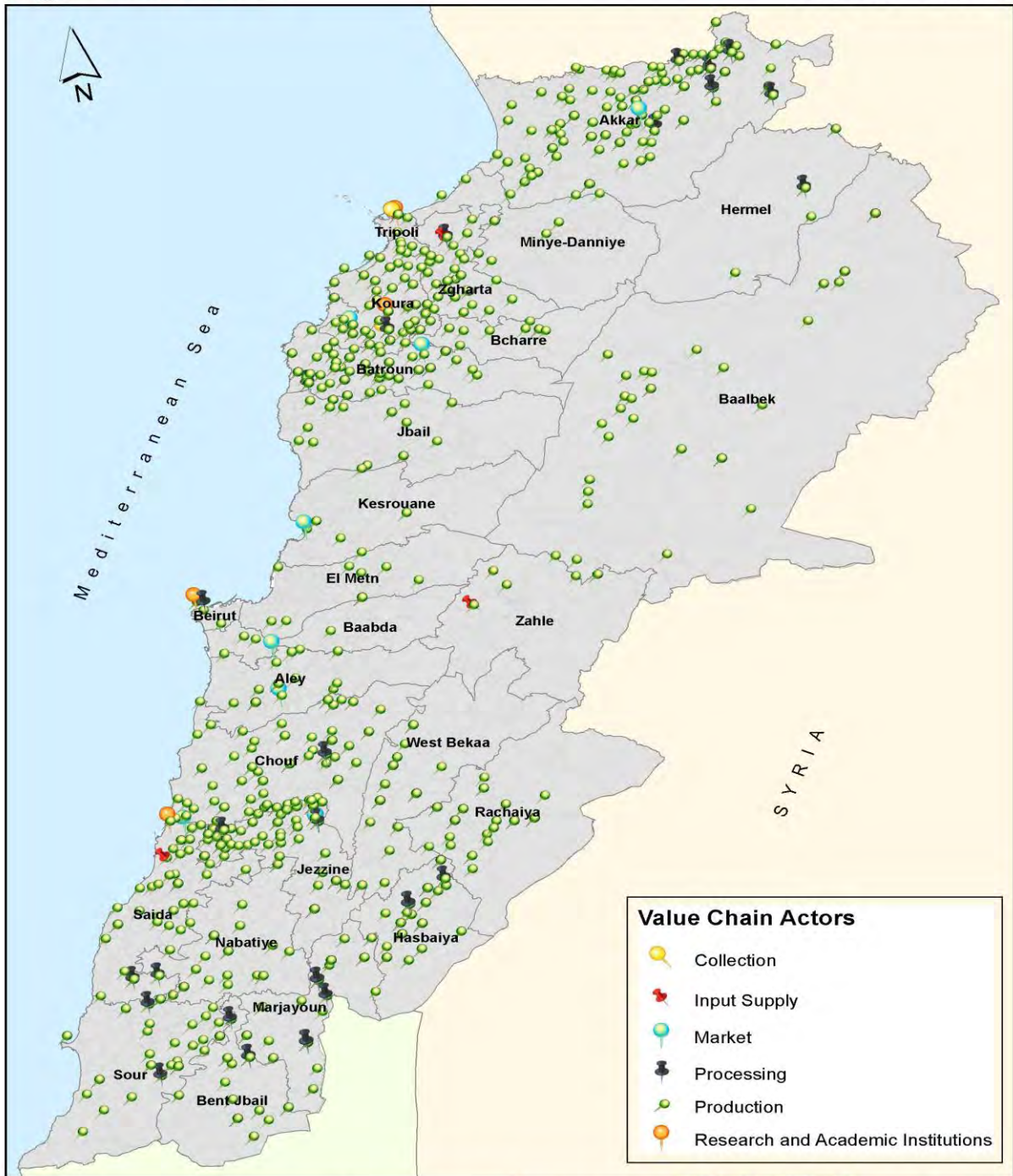


Figure 5: Number of linkages created per value chain



Zahra Ghaith – Farmer in Nabatiyeh, Lebanon

*“Thanks to the mechanical harvesters, an orchard that needed five working days, can now be harvested in no more than a day and a half. Most importantly, we did not need to hire laborers or bring ladders. All we needed were the harvesters and the nets! We saved money and time!”*



## **Processed Foods (Pickles, Vinegar, Freekeh, Syrup, Ready-to-Eat Meals)**

Processed foods account for a sizable percentage of total Lebanese exports. It is difficult to think of processed foods as one value chain, as it takes into account a wide variety of products that are important to Lebanese cuisine. Pickles and jams, Labneh and cheese, freekeh and juices are all part of



processed foods, but they are not similar in terms of processing nor in terms of the production of raw materials. With respect to exports, processed foods are included in sections 3 and 4 of the internationally used HS codes, unlike most value chains which have a discrete 6-digit code.

LIVCD saw this wide variety of products as an advantage to working in the processed food value chain. The project chose to work in the processed foods value chain because of and not in spite of the wide range of possible products. The project understood that this value chain contained many opportunities to make a difference to thousands of people, many of whom are women employed in food processing companies.

In 2012, Lebanese exports of processed foods was about \$412 million, or about 10 percent of total Lebanese exports. According to the Syndicate of Lebanese Food Industrialists (SFLI) and UNIDO, there were 736 registered foods processing enterprises in Lebanon that employ five or more workers in 2007. While these numbers are somewhat dated, it is important to note that this represented 18 percent of all industrial companies and accounted for 25 percent of the total industrial workforce. The total workforce involved in processed foods is however much greater once we include employment on hundreds of farms scattered around the country that provide raw material to processing companies. In 2007 these companies had an output of \$1.75 billion with 27 percent of the country's total value added. If all of food processors are taken into consideration, including those that employ less than five workers and those that are not registered, then, according to the Chambers of Commerce, the output of the processed foods industry exceeded \$3 billion which accounts for seven percent of Lebanon's total GDP.

LIVCD's vision for the processed foods value chain was to increase exports to existing markets and enter new markets. LIVCD sought to work with partners all along the value chain to increase integration of small and medium processors and improve vertical and horizontal cooperation. To achieve this vision, the project chose to work on general issues related to the all actors in the value chain, and at the product level.

### **Strategy**

**Interventions at the general level:** At the start of the project, it was clear that the project could assist the industry by working on market intelligence, in particular on providing

information on relevant standards in target markets, and help processors develop realistic marketing and promotion strategies. LIVCD and the Syndicate for Lebanese Food Industries worked together to promote Lebanese products at international trade fairs. LIVCD also partnered with processors to improve efficiency and meet international food safety and labeling standards, especially achieving standards contained in the United States Food Safety Modernization Act required for export to the US. And the project joined with the Chamber of Commerce, Industry and Agriculture in Zahle in establishing a modern food safety lab to facilitate additional exports.

Interventions at the general level include programs to increase the participation of farmers into the processed foods value chain. LIVCD sought to improve production practices and post-harvest handling and strengthen vertical linkages between groups of farmers and processors. LIVCD also worked closely with small cooperatives around the country, many owned by women, to improve their products and extend their market reach.

**Product-specific interventions:** At the start of the project, LIVCD, in cooperation with processing companies, designed and implemented specific interventions to alleviate bottlenecks that constrained the ability of the value chain to grow. For example, LIVCD and several pickle processors identified a series of key investments that succeeded in radically changing pickle processing in Lebanon. In another example, LIVCD worked with a dynamic women's cooperative in the south to introduce a new technology to process freekeh that meets international food safety standards. In addition to introducing new technologies and inventions, LIVCD also mentored smaller processors and cooperatives in financial management, especially product costing, and marketing to improve competitiveness.

## **Key interventions**

### ***Transforming pickle processing in***

**Lebanon:** Pickle processing is big business in Lebanon. The LIVCD Team estimated that in 2017, the pickles sub-sector had a value of nearly \$128 million, of which \$55 million was from exports and the balance from local retail sales and the hotel, restaurant and catering industry. Yet, the pickles industry was losing market share, especially traditional export markets. The loss of market share was attributed to mediocre quality, a limited offering of products, lack of cost competitiveness, and limited capacity.

LIVCD, in coordination with the largest pickle processors in Lebanon conducted a self-assessment of the sector and determined that the solutions to the main constraints to growth were within reach.



Tank fermentation vs traditional barrels at Msallem factory – Koura, North Lebanon

LIVCD and the processors formed public private partnerships to invest in a more efficient and more controlled method of fermenting pickles. Instead of relying on 120-liter plastic drums, the most common means of fermenting pickles, LIVCD and partners introduced fiberglass tank fermentation. Eight pickle processors, representing 60 percent of the industry, worked with LIVCD to install 10,000-liter tanks which reduced fermentation time by 83 percent and decreased production costs by up to 40 percent. Equally important, tank fermentation gave pickle processors more control over quality and taste.

Another major innovation introduced through a public private partnership is an optical sorter for cucumbers. The PPP was a model of cooperation. LIVCD worked with Mechaalany, large pickle processor; National Instruments, a US technology firm; and Engineer and Educate, a Lebanese start-up technology company to invent a sensor-based optical sorter to sort cucumbers for pickling. This sorter is not used anywhere else. Before the introduction of this technology, manual sorting of cucumbers by length and shape constrained processing capacity. The automatic sorter freed up the women who previously sorted cucumbers to do higher value activities within the processing plant, and greatly increased efficiency. At the same time, LIVCD facilitated the introduction of higher yielding cucumber varieties that are more suited to certain overseas markets. The introduction of these varieties strengthened linkages between cucumber farmers and processors.

Two other innovations improved pickle processing in Lebanon. The first, a carbon dioxide purging system, assists processors to monitor and regulate CO<sub>2</sub> levels in the fermentation tanks to minimize waste, improve pickle texture and maintain consistent high quality. LIVCD led another PPP to develop this system, again partnering with a local processor, National Instruments, and a local start-up firm, Mekatranico. Like the optical sorter, this system is unique to Lebanon, and not available anywhere else in the world. The final innovation is brine recycling. Every year pickle processors would dump approximately 300 tons of salt and thousands of tons of acidic brine into empty fields. This was a large financial loss in addition to an enormous environmental hazard. LIVCD and the Chamber of Commerce, Industry and Agriculture in Zahle (CCIAZ) devised a means of testing the used brine to determine if it is suitable for reuse. So far, one processor has invested in the reuse system.

### **Commercializing Freekeh:**

Freekeh is roasted green wheat that is often cooked as a substitute for rice or bulger. It is common in the Levant and is usually produced in small batches by cooperatives or small businesses. LIVCD concluded early in the project that there was significant demand for freekeh domestically and in export markets, but the method of producing freekeh was not hygienic. Farmers harvesting green wheat would often dry the grains on pavement and use open fire to roast the



Green freekeh cultivated

wheat. Not only was this method inconsistent with basic food hygiene, the open fire meant that the freekeh was not uniformly roasted.

To tackle these issues, LIVCD established another public-private partnership consisting of the Al-Imad Cooperative in southern Lebanon, National Instruments, and a local engineering company. The Al-Imad Cooperative took a risk with LIVCD. The concept of a freekeh roaster and dryer was clear, but manufacturing this equipment had never been done before. The management of Al-Imad, a cooperative of 21 women is the most southern part of the country, worked closely with LIVCD, NI and the local engineer to define their needs so they could expand their sales outside of their small community.

At the same time, LIVCD also worked with the Lebanese Agriculture Research Institution to extend a new wheat variety more suitable for freekeh production.

The results of this collaboration exceeded LIVCD's initial expectations. Sales from the cooperative nearly doubled in the first year, and 43 local farmers supplied green wheat to the cooperative for processing into freekeh. LIVCD, with the help of Al-Imad management, also engaged in a public awareness campaign that resulted in 10 additional cooperatives utilizing the



Freekeh harvesting – Hariss, South Lebanon

freekeh roaster and dryer to produce more than 20 tons of freekeh in the year after the initial investment. One hundred thirty-five farmers, including 72 women, produced improved green wheat to these cooperatives. The yearly incomes of these farmers increased from under \$1000 to more than \$20,000. Numerous exporters have shown interest in procuring significant quantities for export. Finally, other donor agencies have also purchased the roaster and dryer for other cooperatives and small businesses.

**Soft support to businesses and cooperatives:** In addition to providing new technologies for businesses to improve efficiency, LIVCD also provided training in a variety of topics. At the beginning of the project, LIVCD conducted a thorough assessment of all processed foods cooperatives to determine the ability of their management teams and their memberships to adopt new ideas on manufacturing or to improve food safety. In addition, as businesses approached LIVCD about possibly working together, the project deliberately assessed the ability of each business to accept improvements in management, finance or in food safety and good manufacturing practices. It was clear to LIVCD that new equipment or a better product is not sufficient to ensure business success. New technologies, in partnership with good management decision making was the recipe for success.

To illustrate this type of support, LIVCD established a partnership with Lebanese Mezze. This company produced a range of good products like kibbe, and other frozen foods. Originally, the partnership focused on improving production and increasing storage capacity at its production facility. Eventually, the partnership came to include a complete review of its production and marketing costs with a view to making both more efficient and cost effective. Because the management of the company was receptive to change, it was able to significantly improve its market position, especially in Lebanon, where it is a supplier of frozen foods to the largest distributor in the country.

Soft support to businesses and cooperatives in food safety also resulted in noteworthy achievements. For those companies hoping to improve their market position, food safety is becoming an increasingly important variable. Consumers are much more conscious of food safety than in the past, and exports to high value markets increasingly use food safety as a means to discriminate acceptable from unacceptable suppliers. LIVCD thus undertook a thorough training program for food processors in food safety, focusing especially on the standards contained in the US Food Safety Modernization Act. This effort resulted in the largest US-based importer of Lebanese food contracting with LIVCD partners to supply all its Lebanese food requirements. This company, located in Illinois, will no longer purchase from competing countries like UAE, Egypt or Saudi Arabia. This contract is worth millions of dollars to Lebanese firms. It is a high achievement.

### **Impact**

Overall the high-level results of LIVCD's processed foods value chain are:

- 587 micro, small, and medium enterprises (MSMEs), including farmers and other organizations, received business development services.
- 52 MSMEs received assistance and training on ways to apply and access financial services and loans.
- \$5.9 million in loans were facilitated with USAID assistance to support MSMEs in terms of technical upgrading.
- 829 women were assisted to improve existing businesses and supported in establishing new businesses.
- 416 farmers and other value chain actors were supported to apply improved technologies, harvesting and post harvesting techniques, and handling and storage techniques.
- 130 MSMEs have benefitted from business linkages established by LIVCD.
- 313 jobs have been extended or made permanent, including women processors, farmers, and cooperative members.



- 1,164 processors, farmers and cooperative members have received training on new equipment, Good Agricultural Practices (GAP), and Good Management Practices (GMP).

Watch the [LIVCD Processed Food Value Chain Videos](#)



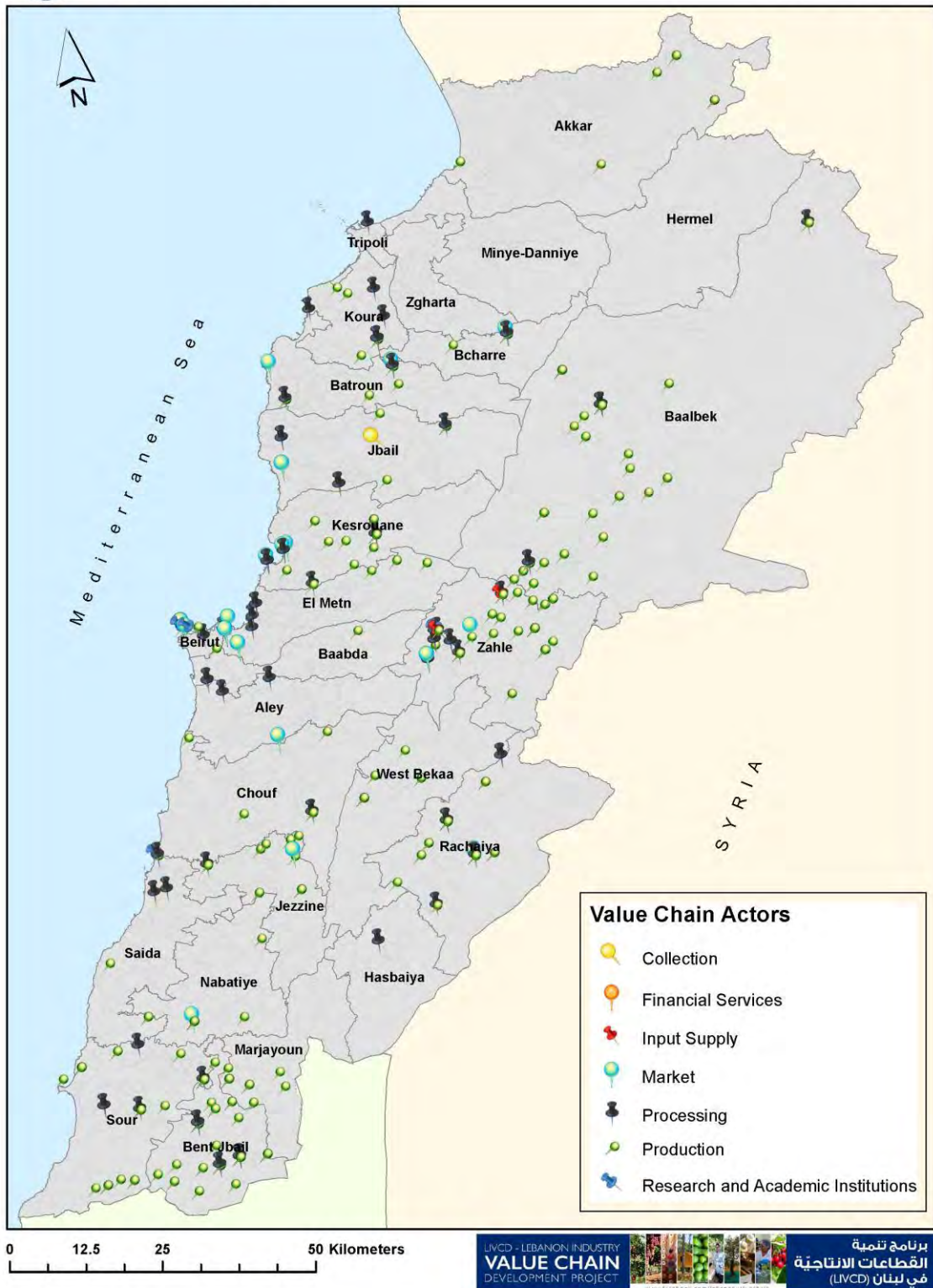
Ms. Rania Chebat – Lebanese Mezze, Managing Partner

*“LIVCD helped us become more efficient, improve our operations, cut down on expenses and secure workers’ jobs. Thanks to both technical and in-kind support, we were able to stay in business during very difficult times and succeeded in bringing in new customers, thus allowing our business to grow in a sustainable way”*



Mr. Wissam Msallem – Msallem Tech, CEO

*“The fermentation tanks changed our whole way of working! It reduced production cost by 30 percent, thus allowing us to follow our philosophy of giving back: so we are now able to invest in technical support to farmers. USAID’s support impacted all the pickle value chain actors and most importantly created many job opportunities”*



### **Rural Basket (Oregano, Pine nuts)**

At the start of LIVCD, USAID and project personnel considered including interventions in small value chains as a means of including marginalized portions of the rural population into the project and addressing the impact of Syrian refugees on host communities. This set of interventions became known as the “rural basket” value chain. This set of products, Lebanese thyme (*Origanum Syriacum*), pine nuts, free range eggs, and capers, offered the opportunity to population groups that are often on the sidelines of development efforts.<sup>8</sup> The products included in the rural basket value chain generally have low investment costs and high market demand and can provide resource poor Lebanese with the chance to obtain significant increases in income.



LIVCD had several grants in free range eggs in early 2013 and into 2014. Free range eggs provided participating families in host communities with good income, but the project chose to halt free range eggs interventions because of difficulty finding a means to make them sustainable beyond the first tranche of layers. Thus, the project focused on zaatar and pine nuts, and a grant to a small scale processor that specialized in rural basket products while incorporating women’s cooperatives into its supply chain.

**Rural Basket – Pine Nuts:** The edible pine nut produced in Lebanon comes from the *Pinus Pinea* tree, commonly called Italian Stone Pine, Umbrella Pine or Parasol Pine. *Pinus Pinea* grows naturally in Lebanon from sea level up to elevations of 1,500 meters. The nuts of this tree are a high value crop and generate significant income for actors involved in the market. They are used in traditional Lebanese dishes and international cuisine, which creates consistent domestic demand and opportunities for export. Of the total forest cover in Lebanon, *Pinus Pinea* constitutes approximately 20%, or 27,000 hectares. These 27,000 hectares were in areas which exhibited a high incidence of poverty, and thereby offered potential additional income to families who needed it the most.

At the start of LIVCD, there was little data on pine nuts markets. This in part is because pine nuts exports are included in an export code that includes other nuts. According to Lebanese customs, pine nut exports were erratic. In 2009, the value of exports was \$1.9 million while in 2010, exports increased to \$7.8 million. In 2011, there was a significant reduction in the export of pine nuts, only about \$500 thousand. In terms of production, the data are even harder to find. During the period 2003-2005, the Ministry of Agriculture

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<sup>8</sup> Honey is also considered as part of the rural basket value chain, but LIVCD chose to separate it from the other products in the rural basket because of the large numbers of honey producers throughout the country.

estimated that the total annual production of pine nuts during 2003-2005 in Lebanon was 1200-1500 tons, with a wholesale value of USD 16.5- USD 25.8 million<sup>9</sup>.

LIVCD determined that the best means of facilitating growth in pine nuts was to focus on marketing and processing. In 2012, there was only one pine nuts processing plant, and that plant did not use technologies to process the nuts to high quality. Other producers sold the unprocessed black nuts, which resulted in a loss of potential added value.

LIVCD's intervention in pine nuts was centered in Jezzine, which has the largest contiguous pine nuts forest in the Middle East. The investment was a model of cooperation among five concerned parties – the Jezzine Pine Nut Cooperative (JPNC); the Union of Jezzine Municipalities (UJM); Jezzine and Zahrani Development Company (JAZ), the Municipality of Bkassine, and LIVCD. The cooperation was as follows: UJM built a pine nut house on land donated by the Municipality of Bkassine. UJM contracted JAZ to operate the pine nut house. UJM required that JAZ purchase black nuts from local farmers in the JPNC at a price not less than \$0.10 higher than the prevailing market price. Further, JAZ committed to providing cooperative members free processing one day weekly. It is also important to note that the UJM Pine Nut House in Bkassine was also part of the Jezzine tourism plan, and operated as a retail outlet for other products in Jezzine, including olive oil, wine, and other specialties. LIVCD shared in the cost of the processing equipment.



Pine nut machine – Jezzine, South Lebanon

This elaborate Public Private Partnership was highly successful, and will have a lasting impact on the rural population of Jezzine. At the close of the intervention, the Pine House in Bkassine had sufficient retail sales to be sustainable. 94 farmers and other MSMEs received business development services and the intervention impacted 10 jobs, most of whom now work in the Pine Nut House. 52 farmers benefited from new horizontal and vertical linkages.

**Rural Basket – Zaatar:** *Origanum Syriacum* is the basis of Lebanese Thyme, or zaatar, a popular Middle Eastern spice mix. In addition to *Origanum S.* zaatar usually includes sesame, salt and sumac. Lebanese thyme is procured through collection of wild growth, and through cultivation. In 2012, it had a retail value of about \$11.5 million. Households producing Lebanese thyme, most through collection of wild thyme, achieved net revenues of about \$160/month. Because collection of wild Lebanese thyme has a deleterious effect on the

<sup>9</sup> Dr. Maya E. Nehme, "Pine Nuts Cluster Development Plan- Jezzine and Akkar Pine Nuts Growth Potential", (June 2010).

environment, LIVCD chose to concentrate its efforts in facilitating irrigated cultivation. Irrigated cultivation reduces production risks and is preferred to unirrigated cultivation. LIVCD estimated during the assessment phase, that a modest investment of about \$5,000, would provide sustained income of over \$2,500/dunum (\$25,000/hectare).

LIVCD chose to establish a partnership with the Zaatar Zawtar Cooperative in Nabatiyeh. The purpose of the partnership was to upgrade the processing capabilities of the cooperative to increase capacity and improve quality and meeting food safety standards, including introduction of Good Manufacturing Practices. It also improved the ability of the cooperative to provide seedlings to additional farmers in the region. Moreover, the partnership chose to work with area farmers, some new to thyme production, to facilitate investments in irrigation equipment. The goal of this was to increase the amount of Lebanese thyme sold to the cooperative. The Zaatar Zawtar Cooperative had excess demand for its product. This partnership was designed to improve the cooperative's ability to meet that demand.

The partnership resulted in an increase in cooperative sales of zaatar of nearly 50 percent and 40 farmers installed irrigation systems for the production of *Origanum S*. 56 farmers received training in good agricultural practices and 38 new farmers were linked to the cooperative.

#### **Rural Basket – Adonis Valley:**

Adonis Valley is a small family-owned company in Mount Lebanon that specializes in products included in the rural basket. Of particular interest to LIVCD was Adonis Valley's procurement of raw material from poor Lebanese farmers and women's cooperatives, many of which produce organic products. Adonis Valley offered support on many levels to these producers. In some cases it provided technical expertise, organic certification, seeds, and networking.



LIVCD's interest in Adonis Valley stemmed from the opportunity to improve the incomes and capabilities of its suppliers through assistance to Adonis Valley. The project was able to strengthen Adonis Valley's ties to cooperatives and farmers that provided raw material. LIVCD also supported Adonis Valley's production through application of Good Manufacturing Practices, which would enable the company to improve its market position and engage in exports.

The partnership between Adonis Valley and LIVCD gave LIVCD the opportunity to extend its support to a women's cooperative in Aarsal. Up to that point, LIVCD had been unable to work in Aarsal due to serious security concerns, but the area is also one of the poorest in

Lebanon and in need of development assistance. The investment between LIVCD and Adonis Valley included assisting a women's cooperative in that troubled region to obtain tomato drying racks for production of sun-dried tomatoes, an Adonis Valley production that had particularly high demand. Fourteen women from Aarsal benefited from this investment and increased their income substantially.

Overall, the partnership with Adonis Valley succeeded in increasing the value of exports from zero to over \$83,000, with a variety of exports going to Kuwait, UAE, Japan and India. The value of sales at the conclusion of the partnership was nearly \$270,000, and the raw material for these sales came from 48 farmers and 13 MSMEs in the poorest parts of Lebanon. Two thirds of the beneficiaries were women (49 of our 74 persons), and 36 jobs were impacted from the partnership, almost all of them women.

#### **Pine nuts - Cooperative for Pine Nut Plantation and Production in Jezzine Caza:**

- 94 MSMEs including farmers have received Business Development Services (92 farmers; 2 MSMEs)
- 10 beneficiaries out of 95 are women
- 56 individuals have had their jobs impacted (employees and farmers)
- 39 farmers have applied improved technologies (benefited from the newly introduced services in the Coop)

#### **Oregano - Zaatar Zawtar Cooperative:**

- 56 MSMEs including farmers have received Business Development Services (55 farmers, 1 MSME (Zaatar Zawtar coop))
- The Zaatar Zawtar coop have achieved \$ 20,028 in incremental sales ( a 42% increase in their sales )
- 42% of the grant's beneficiaries were women (24 out of 57 were women)
- 40 farmers have installed irrigation systems
- 56 individuals were trained on GAP

## **Rural Tourism**

Rural Lebanon is beautiful. Mediterranean landscapes and high arid mountains lead to fertile valleys in the hinterland, and steep valleys in the North cede to mild hills in the south. The population in Lebanon is a mosaic rather than a ‘melting pot’, where homogeneous groups dominate in their respective regions. This mosaic is also home to local cuisines that by themselves are worthy of exploration.



Yet, while urban centers developed, rural Lebanon was increasingly left behind, despite its tremendous natural assets. There were few investments in infrastructure to facilitate the rural tourism sector. When LIVCD began in 2012, USAID, seeing the tourism value of Lebanon’s natural beauty, had already injected considerable effort to improve rural tourism through investments in the Lebanon Mountain Trail, the Dhiaffe Network and a handful of other projects. LIVCD chose to build on these investments by embarking on a strategic program of technical assistance and investments at three levels: local, regional and municipal, and national. LIVCD worked in concert with local businesses, a number of municipalities and the Ministry of Tourism.

The vision that LIVCD had regarding rural tourism was simple: The project would work with the private sector, regional and national entities to expand economic opportunities, increase incomes, and create job opportunities in rural areas. Specifically, LIVCD and its partners hoped to:

- Improve the quality and diversify the range of rural tourism products and services through partnerships and leveraged investments with local tourism partners.
- Create synergies resulting in the improvement and expansion of projects along the rural tourism value chain.

## **Strategy**

***Increase Access to Markets: Support promotional and marketing campaign, increase demand for rural tourism and reduce market failure to match supply and demand (because of lack of information).*** Rural tourism products in Lebanon lack comprehensive marketing and communication strategies. The many tourism offerings in rural areas are invisible to consumers and among value chain suppliers (tour operators, travel agents, and

marketers) as they often lack even the most basic promotional materials or the right communication channels and business linkages. LIVCD facilitated the implementation of a national promotional campaign for rural tourism targeting domestic tourists.

***Increase Business Linkages: Create synergies within the rural tourism value chain to aggregate rural tourism services/products and link in small actors.*** At the beginning of the project, the rural tourism value chain suffered from a lack of business linkages within the value chain. This was the key concern of the actors consulted during the initial assessment phase. Many previous initiatives have failed due to lack of coordination between the different service providers, and therefore they were not able to deliver a full-package product. LIVCD facilitated the cooperation and common action at the cluster level through the development of rural tourism clusters. This required the balancing of healthy competition and mutually beneficial cooperation.

***Upgrade the capabilities of local actors and increase the quality and quantity of products and services.***

LIVCD was able to recognize early in the project that the rural tourism value chain suffered from low service quality and lack of professionalism of the rural tourism workforce in businesses including restaurants, hotels, accommodations and guides. The project sought to increase the quality and quantity of rural hospitality businesses through provision of training on the implementation of rural hospitality standards, and training additional and more experienced trail guides while expanding the network of trails. Moreover, LIVCD worked with businesses to overcome the challenges imposed by the seasonal nature of demand for rural tourism to develop year-round offerings.



Third event for the National Rural Tourism Strategy

### **Key interventions**

As mentioned above, the LIVCD Rural Tourism Value Chain Upgrading Strategy focused on three levels, local, regional and national. The following describes only a few of the most important interventions in this important value chain.

***The Rural Tourism Strategy for Lebanon:*** LIVCD worked with the Ministry of Tourism to develop the comprehensive Rural Tourism Strategy for Lebanon. Based on a series of focus groups and interviews, the strategy outlined key areas to improve rural tourism. Those key areas included marketing and communication that improve the visibility of rural tourism destinations and products catering to the domestic market and the Lebanese diaspora. The strategy also included suggestions to improve involvement of local



communities and stakeholders in institutionalizing tourism at the local level, in enforcing policies and regulations to manage tourism activities and to preserve natural, cultural and historic heritage. In addition to working with partners to improve visibility of rural tourism destinations, the project also improved and enforced conservation and protection of the environmental, cultural, historical and agricultural heritage through working with natural reserves.

The Rural Tourism Strategy guided investments for the Ministry of Tourism and many other rural tourism stakeholders to develop new rural tourism projects in Lebanon funded by the private and public sector. In this regard, the Ministry of Tourism implemented projects in rural accommodation, education tourism for schools in rural areas, and marketing and promotion of rural destinations. LIVCD calculated the return on its investment in the strategy at 7.1, meaning that for every \$1.00 LIVCD spent on the strategy generated \$7.10 of investments by the Ministry of Tourism and private sector partners.

**Travel Lebanon Show:** In partnership with Hospitality services, LIVCD invested in a national rural tourism fair, Travel Lebanon, for four consecutive years. Implemented in conjunction with the annual Garden Show and Spring Festival, the show gathered more than 80 businesses, NGOs and municipalities to present their products and packages. More than 25,000 visitors were able to discover what Lebanon has to offer in term of rural tourism packages and products and was a key driver in increasing the demand for rural tourism. Many businesses reported an increase in sales from their participation in Travel Lebanon. While complete data on increased sales are difficult to acquire, LIVCD was able to estimate that the direct return to four years of Travel Lebanon was \$3.2 million and the indirect return was another \$3.1 million. Thus, the combination direct and indirect cost-benefit ratio for Travel Lebanon was 13.1. Every \$1.00 LIVCD and its partners spent on the Travel Lebanon activity generated \$13.10 of benefits to tourism businesses and municipalities.

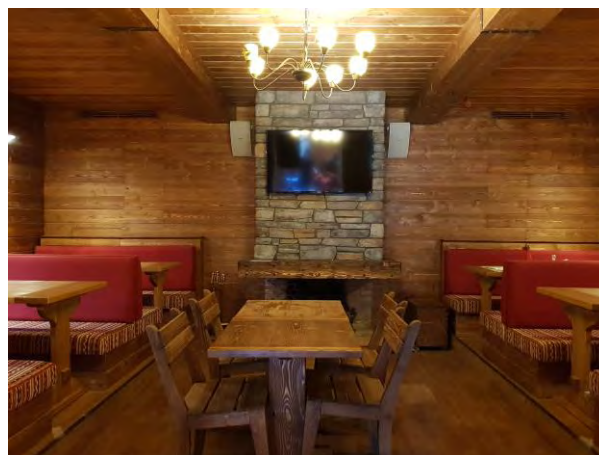


Opening ceremony of "Travel Lebanon" at the Garden Show

**Support to individual businesses or local entities: Marketing assistance to small businesses.** LIVCD supported 18 small rural tourism organizations in developing marketing tools, including 11 videos, print materials (brochures, maps, leaflets, posters), and signs to increase visibility. The tools created for each organization were disseminated on the Travel Lebanon website, mobile app, online/print magazines, and during the public exhibition mentioned above. The grant also developed on-site signage and informational panels for Hima sites of Bekaa valley SPNL and the Menjez Thematic Trail. It supported familiarization

day trips for tour operators for three tourism organizations including Agnes Varis Women Empowerment Center in Taanayel and Rashaya Al Wadi's Souk.

**Arz Ehmej Park:** LIVCD invested with many individual businesses. For example, LIVCD's investment in Ehmej, with the Ehmej Development Association (EDA), illustrates the type of project that formed the backbone of LIVCD's rural tourism strategy. With this investment, LIVCD and its partner EDA spent nearly \$412,000 in Arz Ehmej Park to upgrade its existing facilities, including winterization of the restaurant and lodging. It also created new attractions and trails for nature tourism lovers. Also, members of the



Winter restaurant at Arz Ehmej

local community were trained on quality management. The evolution of the rural tourism sector in Ehmej is not related exclusively to the LIVCD-funded projects since the village has other tourism attractions and services, but the upgrade of the facilities and the training was instrumental in making Ehmej capable of increasing income during the winter months. The total impact of this partnership was nearly \$860,000, as for every \$1 spent by LIVCD, \$3.6 was generated in Ehmej.

**Interventions at the municipal or regional level: Regional tourism strategies:** LIVCD supported local municipalities in developing local tourism strategies in Baskinta, Menjez, Hadath El Jebbeh, Rashaya El Wadi, Rashaya EL Fakhar, Hammana, Aley, Maghdouche, Deir El Ahmar and Batloun.

**Hadath El Jebbeh:** LIVCD assisted Hadath El-Jebbeh with the development of a municipal tourism strategy, which identified several potential projects to take advantage of the natural beauty and cultural heritage of this municipality. In partnership with the Association for the Development of Hadath El Jebbeh, LIVCD followed the tourism strategy to guide investments in the following:

1. Creation of a network of hiking and biking trails;
2. Establishment of a "Gate Facility" at the Hadath al Jebbeh Cedars forest entrance;
3. Development of rural tourism packages.

Moreover, the partnership between LIVCD and the Association also focused on training and coaching activities to increase local tourism management and operation skills.

The partnership between Hadath El-Jebbeh and LIVCD was fruitful. It resulted in the following achievements:

1. Tourism office was installed, furnished and equipped at the municipality to manage the rural tourism network;

2. Coaching sessions and trainings were delivered to the project manager and the guides;
3. Hadath El Jebbeh Auberge re-opened with a heating system so that it could be used in winter;
4. Branding network was created: website, Facebook, signs, brochures;
5. Six seasonal packages were created (including family and school packages);
6. Gate facility and resting area were created in the Cedars forest;
7. Creation of network of hiking trails: 9 hiking trails were delineated, blazed and mapped;

The direct, indirect and induced<sup>10</sup> investments resulting from the program of work in Hadath El-Jebbeh is impressive. LIVCD estimates that in addition to direct and indirect returns of \$111 thousand, the project in Hadath El-Jebbeh led to about \$3.5 million of additional investments from the private sector and international organizations, including additional USAID funding.

**The Shouf Biosphere Reserve (SBR).** SBR is the largest nature reserve in Lebanon stretching from Dahr AL Baidar mountain pass (in the middle of Mount Lebanon) to Niha Mountain in the southern limit of the Shouf district. The reserve is among the most famous attractions of Lebanon. It has magnificent cedar forests and offers a wide variety of ecotourism activities for nature lovers: hiking, trekking, bird watching, mountain biking and snow shoeing. The SBR strategic management plan is based on three programs:



Shouf Biosphere Reserve

- **Environmental conservation** aiming at protecting and valorizing the natural resources of the reserve through research and monitoring;
- **Ecotourism** aiming at promoting responsible tourism activities in the reserve which contribute to job creation and income generation inside the reserve and in the surrounding villages;
- **Community development** aiming at supporting the local economy of the 22 villages surrounding the Biosphere Reserve (14 in the Shouf district and 8 in the West Beqaa district) through the promotion of local products and tourism services and activities in the villages.

In the last decade, the SBR has been one of the most active reserves in Lebanon. It implemented more than ten local development projects to upgrade and to improve the

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<sup>10</sup> The induced investments: Following LIVCD interventions, value chain's actors or stakeholders felt confident and were encouraged to proceed with additional investments.

quality of services. Thus, the LIVCD rural tourism project implemented in the reserve is a continuation of what has been done previously.

The objective of the LIVCD and SBR investment was to “increase rural tourism competitiveness through capacity building for SBR stakeholders and increase the sales of local products, as well as rural tourism packages thanks to the creation of an online sales platform.” The activities included installation of infrastructure (laptops on all entrances including intranet system, POS and cameras to retain numbers of visitors and local product sales) at strategic points in the Biosphere, training on quality management and networking, development of tourism packages, development of brochures, and upgrading the SBR website to include an on-line reservation system. Seventy local food and handicraft businesses benefited from the project. 40 local small and medium scale businesses were integrated into the rural tourism program of SBR, and 25 SBR employee received training. The total budget for this activity was \$125,000, including both LIVCD and SBR contributions. LIVCD estimates that the direct and indirect economic return to this project is 49; that is for each \$1.00 invested, the return to the beneficiaries was \$49.

### **Impact**

Overall, LIVCD’s efforts to upgrade the rural tourism value chain accomplished the following high-level results:

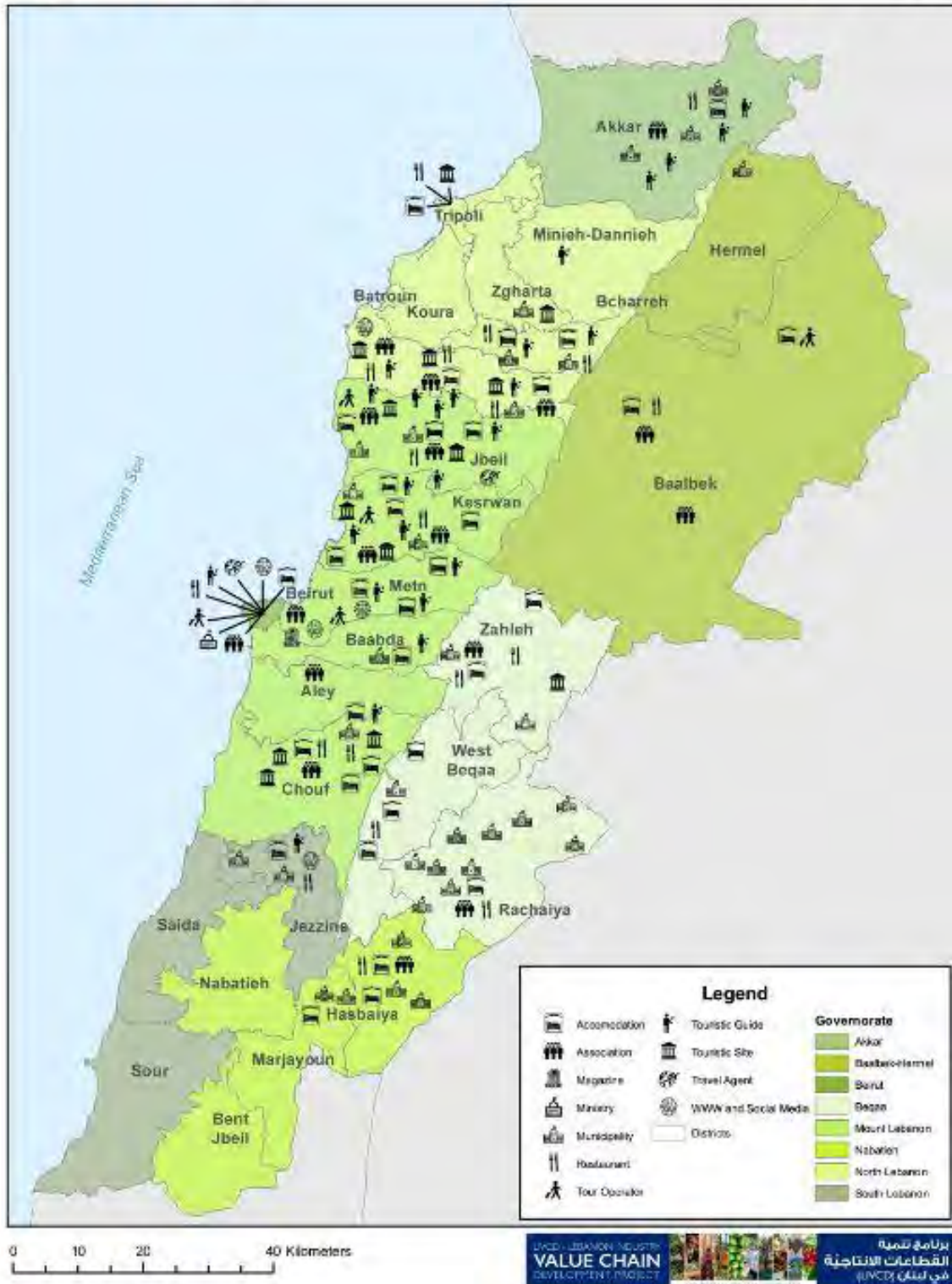
- 1,034 micro, small, and medium enterprises (MSMEs) including farmers and other organizations located all over Lebanon received business development services.
- More than 20 MSMEs received assistance and training on ways to apply for and access financial services and loans.
- 960 women were assisted to improve existing businesses and help in establishing new businesses.
- 498 rural guides and other value chain actors were supported to apply improved practices on eco-guiding and hospitality management.
- 171 MSMEs have benefitted from business linkages established by LIVCD.
- 859 jobs have been impacted/created.
- 1,491 individuals have received training on Marketing and Marketing tools, Quality Standards, Guiding and Tourism Management, Eco-guiding and Guiding Techniques.

Watch the [LIVCD Rural Tourism Value Chain Videos](#)



Ms. Imane Khalifeh  
Ecotourism Manager – Ehmej Development Association

*“Thanks to USAID, Ehmej achieved an important goal by reducing seasonality and becoming an ecotourism destination all year long. The team gained the necessary practical techniques to preserve and invest in our natural heritage in a sustainable manner and to deal with visitors in a professional way. On a personal note, LIVCD was the drive behind my decision to prepare a master degree in NGO management; goal achieved in 2018. I have the conviction that it will help me positively impact my community in a sustainable way. I am very thankful to USAID for their trust and for their help!”*



**Orchard  
Establishment:  
Good  
Agricultural  
Practices &  
Introduction of  
New Varieties**

## 4. Orchard Establishment: Good Agricultural Practices & Introduction of New Varieties

One of LIVCD's top priorities was to help farmers increase their revenues. This could be done by increasing the orchards' productivity, producing high-quality produces, and reducing production costs, thus enabling producers to sell at higher prices and increase their profits. In order to attain that objective, farmers and value chains actors needed to learn about improved orchard establishment and management, and about new in-demand varieties. The physical characteristics of a site should be fully assessed before planting. Varieties and rootstock types should be matched to various conditions, but also be chosen based on market demand. The choice of a suitable rootstock is important as well for the long-term health and productivity of the orchard taking into consideration soil type, scion varieties, climate and locality. It also determines sometimes the period of crop maturity, fruit quality and more. So many parameters must be taken into consideration to establish and manage a healthy, highly productive orchard to ensure a good return on investment. Nurseries and most farmers in Lebanon lacked the required knowledge to properly establish their orchards; as for the ones already farming their lands, they were using outdated practices and planting old varieties that were not meeting market demand.

Farmers were shown that production of sustainable yields is possible when certain parameters were in place. LIVCD established demonstration plots and conducted hundreds of trainings to share the knowledge. The introduction of new cultivars under LIVCD's guidance on rootstocks and varieties was another key intervention. LIVCD brought in-demand varieties to the various value chains.

### **Apples**

#### **Introduction of new varieties and promoting the intensive production system**

Lebanon does not have sufficient production of Grade I apples to meet the demands of both domestic and export markets as it only produces for the most part, old varieties such as the Red Delicious, Golden Delicious and Sans Pareille (mouwachah) varieties that have distinguished Lebanon as an apple producer in the region. However, as competing countries have produced



Trellis system – Zaarour, Metn

and sold newer varieties to regional high-value markets such as GCC, Lebanon's apples were for the most part destined to the low-value Egyptian market. In addition to the type of varieties, competitiveness is constrained by high production costs resulting from inefficient farming and poor agricultural practices, such as the excessive use of pesticides, unsuitable irrigation and fertigation techniques, inappropriate harvesting methods, and inadequate cold



storage facilities. The old apple varieties and their poor quality led to low selling prices, which in peak season was lower than the cost of production. This was detrimental to farmers and forced many of them to abandon their orchards.

To address these issues, LIVCD established 13 demonstration plots across Lebanon that promoted intensive apple production systems using dwarf rootstock: the vertical system and the V-Shape system. These demo plots were promoted to farmers and service centers with the aim of converting the conventional planting systems to ones that produce higher quality apples in a



Apple demonstration plot

more productive and cost-efficient manner. The LIVCD project and service centers used the newly established demonstration plots to introduce to apple farmers new agricultural practices, new varieties as well as new types of the dwarfing root stock (MM9) resulting in improved apple-quality, increased production quantities per m<sup>2</sup> and a higher market price. In 2017, apples from Brih demonstration plot were sold at \$1.33 per kg compared to the market price of \$0.47. The intensive apple production on trellis systems consists of 300 trees planted per dunam when compared to 60 trees on traditional planting systems. The new system has already shown that the intensive production method is more competitive than the conventional one with results to date indicating production per dunam at 9 tons as compared to 4. A comparison study demonstrated that the net profitability of the trellis system exceeds the one of the conventional system by 300%, due to higher yield, improved quality and better selling price. One hectare of apples planted on a conventional system generates approximately \$20,000 net profit per year as compared to an estimated \$80,000 per year for the trellis system. Based on this comparison, the 3.56 hectare planted on the trellis system, the 13 pilot orchards are projected to generate US\$2,595,476 (using an average yield per hectare starting with Year 3 after planting) in a 10-year period (2016-2025). As a result, the direct economic impact ratio of the pilot orchards is estimated at \$2.22 for each \$1 funded by USAID.

During the project, LIVCD introduced the following in-demand varieties:

1. Red Delicious group, which includes the following varieties: Red Velox, Jeromine and Scarlet. The advantage of these varieties over the ones that are traditionally used (Double Red, Red Chief, Super Chief, Top Red, and Starking) is better coloring and long lasting in cold storage.
2. Golden Delicious group which includes the following varieties: Golden Delicious Clone B, Golden Reinders (resistant to russetting, i.e. developing a rough reddish-brown or yellowish-brown skin, or patches of such), and Gold Chief Gold Pink. The

advantage of these varieties over the ones that are traditionally used is better performance in cold storage.

3. Gala group: In the Gala group LIVCD promoted the Buckeye Gala, Schniga, Schnico and Schnico-Red varieties. The advantage over the existing Royal Gala is better coloring and better taste.
4. Granny Smith group: LIVCD encouraged production of the Challenger variety. The planting of Granny Smith apples is still very limited but is gradually gaining popularity in the market.

### Service Centers

In 2012, LIVCD started a long-term strategic approach to address challenges in Lebanon's apple value chain. This consisted of two major interventions implemented in parallel; firstly, the establishment of demonstration plots to promote intensive planting systems as stated in the previous section; and secondly, the creation of "service centers" to unify and empower farmers to improve the value chain's competitiveness.



Brih Service Center

LIVCD identified the Service Center Business Model to address the apple value chain's challenges. Apple farmers do not achieve good productivity ratios mainly due to the fragmentation of the production areas, the outdated practices and the weak state of the existing cooperative models. LIVCD selected four cooperatives in Lebanon that were performing well and established service centers within their operations. These four service centers are: "The Mar Semaan Agricultural Cooperative Association in Hadath El Jobbeh", Sannine Cooperative for Sustainable Agriculture (SCSA)", "The Global Agricultural Cooperative of Ainata (GACA)" and "the Agricultural Cooperative Association in Brih".

Based on the principles of empowerment and education, the cooperatives selected promoted member participation using the economy of scale approach, both within their own organizations, and through community-based interactions. This approach helped these cooperatives to meet the needs of their apple farmers, to facilitate improved operations, and to allow collective decision-making. The service centers unify farmer members and empower them when compared to non-members. In addition, they can facilitate collective purchase of both farm inputs and services, and secure the possibility of direct linkages between the farmers and the wholesale markets, thus bypassing intermediaries and thereby achieving better prices for the producer. The SCSA established linkage with local traders and now conducts annual contract "Contract Farming" to sell more than 75,000 crates of apples per year. The Service Centers are a "One Stop Shop" for farmers to find what they need in terms of inputs, machinery, technical advice and technology transfer.

The four service centers focused on adopting new technologies and improved agricultural practices to increase production and reduce costs. In their respective areas, each cooperative mapped available resources and collected the necessary data to facilitate and maintain sustainable vertical and horizontal linkages between farmers and service providers, input suppliers, traders and processors. They provided the farmers with access to knowledge, information and technical advice validated by demonstration plots and linkages to local universities in Brih, Hadath el Jebbeh, Ainata and Sannine. From land preparation to the end market, LIVCD introduced new practices and equipment, to increase competitiveness by increasing quality and decreasing production costs.

A range of equipment was introduced to support production upgrades including:

**Electrostatic Spraying Machines:** At Brih, Ainata and Hadath el Jobbeh cooperatives, the introduction of Electrostatic spraying (ESS) machines allowed the farmers to increase their spraying efficiency by 50% and save 20% on pesticide products. The ESS machines are more efficient than traditional spraying systems as they apply pesticides more uniformly. The most important goal in the application of agricultural pesticides is to get uniform distribution of the chemicals throughout the crop foliage and fruits. Under dosing may not give the desired coverage and needed control and overdosing makes the product unsellable, wastes pesticide and increases the potential for environmental contamination and risk to farmers.

**Refractometers and Penetrometers:** Both instruments are essential to indicate fruit maturity and optimum harvesting times. Access to and application of this information results in better quality of apples as the farmers know when to harvest at the right time. This in turn results in increased apple shelf life in cold storage. Each of the four service centers were equipped with these instruments, which are used routinely as a good agricultural practice.

**Soil humidity Tensiometers:** A tensiometer measures soil moisture and during the irrigation season, the tensiometer is partially buried in the soil. It enables improved irrigation management by accurately determining when water should be applied to maintain optimum crop growth or avoid over-irrigating. The farmers at the Agricultural Cooperative Association in Brih witnessed a reduction of 30% in their water consumption.

**Electrical Pruning Shears:** The electrical pruning shears are preferable to manual shears as they are more efficient and twice as fast when compared to the manual shears, resulting in a 30% reduction in pruning costs. In addition, they are less strenuous for the user and reduce the risk of repetitive strain injury.

**Apple Picking Baskets:** Bruising of apples during harvesting is one of the main reasons for poor quality produce. In Lebanon, farmers lose about 30% of their apple quality during harvest operations due to poor picking operations, resulting in sales to low-end markets. Suitable apple picking baskets help to prevent loss of quality during the harvesting and consequently optimizes the opportunity to sell to higher value markets.



Apple picking basket

**Composting machines:** The Organic Waste Composting Machine as supplied to the Sannine Cooperative for Sustainable Agriculture (SCSA) can efficiently mix and compost organic waste. This automated compost-turning machine is used on-site and can reduce solid waste from food and agricultural sources into high quality compost. The SCSA is selling compost to local farmers, an environmentally friendly practice and creating additional income for the service center. In 2016, SCSA sold 170 tons of compost at \$215/ton compared to \$400/ton in the market, with a 40% profit margin, and in 2017, 350 tons of compost were sold. Considering the same market prices and profit margins, SCSA estimates an increase in the compost sales by 100 tons on a yearly basis from 2018 until 2023 until it reaches the maximum capacity of 1,000 tons in 2024 and 2025.

**Wood shredders:** The agricultural waste shredder shreds and prunes dead tree branches into small pieces for use as organic mulching on farms, which is preferable to burning branches, still a common practice in Lebanon. The shredded branches are spread on the land, saving humidity, conserving water and adding nutrients, all of which help to maintain and enhance soil quality.

### **Implementation of collective purchase and marketing schemes**

Adopting a collective purchase scheme assists farmers to reduce their costs on many fronts. This process can be applied to the purchase of a range of goods or services from high tech machineries to negotiating group insurance, pesticides and fertilizers, or credit terms. The capacity to negotiate lower prices is a major advantage of collective work and service centers have already launched collective purchase schemes and are offering various services to their members. The Mar Semaan coop in Hadath El Jebbeh, the Sannine and the Brih cooperatives succeeded in the implementation of a collective purchase scheme for foliar fertilizers, organic fertilizers, fruit seedlings and pesticides. In addition, the LIVCD project and the above-mentioned cooperatives worked together to create a brand identity, to generate brand loyalty and visibility for each cooperative.

### **Integrated Fruit Production (IFP)**

Integrated Fruit Production (IFP) or IP system is the production of high quality fruit while protecting the agro-ecosystem, human and animal health, wildlife and the environment. Crop protection methods that minimize the use of agrochemicals are preferred and the primary goal of the IP guidelines is the assurance of quality, safe and healthy fruit for human consumption. This is accomplished by adhering to good agricultural practices, traceability and management practices throughout the value chain from the orchard to the grocery store. A second aim of IP is conservation of the orchard environment, its habitat and wildlife. As far as possible, a balanced and natural orchard environment with a diverse ecosystem of plants and animals must be created and conserved.<sup>11</sup> The SCSA in collaboration with the LIVCD project developed a manual, “Guidelines for Integrated Production of Pome Fruits” which was the starting point of the IFP implementation in Sannine. Following the training, 30 farmers have to date abided by the requirements, making SCSA, the first cooperative to present IFP produce for sale in Lebanon. Brih and Mar Semaan cooperative are also working on implementing the IFP system.

### **Traceability**

All stakeholders in the apple value chain are aware of the importance of traceability and how it impacts supply chain management. Supply chain partners are required to understand and support supply chain transparency, data sharing, cooperation and food safety. There is a need for proper identification of fruits, their origin, location within the supply chain and the ability to execute efficient product recall if needed. At the same time, improved traceability helps to facilitate export trade. Implementation of a traceability program enabled SCSA to secure new export contracts in 2014, with 903 tons of Grade I Apples sold at \$667/ton (\$0.66/ kg). In addition, there is a growing demand for locally produced, organic, non-genetically modified foods. Traceability mechanisms are key to showing consumers that they can purchase and consume such produce, while meeting their expectations.

Watch the [Apples – Intensive Plantations Video](#)

### **Grapes**

Grapes are one of Lebanon’s most important agricultural products with over 120,000 tons of table and processing grapes produced annually valued at \$110 million. There are nearly 16,000 grape farms, including 4,200 commercial farms that employ nearly 16,000 full time production workers, making grape production one of the largest agricultural employers in the country. Nevertheless, most farmers



Grapes orchard

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<sup>11</sup> New York Integrated Fruit Production Protocol for Apples <https://nysipm.cornell.edu/sites/nysipm.cornell.edu/files/shared/nyifp-protocol-apples.pdf>

lack knowledge of good agricultural practices to establish their orchards properly and are not aware of the new in-demand varieties. Land preparation and orchard establishment is an expensive endeavor and it is not financially viable to cultivate the land unless the area exceeds 10 dunams (0.1 hectares). Farmers are however aware that traditional varieties should be replaced by new varieties due to demand in high-end export markets. It was clear to most grape framers that they could not continue to apply traditional agricultural methods to the new varieties.

As a result, LIVCD assisted farmers to successfully grow new varieties by training them on new agricultural practices, new production methods and farming technologies, appropriate protocols for each variety, and upgrading the grapes cold chain. LIVCD also supported producers in entering high value markets with new high quality grape varieties. LIVCD assisted farmers in selling their second grade grapes by creating new market opportunities for processed grapes. This was done by supporting processors in developing new grape syrup products and by-products, and by assisting them to expand their markets, and linking farmers to processors.

### **Medi-Gardens**

Dr. El Tini, Managing Director of Medi-Gardens, an LIVCD partner and leading exporter of fruit to high value markets like the GCC and EU said, “All the grapes in Lebanon can be sold in one week to Europe”. However, Lebanon has high costs of land, labor and inputs, so it must compete on quality and value. El Tini thinks he could market ten times what is currently exported but would need to aggregate production from local farmers. The key constraints are growing the right varieties and compliance with international market quality and regulatory requirements. Farmers needed to be organized and trained to meet EU standards for variety, size, shape, color and absence of chemical pesticide residues. The biggest challenge is working with farmers who are at times resistant to change. Nevertheless, through high quality training and follow up, farmers have successfully grown new varieties. To date, 900 out of 1,500 commercial grape farmers are trained and have purchased more than a million new vines from Medi-Gardens.

### **Jaber Trading Company**

LIVCD also worked with Mr. Ali Jaber and the Jaber Trading Company, starting early in the project with 11 farmers in different regions of Bekaa. Jaber is helping farmers to grow seedless varieties as they are taking a bigger market share every year but in addition, as an exporter aggregating grapes from collaborating farmers, Jaber provided support for pesticide spraying, pre-cooling, refrigerated packing and transport to markets. Building on a family business history that goes back to 1992, personal relationships, fair treatment of farmers, and trust are the hallmark of the Jaber operation, which has earned the company farmers’ trust and loyalty. When farmers trust, they are more likely to invest in new varieties and new production technologies. This trust relationship accelerated the learning cycle and attracted new growers, which was necessary for LIVCD to achieve its objectives in the grape value chain.

### Middle East Business Company

LIVCD also partnered with Middle East Business Company, which specializes in fruit and vegetable exports, and encouraged the establishment of new grape orchards. The company also signed a Public Private Partnership (PPP), with the LIVCD project and 18 grape farmers who benefited from the partnership. Due to the border closure with Syria and the significant impact on fresh fruit and vegetable exporters, Middle East Business Company was unable to meet its commitments to farmers. However, since the grapes planted under this partnership were of high quality and in high demand, the farmers were not affected and sold all their grapes to other exporters at high prices.

As a result of LIVCD's partnership with the three above listed exporters, 48 new orchards were established in 11 regions. The total area cultivated was 641 dunams with 6 new grape varieties:

During the project, LIVCD invested \$355,736 while partners invested \$1,142,666, which is expected to yield production values much higher than these investments. In 2017, the production value was estimated at \$1,113,665 and for 2018, \$3,021,589. By 2021, the total production is estimated to be 2,387 tons with a production value of \$5,310,812:

Over 640 Dunams Cultivated with New Grape Varieties

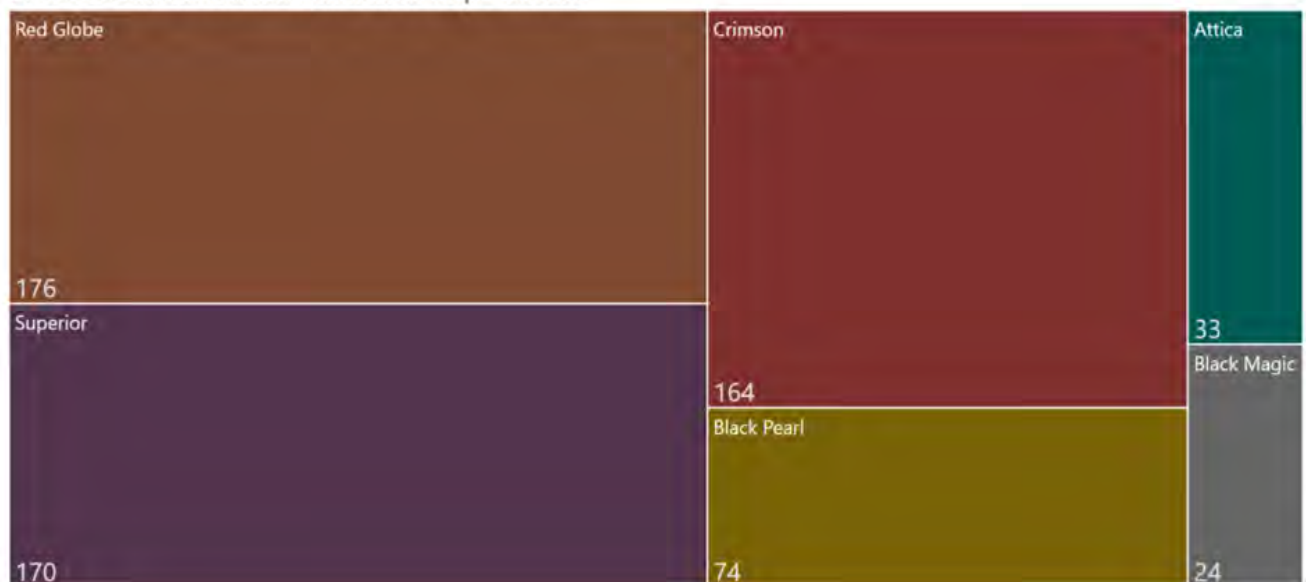


Figure 6: New grape varieties with their respective cultivated areas

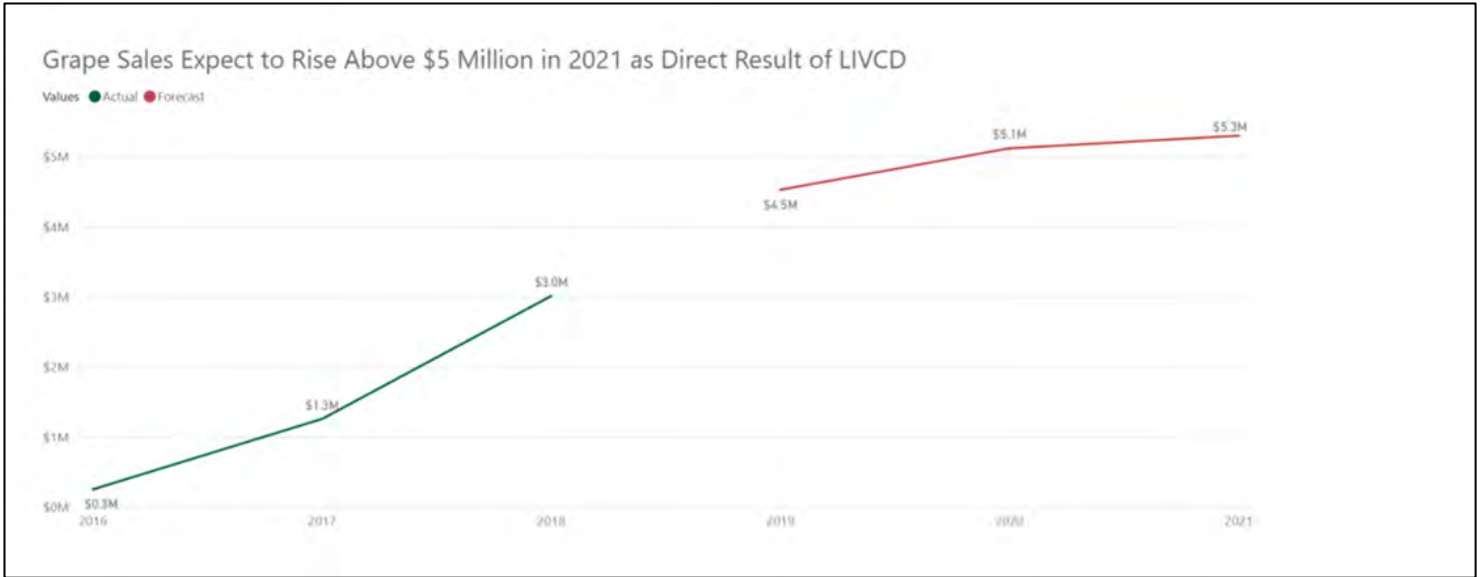


Figure 7: Grape sales forecast as direct result of LIVCD interventions

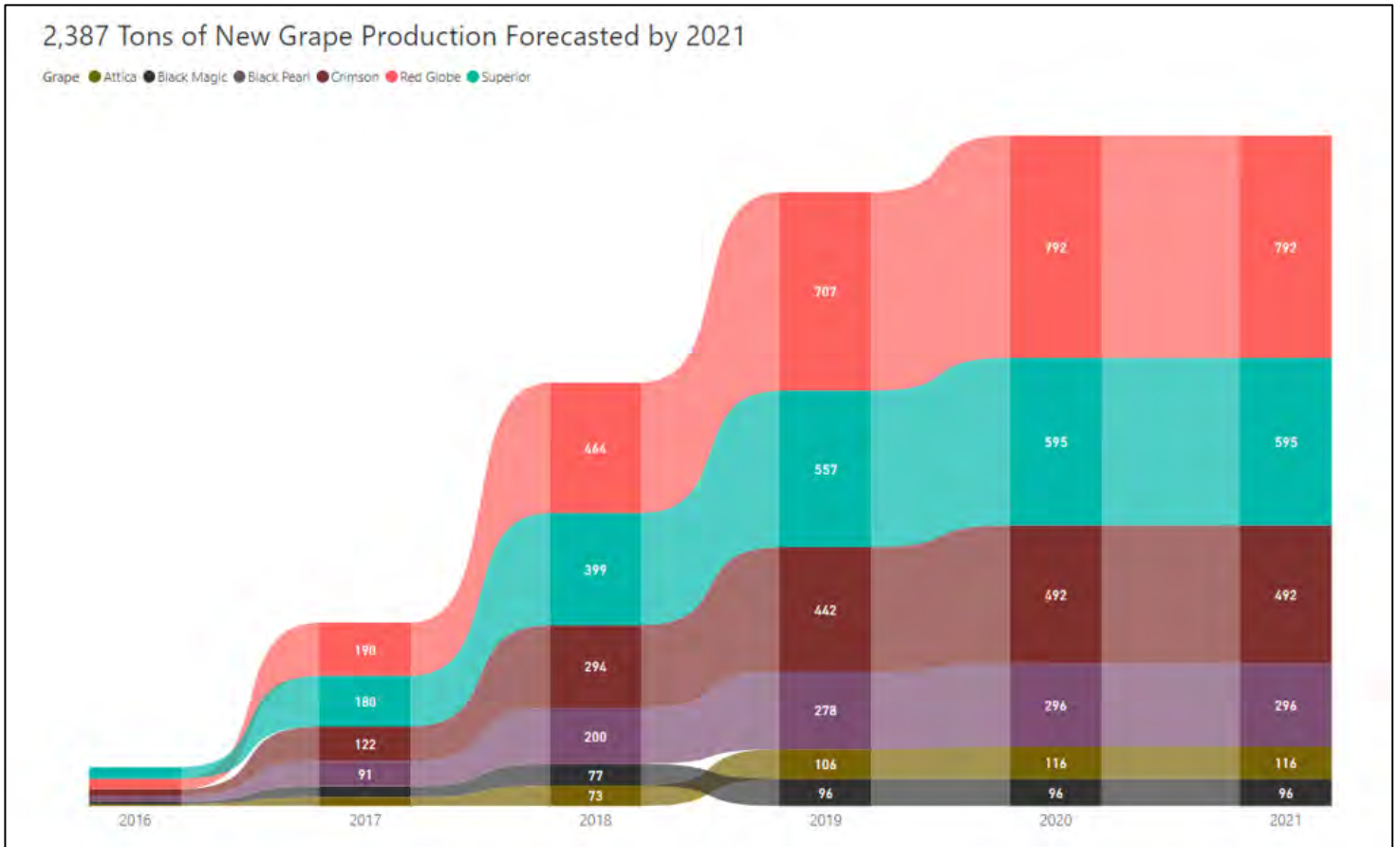


Figure 8: Forecast of grape production by 2021



## **Drip irrigation systems with the Chamber of Commerce, Industry and Agriculture at Zahle**

LIVCD in collaboration with the Chamber of Commerce, Industry and Agriculture at Zahle upgraded the drip system designs in the grapes orchards in the Bekaa. LIVCD supported around 170 grape framers in (CCIAZ) upgrading their drip systems, which covered around 2140 dunams. LIVCD project cost share was about \$346,438 and the farmers cost share was about \$363,740. As a result, the project improved grapes productivity while reducing cost of production by improving water and nutrient management. LIVCD technical team estimate an increase in productivity of about 36% in 2017 and reaching 120% in 2019.

## **Avocados**

LIVCD's assessment of the avocado value chain in 2012-2013 showed that it was disorganized, yet, based on favorable market potential and good growing conditions in Lebanon, the project determined that the development of this value chain had the potential to create good income and employment for the rural population. The project initially launched an awareness campaign, first on plant varieties and second on the use of grafting to convert non-commercial varieties to varieties desired by consumers. Avocado growers had haphazardly planted a variety of cultivars, some of which had little commercial value. Important LIVCD contributions to avocado expansion in Lebanon included developing simple information materials to help farmers identify varieties (Table 4) by the form of the tree and the shape and texture of the fruit.

**Nurseries:** During the initial assessment, LIVCD noticed that the avocado nurseries in Lebanon lacked the know-how about avocado varieties and characteristics of each variety. They also had high mortality rates in seedling production resulting from improper methods and timing for grafting and the wrong rootstock specifications. LIVCD worked with several nursery owners, such as Mr. Adel Badreddine, to establish a new avocado nursery – Grow Smart Nursery – that succeeded in producing high-quality avocado seedlings and selling them to farmers at affordable prices.



Avocado nursery

**Orchards:** Lebanese farmers' avocado trees suffered mortality rates as high as 60 percent during cultivation of the newly planted seedlings due to the lack of knowledge of avocado cultivation and management. LIVCD introduced new methods in orchard establishment and management, which helped farmers to reduce the mortality rate during planting from 60 to 3 percent.

The new technologies and management methods also helped farmers increase their profitability and reduce the cost of production. This included intensive cultivation,

whitewashing tree trunks, new irrigation systems, water management systems, drainage system, raised beds, introduction of new varieties, and harvesting and post-harvesting practices. New grafting techniques helped the existing non-producing orchards to become commercial orchards by improving the yield from 30 to 90 percent.

**Outreach:** To ensure that the new practices spread and continue to be followed, LIVCD created an extension booklet that was widely adopted by farmers and led to better orchard management. The booklet and a 90-minute training video contained information about varieties, rootstocks, grafting, adaptation to the Lebanese climate, soils and ecosystems, and tolerance of cold, wind, salinity and disease.

Name and origin*	Characteristics	Tree growth habit	**Flower type	Harvest	Fruit weight (g)
Fuerte (MxG)	Pear shaped fruit with a characteristic neck, though it can vary from elongated with a long narrow neck to round with a wide and short neck. Its skin is thin, green, moderately bright, flexible texture with a somewhat grainy surface. Excellent quality flesh, tasty and nutty flavor.	Widespread	B	Nov-Mar	170-500, 75-77% flesh
Hass (MxG)	Pear-shaped dark green fruit on the tree that turns purple to black when ripe. The skin has a medium to coarse, rough texture. Excellent quality flesh with a rich, nutty flavor.	Rounded	A	Jan-Jun	140-400, 66-70% flesh
Lamb-Hass (MxG)	The fruit is very similar to Hass but with wider shoulders and black skin at maturity. Larger fruit and matures later than Hass (June-July). It is more productive, more tolerant to winds, to high temperatures and perseia mite than Hass.	Erect	A	Feb-Jul	200-500, 66-70% flesh
Pinkerton (MxG)	Pear fruit with a very long neck in temperate climates. The skin is medium thick, similar to Hass, dark green, with protruding granules and easy to peel. Its flesh has a good quality with a nutty taste.	Erect	A	Jan-Mar	230-425, 80-82% flesh
Reed (G)	Round fruit with medium to coarse skin, green, corky, slightly grainy and easy to peel. Rich, nutty flavor, flesh does not blacken after cutting. A very productive variety.	Erect	A	Mar-Jun	270-680, 71-72% flesh
Zutano (MxG)	Fruit ovate to pyriform thin-skinned, light green, smooth, shiny and leathery. Low to mediocre quality, watery texture and poor taste. In California it is widespread as a pollinator of Hass. Use in windbreaks.	Erect	A	Oct-Dec	200-400 64-65% flesh
Ettinger (MxG)	Fruit narrowly obovate, bright green, fine, fairly smooth. The pulp is buttery and fiber less with a good taste. Vigorous tree with good yield. Store fruit on tree.	Erect	B	Dec-Feb	250-350, 75-90% flesh
Bacon (MxG)	Pear-shaped ovate fruit, green even when ripe. The skin is green, thin, bright, and sensitive to damage caused by wind. The taste is mediocre. It is a good pollinator for Hass. Use in windbreaks.	Large erect	B	Oct-Dec	170-510, 61% flesh
*The three main strains of avocados are the (M)exican, the West Indian and the (G)uatemalan					
**Type A varieties of avocados have flowers that open as females on the first morning and close that afternoon. The following afternoon, the flowers reopen as male, shed pollen for a few hours, and then close again. Type B varieties open as females in the afternoon of the first day before closing, and then reopen the next morning as males.					

Figure 9: Avocado varieties grown in Lebanon

LIVCD supported seven Lebanese avocado experts to attend a 14-day Training of Trainers program in California in the United States from May 11 – 25, 2017. The program was designed to give the delegates exposure to academics, researchers and staffers from

California's leading institution for the study of agriculture, the University of California, Davis as well as three University of California Research and Extension Centers: UC Lindcove, UC Kearney and UC South Coast, all of which specialize in avocados. The training sessions provided knowledge and understanding of best practices on the cultivation of avocados, which was later used by Lebanese avocado farmers.

One of LIVCD's successes in the avocado value chain is its work with an early adopter and avocado farmer named Mohamed Hijazi. As a result of his work with LIVCD, he later started his own business called Lebanese Avocado, which has become one of Lebanon's biggest avocado producers. The collaboration between LIVCD and Lebanese Avocado accelerated the transfer of knowledge to other farmers. This was done through demonstration plots, extensive training sessions and technical support. Early on, Mr. Hijazi understood the "magic" of growing avocados. While he benefitted greatly as one of the largest producers of avocados in Lebanon, he also understood that farmer collaboration is one of the necessary ingredients for scaling up the avocado value chain. He spared no effort to show his colleagues the proper management of avocado plantations as a fellow farmer and practitioner. The combined passion of Mr. Hijazi with the economic benefits shown by LIVCD convinced many farmers to venture into the avocado value chain.

Watch the ["Enhancing the Avocado Value Chain in Lebanon" Video](#)

### **Cherries**

Cherry production in Lebanon is relatively minimal when compared to the large-scale production of other fruits such as apples, grapes, and citrus. Nevertheless, cherries are in strong demand in both domestic and export markets and have a high economic value with a farm-gate production (5,802 ha, 19,384 tons) valued at \$31 million in 2014. The cherry season is short, lasting approximately two months from mid-May to mid-July. Since cherry trees need to be planted in high-altitude areas over 900 m above sea level, they can mostly be found in mountainous areas, especially in the Bekaa region and Mount Lebanon. Lebanese cherries are typically of the sweet variety and 46 percent are exported, mostly to neighboring Arab countries.



Cherry orchard

Agro-ecological, climatic, and geographical factors in Lebanon are ideal for producing high-quality cherries with desired taste and texture. However, like other fruits, cherry production in Lebanon faces many challenges and constraints hindering its competitiveness

in both local and export markets. Competitiveness is constrained by the use of substandard varieties, high production costs (harvesting and pruning activities), inefficient harvesting techniques, lack of quality control, small farm sizes, and insufficient and inefficient post-harvesting facilities that result in short shelf life. However, opportunities to increase competitiveness exist. They include extending the season and decreasing marketing gaps by organizing production of early/mid/late season varieties, and building investment in post-harvest and transport infrastructure that would improve quality and shelf-life and as a result facilitate access to more lucrative export markets in Europe.



Applying Good Agricultural Practices

The cherry value chain is dominated by smallholder production, with more than 80 percent of individual orchards smaller than 0.2 ha. These small orchards are typically plots that were once part of larger orchards that were divided as the land was passed through generations by inheritance or sale of property. Little to no cooperation in terms of production or harvesting was one of the constraints identified by LIVCD during the initial assessment. Rivalry between producers of different families or even within families means there is little potential to build a cooperative model between individual growers. An appropriate incentive scheme is therefore required to organize these smallholder producers so that they can merge into a large production base and achieve economies of scale that could potentially improve the value chain.

Lebanese value chains relying heavily on export to GCC and other Arab markets have faced additional challenges since 2012 due to the Syrian crisis and associated increased duration and cost of transportation. This was especially the case for cherries that had a short shelf life due to inadequate harvest and post-harvest practices. The short cherry season combined with short shelf life and inability to export, led to oversupply in the local market that led to below-cost prices during peak season. This has led to the widespread trend of cherry farmers abandoning their farms or using them for other purposes.

To counter the downward trend of cherry production, LIVCD worked with farmers to increase shelf life, improve quality, reduce cost, and increase profit. LIVCD assisted stakeholders to achieve these objectives by introducing new varieties that extend the harvest season and intensive planting to increase production per hectare. LIVCD also helped farmers improve production, harvest and post-harvest practices, and establish new market linkages. The methodical approach taken by LIVCD helped farmers regain confidence in the cherry sector, revitalize their orchards and plant new cherry trees.

**Applying Good Agricultural Practices to establish new orchards:** Through LIVCD trainings offered in collaboration with project partners Agripharm and Liban Village, farmers were shown that production of sustainable yields from superior cherry varieties is possible when certain parameters are in place. This includes determining the best orchard location,

understanding the resources needed, and knowing the impact of weather conditions that can affect success. Farmers learned that cherry trees grow well in a wide range of soil types, but that they do not tolerate poorly drained soils. They also learned that cherry trees grow best on a site that offers full sunlight throughout the day. In addition, they were taught the significance of winter hardiness, the risk of frost injury to spring blossoms, and that proper soil preparation is the first step to profitable cherry production.

**Orchard management upgrades:** LIVCD guided farmers to upgrade the traditional orchard management systems, which did not use irrigation or trellises. The project introduced intensive plantation technology, which uses the trellis system, including poles and mulch, a semi-dwarf root stock on a trellis grafted with new varieties that is managed with Integrated Pest Management systems. Part of the project's approach was to always include a traditional plot of fruit tree management with good agricultural practices near to the demonstration of the intensive production system established by LIVCD, so that farmers could look at their own system and compare it directly to the intensive production system. In the case of cherries, 12 demonstration plots, (nine of them on trellis systems and three traditional, grafted on semi-dwarf rootstock) were established on farms. The farmers (owners of the plots at each location) signed multilateral agreements with the agriculture service center Liban Village and LIVCD, committing to sharing knowledge and adopting an open-door policy to receiving other farmers for visits and training.

**Trellis:** There is no single orchard management change that summarizes what happened in the past five years better than trellising systems for cherries. The density of cherries on a single dunum (1,000 m<sup>2</sup>) in a traditional orchard layout with no trellis has 45 to 60 trees, planted in rows that are three to four meters apart, while an orchard planted using vertical trellises have 300 trees in rows that are one to one and a half meters apart, and V-shaped trellises have 450 trees in rows that are 35-45 cm apart. The trellised system produces fruit by the third year and is fully mature in the fifth year, versus the traditional system that takes 7-8 years to produce fruit, with full maturity at 10-12 years. There is also a 20-30 percent increase in yield in the trellised system. Farmers were able to see in a short time, the difference between the traditional systems and the two higher-yielding systems (vertical and V-shaped trellises) on LIVCD demonstration plots.

**Rootstocks and cherry varieties:** As seen with apples, inappropriate plant varieties are part of a complex issue that must be overcome in the cherry value chain. In the past, cherries were grown on rootstock (the "Mahaleb" variety) that was not resistant to moisture. The introduction of new varieties of rootstock and cherries under LIVCD's guidance was a key intervention. LIVCD brought in-demand cherry varieties from Europe such as "Sweetheart", "Staccato", "Sentennial", "Fertar" and others. These varieties were chosen for their adaptability, high productivity, size, firmness, crack resistance, crunchiness, and their excellent shipping characteristics. In addition, they are early and late-varieties that allow the farmers to sell their produce at higher prices outside of the peak season. The new rootstocks that were introduced, such as "MAXMA", "Gisela 6 (G6)", and "Prunus Avium",

are more tolerant to water logging and can be irrigated using drip irrigation systems, unlike the traditional “Mahaleb” variety.

Watch the [“Stories of Cherry farmers” Video](#)

### **AgriPharm**

To boost cherry farmers’ production, sales, and exports, LIVCD collaborated with AgriPharm, an agricultural input supply company in the mountainous cherry producing area of Bcharre in North Lebanon. LIVCD’s work with AgriPharm focused on land preparation, land rehabilitation, orchard management, spraying, pruning, and weeding. AgriPharm’s owner and agricultural consultant, Charbel Tawk, has a clear vision for improving cherry productivity in the mountainous northern region where he grew up. For LIVCD, it was critical to partner with someone like Mr. Tawk, who would be trusted in the local community and could inspire farmers to consider cherry production. LIVCD and AgriPharm’s approach was to provide sustainable agriculture services and technical support to local farmers. Some of the activities are described in the “Orchard Establishment” section above, and they were complemented by the following activities.

**Expanding farmer knowledge:** In 2015, LIVCD linked some of the existing value chain actors – five agricultural engineers, including one from AgriPharm – with the USAID-funded “Expand your Horizons”<sup>12</sup> project. LIVCD supported them to participate in a 20-day professional training in California, Oregon, and Washington State. During this training, the group learned about new cherry varieties, cutting-edge agricultural



Good Agricultural Practices with Liban Village

practices, and harvest and post-harvest techniques. After this training, LIVCD was able to work with the agriculture service center Liban Village and AgriPharm to establish mechanisms to share the information learned with cherry producers in the Mount Lebanon and Bcharre districts.

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<sup>12</sup> The three-year, \$3.9 million project was implemented in partnership with AMIDEAST and Knowledge Development Company, with trainings taking place in Lebanon, the U.S., and third countries. It was funded by USAID as a task order under the Focus on Results: Enhancing Capacity across Sectors in Transition II-Participant Training contract.

### **Introduction of Good Agricultural**

**Practices:** From pruning to harvesting and post-harvesting practices, LIVCD supported Liban Village and AgriPharm to introduce good agricultural practices among cherry farmers. They encouraged farmers to apply tip and non-tip pruning (two methods described below), introduce early morning harvest time, apply the correct pre-cooling process, and transport fruit to the market immediately after harvest. LIVCD produced *The Farmer's Guide to the Production of Cherries in Lebanon*, which includes the steps required for the establishment of properly functioning orchards, and information about in-demand varieties, pruning techniques, and good harvest and post-harvest practices. This manual was widely used by Liban Village and AgriPharm in its farmer training sessions.



Cherry pruning

**Tip and non-tip pruning:** Cherry trees, unlike other fruit trees, are very delicate. Knowing when and how to prune a cherry tree is a critical piece of knowledge that many farmers in Lebanon lacked. Trimming a cherry tree ensures optimal access to sunlight and aeration to allow it to develop a proper form, yield higher quality fruit, fight disease and remain healthier overall. Other benefits of the practice include maintaining plant shape, improving plant appearance, increasing flower production, and encouraging plant health. Following many training sessions, Liban Village and AgriPharm introduced a mix of tip and non-tip pruning methods to the cherry orchards. Tip pruning is performed on plants in early spring once new growth has occurred. It stimulates thick, new growth, which results in a fuller, bushier plant. Non-tipping allows the branches to bear a maximum number of fruits. The mix of the two resulted in optimal production while allowing the right level of exposure to the sun. In addition, LIVCD introduced electrical pruning shears to both Liban Village and AgriPharm to make harvesting easier for farmers. They are preferable to manual shears as they are less strenuous for the user, more efficient, and twice as fast when compared to manual shears. Introduction of electrical pruners resulted in a 30 percent reduction in pruning cost and a 25 percent reduction in manual labor.

**Gibberellic acid (GA3) and calcium oxide application:** During the training visit to the United States, AgriPharm's Charbel Tawk first heard about the bio growth regulator known as gibberellic acid, which greatly affects cherry quality. When applied under the right

conditions, the cherries are consistently firmer, crunchier, and larger as compared to untreated fruit at similar color maturities. Fruits also last longer on the branches, thus allowing for late harvest and higher market prices. The LIVCD team and AgriPharm introduced GA3 to the cherry orchards for the first time in Lebanon in 2016. They complemented its application with the use of calcium oxide, which helps to prevent the fruit from cracking. The application of both materials led to a 59 percent increase in the selling price, raising the price from \$1.67/kg to \$2.67/kg as farmers were able to sell their fruits up to four weeks later in the season after the main harvest. This extension of the season greatly contributed to increased incomes for these farmers.

The cherry value chain has often been overlooked in Lebanon. Over the past few years, LIVCD has helped farmers realize that planting cherries could be an interesting and lucrative venture once they gained knowledge of best practices. Due to LIVCD's assistance through training and rehabilitation of cherry orchards, farmers are again beginning to fundamentally believe that owning cherry orchards can prove to be good business.

Watch the [“Cherries from the Peaks” Video](#)

## **Olives**

Olive trees are the dominant crops in most of rural Lebanon and olive oil production is a source of livelihood for a large portion of the local population. During the initial assessment phase, LIVCD determined the need to focus on harvest and processing of olive oil rather than orchard establishment. Nonetheless, since the quality of olive oil starts with the quality of the pressed olives, LIVCD provided technical assistance and training on good agricultural practices such as: Integrated Pest Management, proper use of fertilizers, improved pruning techniques and improved harvesting practices. In addition to the training/technical assistance conducted to improve the quality of the olives, LIVCD also targeted cooperatives that were ready to improve their service centers to benefit farmers in their region and neighboring regions. The Darbechtar Cooperative for example, is one of the cooperatives that benefited



Training session on olive pruning techniques in North Lebanon

from the improvement of its service center. It already owned an automatic milling line and aimed at improving its agricultural services through receiving/purchasing equipment such as tractor add-ons for plowing, spraying and fertilizing, chopper for branches, brush cutters,



electric pruning shears, and olive sieve to benefit farmers in Darbehtar and all the neighboring regions. Through this partnership, farmers improved their agricultural skills while applying good agricultural practices on their olive orchards and in turn improving their productivity and the quality of their olive oil.

LIVCD conducted a series of trainings and technical assistance to 3,494 olive farmers on good agricultural practices to help them increase the productivity of olive trees and improve the quality of olives.

Work done to improve olive harvest and processing will be covered in following sections of this report.

**Harvest and  
Post-Harvest:  
Adoption of  
New Practices  
and  
Technologies**

## 5. Harvest and Post-Harvest: Adoption of New Practices and Technologies

Competitiveness is constrained by high production costs; inefficient farming, harvesting and post-harvest practices such as over-application of pesticides, inappropriate transport methods, inappropriate irrigation and fertigation techniques, and below-standard cold storage. Lebanon suffers from all these constraints, which were identified in almost all of the value chain assessments. LIVCD addressed some of these concerns, while simultaneously providing direct assistance to the communities, and a result of LIVCD assistance, more than 12,000 beneficiaries have applied new technologies or management practices in their businesses.

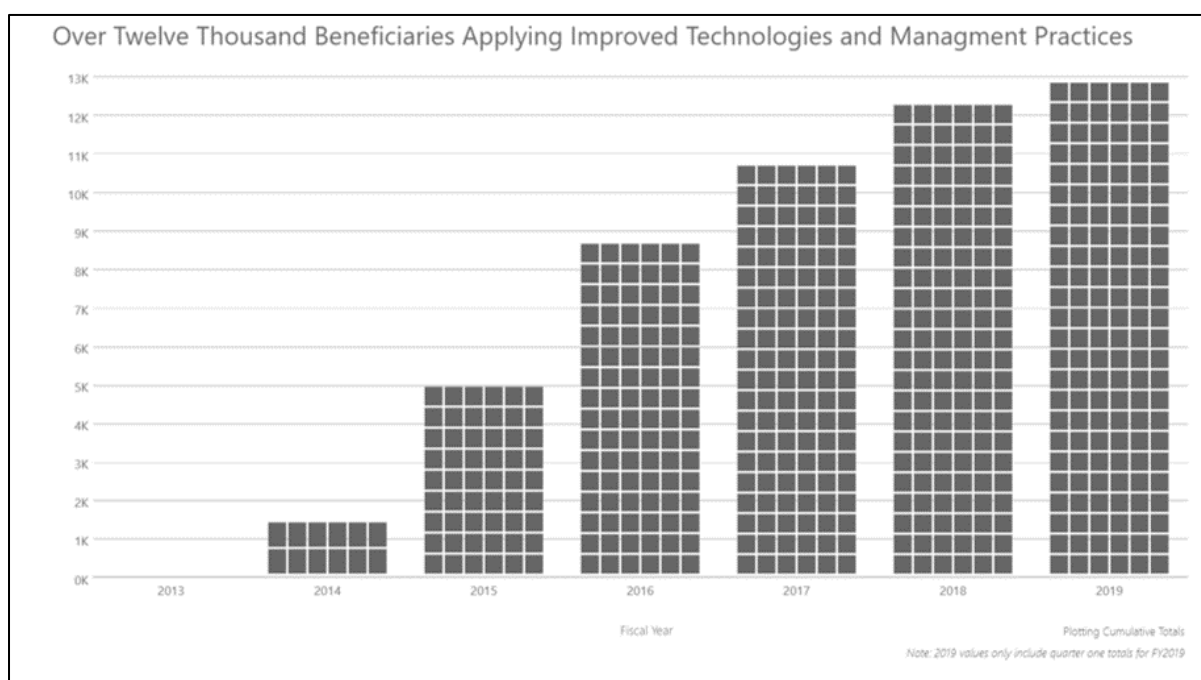


Figure 10: LIVCD beneficiaries applying improved technologies and management practices

This section will describe a few of the many interventions carried out in the following value chains:

- 1- Olives
- 2- Grapes
- 3- Apples
- 4- Avocados
- 5- Cherries

## Olives

Olive oil is among the most important Lebanese agro-industrial products. Based on the UN Food and Agricultural Organization (UNFAO) statistics, olive production covers over 20 percent of agricultural land in Lebanon, and accounts for over 7 percent of the agricultural Gross Domestic Product (GDP). Olive production and handling takes place in all regions of Lebanon and the majority of olive producers are smallholders with very small plots of land – under half a hectare. According to the Investment Development Authority in Lebanon (IDAL), 41 percent of olive oil production takes place in the North, followed by the South producing 37 percent, 13 percent in the Bekaa and around 10 percent in the Mount Lebanon area. Seventy percent of Lebanese olives are used for olive oil production, and the remaining 30 percent are used as table olives. According to FAO, olive production went up from 90,307 tons in 2011 to 118,146 tons in 2016; while olive oil production was 11,300 tons in 2011 growing annually by 6.5 percent and reaching 15,000 tons in 2016.

The Ministry of Agriculture estimates Lebanon's olive oil consumption to be 20,000 tons per year, and the country relies on imports to meet this demand. Figures from Lebanese customs show that in 2016 Lebanon imported a total of 2,894 tons, mostly from Syria, while it exported 10,013 tons. They also show that olive oil exports are mainly destined to North America and GCC countries, with the United States and Kingdom of Saudi Arabia being the two largest importers of Lebanon's olive oil. The U.S. purchases 22 percent of total exports, and KSA imports 20 percent. Interestingly, there are several emerging export partners such as Australia, New Zealand, and Latin American countries with large Lebanese diaspora. Olive oil exports to these markets have been on the rise in recent years.



Olive orchard

Most olive oil producers in Lebanon are facing difficulties in accessing local and international markets because of their high price. Moreover, many orchards are not being cultivated due to the high cost of production relative to the selling price. Most sales of Lebanese olive oil in high value markets such as North America are to the Lebanese diaspora, and these are comparatively lower-value ethnic market channels within the U.S. Lebanese olive oil does not make it to the broader high-value market channels due to competition from well entrenched producers like Italy and Spain, and the inability of Lebanese producers to provide high quality oil in large volumes at competitive prices. In its assessment of the olive oil value chain, LIVCD identified harvesting to be the largest cost contributor and one that significantly affects quality. Lebanese olive farmers use an outdated manual and inefficient harvesting practice, which is the predominant means of harvesting in Lebanon. Farmers use

combs and nets to harvest at a production rate of 5 to 10 kg per hour<sup>13</sup>. Many growers also beat trees with sticks to increase their harvesting yield from branches that are hard to reach. However, such practices destroy new shoots destined to bear olives in the next season, thus negatively affecting the olive oil quality and decreasing by up to 80 percent the orchard's production in subsequent years.

LIVCD conducted an extensive survey of more than 100 olive farmers across Lebanon to determine the cost of olive oil production. Various parameters such as agricultural practices (ploughing, fertilizing, pruning and pest management), harvesting, milling and storage processes were taken into consideration and the results showed that manual harvesting represented 40 to 60 percent of olive oil production costs, making it the single most expensive activity related to olive production. In addition, LIVCD found that the quality and quantity of Lebanon's olive oil is compromised due to the use of sticks to beat the tree during harvesting.

Decreasing the cost of olive harvesting, reducing the negative impact of traditional olive harvesting methods on olive trees, and improving olive oil quality were the most important issues associated with improving the competitiveness of Lebanese olive oil. In more mature olive markets for the past 30 years, mechanical harvesting has been the most reliable method for reducing costs and improving the quality of olive oil. As a result, LIVCD introduced it to Lebanon to boost the products' competitiveness and used demonstration and learning approaches to prove the technology's viability and encourage cooperatives and farmers to use this best practice.

### ***Comparative field demonstrations:***



New mechanical harvesters versus the traditional manual harvesting method

LIVCD conducted comparative field demonstrations to present the difference in harvesting costs using the new mechanical harvesters versus using the traditional manual method. During one working day, olive orchards were divided in half. Workers using the traditional manual method harvested the first half, while other workers using mechanical harvesters

harvested the other half. The results were as follows:

- 8 laborers using the traditional manual method were required to harvest 400 kg of olives. Every worker was paid \$20/day, amounting to \$160.

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<sup>13</sup> According to a study by the Italian Cooperation funded project, Olio del Libano

- 3 workers using mechanical harvesters were needed to harvest the same quantity of 400 kg of olives. Every worker was paid \$20/day and the harvester was rented for \$20/day, which amounted to \$80.

The comparative results demonstrated both how effective and cost efficient the modern mechanical harvesting methods were. The mechanical harvesters reduced by half the cost of harvesting, avoided damage to harvested olives, and protected the olive trees from damage that frequently occurs with traditional harvesting methods, thus insuring larger yields in subsequent years. Through the introduction of mechanical harvesters, LIVCD also focused on creating linkages between cooperatives, farmers and input suppliers.

**Introducing mechanical harvesters to olive cooperatives:** Through the grant mechanism, LIVCD co-invested in mechanical harvesters with agricultural cooperatives located across Lebanon. The cooperatives in turn, rented them to many olive growers. This provided income streams to cooperatives and turned those previously without activities into successful and operational service centers. LIVCD launched the initiative in North Lebanon during the season of 2013-2014, with a pilot project called “The Mechanical Harvesting Program” involving 6 agricultural cooperatives and 29 mechanical harvesters. Following the program’s success, LIVCD replicated it first in 2014-2015, with 123 mechanical harvesters distributed to 18 cooperatives/associations, then for the third consecutive year in 2015-2016, 166 mechanical harvesters were distributed to 28 cooperatives/associations. Finally, during the fourth season of 2016-2017, 12 cooperatives/associations benefited from 60 new mechanical harvesters. LIVCD invested \$644,086 throughout all four seasons while the cooperatives participated with a total leveraged investment of \$344,197. The total invested amount was \$988,283, which led to savings of \$1,400,000 in the olive value chain across Lebanon.



Mechanical harvesters

**Harvesting equipment packages:** LIVCD cost-shared harvesting equipment consisting of a battery-operated mechanical harvester, plastic crates and harvesting nets with 51 cooperatives across Lebanon. The cost of each package was approximately \$1,800 and more than 3,000 farmers benefited from this initiative. Farmers found that using mechanical harvesters saved them time and reduced the harvesting production cost by an average of 50 percent. It also protected the trees from frequent damage occurring with traditional harvesting methods. In addition to the mechanical harvesters, the program introduced the widespread use of plastic crates instead of bags, which helped to maintain the quality of olive fruit and provided protection during handling and storing. The harvesting nets collect the

harvested olives on a clean soft breathable surface and protect them from touching the soil and acquiring mold infections and insect invasions.

The impact of the mechanical harvesters' technology on the olive oil value chain in Lebanon was significant as it increased the olive orchards' productivity, decreased the cost of harvesting, improved quality and gave farmers better control of the selling price.

***The Mechanical Harvesting Program benefited over 3,000 farmers:*** More than 7,000 tons of olives were harvested in 4 years using the new technology, leading to savings of \$1,400,000 in olive harvesting. The cost of harvesting olives decreased by an average of 50 percent, from \$0.40/kg to around \$0.20/kg which in turn led to an average 30 percent increase of the gross margin value per unit of production. In 2016, the profit per unit of production (1 ha) increased from \$8,862 to \$11,950 – leading to \$3,088 profit increase per each hectare harvested.

The cooperatives generated income of \$435,000 by renting 378 mechanical harvesters over 60 working days during each harvest season. As a result, 66 farmers and 10 cooperatives purchased at their own cost an additional 150 mechanical harvesters.

Resistance to change occurred during the project's introduction phase. The biggest challenge was convincing farmers to adopt the new technology. The olive growers refused to use the mechanical harvesters at first, thinking that the machines might damage their olive trees and consequently affect the quality of their olives and olive oil products. After the field demonstrations, farmers started using them without fearing negative consequences.

The introduction of the mechanical harvesters had a positive impact among olive stakeholders including farmers, cooperatives and associations in terms of cost saving, improvement of olive oil quality, as well as the protection of the olive trees.

Watch the [Olive Mechanical Harvesters Video](#)

## **Grapes**

Over 90% of Lebanon's harvested grapes are of traditional varieties. This creates a problem for farmers during peak season when prices drop below cost, especially during banner years. The closure of the Syrian border in 2012 exasperated the problem as grape farmers lost access to the GCC market; their biggest by far. Due to poor shelf life resulting from poor harvest and post-harvest practices, shipping by sea was not a good option



Grape orchard

due to the longer transport duration. High-value European markets were not an option for most farmers due to the undesirable varieties, poor quality, high pesticide residue, and short shelf life. To affect a large impact on the grapes value chain, LIVCD worked with exporters and farmers to establish 48 demonstration plots, hold extensive training sessions and workshops held by leading local and international grapes experts and sent to UC Davis a leading team of farmers, exporters, agricultural engineers, and agriculture university professors. Since irrigation is key to good quality grapes, LIVCD also partnered with CCIASZ to implement a large irrigation upgrading program that covered all commercial grape production regions of Bekaa. In addition, LIVCD worked on improving harvest and post-harvest practices.

To improve shelf life and access to markets, LIVCD built the technical capacity of grape farmers on best harvest and post-harvest practices, and worked with exporters and packers to establish integrated cold chains with refrigerated packing rooms, precooling units and refrigerated trucks. LIVCD built two post-harvest models that could be duplicated by other stakeholders; one in the Bekaa with Jaber Trading Company, and the other in the South with Rashaya Al Foukhar Cooperative.

### **Jaber Trading Company Model**

Jaber Trading Company (JTC) is one of the leading Lebanese companies specialized in general trade (both export and import) of fresh fruits and vegetables with focus on table grapes and apples. JTC aimed to increase exports to high value markets for table grapes and they established modernized grape trellises and planted new varieties. As they needed high quality produce to export to high-end markets, they also sought to upgrade their cold chain.

JTC was already exporting approximately 15,000 tons of fruits per year mainly to GCC markets, Egypt and Sudan; however, JTC recognized the need to extend the shelf life of



their produce in order to prevent problems during transportation and ensure the delivery of high quality products to export markets including Europe. Therefore, they needed to invest in upgrading their cold chain; pre-cooling units, mobile cold storage and a refrigerated packing room for grapes.

LIVCD collaborated with JTC, a company that works with a large number of grape farmers to provide them with post-harvesting services and facilitated the engagement of new producers in this promising value chain. LIVCD succeeded in providing seminars and workshops on harvesting and post-harvest practices to more than 500 attendees, which is an important step towards having high-quality grapes with required standards for high-value export markets. Subsequently LIVCD collaborated with Jaber Trading Company in upgrading its post-harvesting practices by investing in a cold chain at Majdaloun to increase the quality of 2000 tons of new grapes varieties and make them compatible with international standards. The new facility includes a precooling stage that is not common in Lebanon, despite the fact that precooling is critical in extending grape shelf life and insuring that high quality grapes reach consumers.

Since JTC is linked to many grape farmers in the center and north of the Bekaa, and specifically in Majdloun, JTC provided existing grape farmers with post harvesting services as well as engaged new farmers in the grape value chain which would allow JTC to respond to the market demand and abide by international food safety standards through implementing GMP in the packaging process.

As a result, in 2017, 12 grape farmers at Majdaloun and surrounding villages sold 450-500<sup>14</sup> tons of grapes to JTC. With the increased capacity in the state-of-the-art cold storage facility, Jaber Trading will be able starting 2018/2019 season to significantly increase its purchases from farmers and export to high value markets.

LIVCD's training on improved post-harvest practices along with cost sharing of the upgraded cold storage facility, improved the quality of the grapes and increased the value of production and quantities for export. Increasing the production value raised the profitability of farmers, which contributes to improving livelihoods and social resilience of poor farmers. This pilot project helped expand the quantity of exported Lebanese grapes to other markets, both domestically and abroad.

Watch the [“Pruning Principles and Practices” Video](#)

### **Rashaya Al Foukhar Model**

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<sup>14</sup> The list of potential beneficiaries submitted by JTC showed 12 farmers growing 520 dunams. These 12 farmers harvested 450-500 tons in 2017 , the estimated quantity at full maturity will be around 2000 tons. we estimated that Jaber can achieve around 34 tons per day packing and precooling ( Capacity of the units is 17 tons / 12 hours which means an average of 2 months of harvest (60 days) that could extend to 75 days depending on the varieties and climatic conditions.

The village of Rashaya Al Foukhar, located 110 km southeast of Beirut, has seen its population slowly migrate to Beirut looking for security and searching for jobs; leaving behind their fertile land. Rashaya has lost a majority of its inhabitants and, as a result, its land value has dropped significantly, reaching \$3/sqm. Dr. Roger Bassit, who inherited land from his grandmother, looked to create economic opportunities that would encourage villagers to return to Rashaya. After studying different options,



Rachaya Al Foukhar Orchard

Dr. Bassit identified grape production to be an excellent option due to its high return. Grape farmers in south-east of Lebanon, benefit from soil and weather conditions to produce high quality grapes with a competitive advantage of harvesting earlier than other regions of the country; thus fetching high selling prices. In 2013, with 11 other villagers, he established an agricultural cooperative, Agricultural Cooperative Association for the Processing and Marketing of Grapes and Olives, in Rachaya Al Foukhar and Khraibe and its main objective is to sustainably cultivate grapes in abandoned arid land. The cooperative offered landowners a profitable way of using and keeping their uncultivated lands and offered to farm the land for a period of 21 years, during which time the land would be rehabilitated to generate income. Under this arrangement, the landowners would not be charged for the initial cost of rehabilitating the land, extending irrigation lines, and planting new orchards. In return, the cooperative would get 100 percent of the revenues during the first 7 years, which besides bearing the initial investment cost is the hardest and riskiest time. From Year 8, the cooperative and the landowners would then share 50 percent of the profit, which would ensure an income for the landowners, encouraging them to keep their lands as it appreciates in value. This offered a means to alleviate a growing social crisis including rural unemployment and environmental concerns of water and land use especially in a region that was long forgotten.

**Distance from farm to market:** The geography of Rashaya Al Fakhar is both a blessing and a curse. The village's micro-climate provides the farmers with early harvest advantages and high-quality grapes. But as the town is at least two hours away from the nearest major market, the grapes were exposed during transportation in open trucks to high temperatures exceeding 30°C. Their quality at market was negatively affected, which reduced the wholesale price. Starting in 2014, LIVCD collaborating with the cooperative to upgrade the grape value chain and guided the cooperative to address the above-listed constraints and problems through the following actions:

- 1- Introducing new varieties demanded by high value markets,
- 2- Training on modern production, harvest, and post-harvest practices,

- 3- Establishing a complete cold chain system, ensuring the delivery of high-quality grapes to the market.
- 4- Acquiring modern pesticide spraying equipment to reduce the amount and cost of pesticide used in order to comply with international safety and pesticide residue levels, while also reducing the cost of production.

**Maintaining the cold chain from harvest to market:** To insure the integrity of the cold chain, LIVCD trained the coop's staff, farmers, and harvesting crew on proper harvesting techniques and cost-shared with the coop the investment in a climate-controlled packing room and refrigerated truck. The introduction of the cold chain provided the cooperative and the existing farmers with post-harvest services to preserve the quality of their grapes and to abide by international food safety standards through implementation of good manufacturing practices, ensuring the highest wholesale price and return on investment.

**Climate-controlled packing room:** LIVCD supported the establishment of a climate-controlled packing room to sort and pack grapes in a suitable environment that preserves the freshness and quality of the grapes and contributes to a longer shelf life. The room meets Good Manufacturing Practice requirements and has one entrance and exit, per regulations, and contains one long table where 12 women place the grapes into appropriate boxes, which are then loaded directly to a refrigerated truck for transportation to the market.

**Refrigerated transportation:** The cooperative purchased a five-ton truck (box and chassis) while LIVCD purchased the refrigerated box, which was mounted onto the truck. The refrigerated truck transported the packaged grapes from the climate-controlled room to the market at the appropriate low temperatures, thus maintaining freshness by the time they reached the market. To ensure



Refrigerated truck

differentiation and product recognition, the cooperative invested in a professionally designed label and cardboard packaging that provides improved preservation of the grapes.

**Electro-Static Spraying Machine (ESS):** LIVCD introduced the ESS spraying machine, which insures compliance with international safety and pesticide residue levels while reducing cost. The ESS also improves quality and productivity of grapes by significantly improving the coverage of nutrients and pesticide applied. It allows for the proper application of gibberellic acid (a natural growth regulator) and foliar fertilizers needed for preferred berry coloration, size and cluster weight as demanded by high value markets. The

ESS reduces chemical applications by up to 50 percent and reduces water use by 20-40 percent; thus, providing significant economic and environmental benefits. It also improves compliance with requirements and standards of high value markets in terms of maximum residue limits.

The cooperative is now farming more than 20 hectares of grapes and has reduced the cost of production and increased wholesale prices, and as a result its profits. The early harvest advantages offered by Rachaya Al Foukhar's microclimate, combined with updated value chain activities, allowed the cooperative's grapes to maintain its freshness when presented at the market. As a result of LIVCD's interventions, 18 farmers benefited from the services of the cold storage and packing unit and through improved post-harvest practices increased the market price of their products by 30 percent on the local market compared to farmers who are not using the same post-harvest practices. Their market price increased from \$1.60 up to \$2.00/kg.

In 2016 and 2017, the cooperative respectively sold 150 and 200 tons of table grapes. According to the cooperative managers, it is estimated that the post-harvest unit will increase its trade volume by 50 tons on a yearly basis for 2019 and 2020 and will reach its maximum capacity of 350 tons from 2021 to 2025.

## **Apples**

Similar to grapes, the apple value chain suffered from poor harvest and post-harvest practices affecting the quality and shelf life of apples; thus hurting their marketability in high-value markets. The apple value chain suffered especially from poor sorting and grading of apples, further limiting the sale of Lebanese apples to low-value markets. In addition to introducing new apple varieties and improving production practices, LIVCD also worked



Liban Village sorting line

on upgrading harvest and post-harvest practices. The project did extensive training across Lebanon and cost-shared in the establishment of four modern sorting and cold storage facilities that would serve as models for other apple packers/exporters wanting to upgrade their facilities.

### **Modern Apple Sorting Models at Shapash and Liban Village**

Amado Fakhry is a third-generation apple grower in Bcharre, north of Lebanon. His great grandfather started growing apples in the 1950s and he and his three brothers through their company, Shapash, produced approximately 20 tons per year of Golden and Red Delicious varieties for export to the Egyptian market. In 2014 when there was a devaluation of the Egyptian currency, Mr. Fakhry began exploring other markets such as the GCC, India and

East Africa as well as exploring other markets. In order to enter these markets, he needed to follow certain standards since importers in these markets required 40-pound multilayered boxes of apples with the same size and color and without defects or pesticide residues. Therefore, he needed to sort his apples and organize farmers, which would allow him to enter these markets. Mr. Fakhry introduced simple techniques and instruments to help the farmers in his community manage their apples, e.g. fruit thinning, electrical conductivity meter (salt concentration of water), a hygrometer (storage humidity), refractometer (sugar content) and penetrometer (firmness of fruits). After applying these simple tools, the quality of his harvest improved significantly, reaching 80 percent of Grade I apples. Neighboring apple farmers started seeing the results and came together to form a plan for an advanced apple sorter especially after having witnessed the success of the LIVCD supported apple sorting plant established at “Liban Village SARL”.

The Cedar Mountain Foundation offered the land and the excavation and warehouse designs were offered as a contribution from Bureau Hamid Keyrouz for Contracting and Dar El Handasa. LIVCD funded approximately \$400,000 as a grant for the sorter and other equipment needed to establish the sorting plant; and Shapash’s cost share amounted to \$472,683. In addition, Shapash also paid \$1,400,000 for the construction of the warehouse.



Shapash sorting line

Extension needs are equally critical and LIVCD developed an apple management methodology booklet to help farmers improve the quantity and quality of their harvests. Those who followed the recommendations performed well with the quality of their apples and the municipality took note and created a local extension service with ten agents. At the post-harvest level, the promotion of the automated apple sorting was a deep shift in the paradigm for farmers and traders, who were resistant to change and not convinced on the benefits of grading apples. Farmers initially thought the machine would bruise the apples and cause them to lose money due to higher rejection rates. However, at another apple growing location, Liban Village – Halat-Jbeil, the automated sorting machine increased the volume three-fold and stimulated other traders to buy sorting lines.

### **Modern Cold Storage Facility Models at Two Locations in Bcharre**

To help upgrade cold storage facilities in an area of intensive apple production, LIVCD partnered with two packers and a cold storage company to create two models that would serve the region and showcase the benefits of upgrading cold storage facilities. One facility has a storage capacity of 15,000 crates, the equivalent of 300 tons of fresh apples, while the other has the capacity of up to 25,000 crates, the equivalent of 500 tons.

Watch the [“Apples Best Harvesting Practices” Video](#)

### **Avocados**

Most avocado farmers and nurseries in Lebanon follow poor agricultural practices and do not have adequate knowledge of the different avocado varieties, their individual characteristics, or the crucial practices required for the plant’s survival and productivity. One of the many problems encountered involved 54 farmers growing 50 hectares of avocado planted with non-commercial varieties. This unproductive practice was increasing, as both established and new farmers were planting trees from seeds bought from nurseries, who did not understand varietal differences. Non-commercial fruit trees take up to fifteen years to bear fruit, and these avocados are not in demand by consumers. In addition, the farmers, unaware of the different varieties and of their respective harvesting periods, harvested all fruit during a short harvesting period of three months (November to January). Consequently, immature fruits were sold at low prices, \$1/kg, and did not ripen because they were harvested prematurely.

These practices made avocado cultivation an expensive and risky endeavor to pursue, as farmers were losing money instead of having a profitable business. The non-commercial varieties’ market share was increasing compared to much more profitable varieties. This practice needed to be stopped.

To upgrade non-commercial avocado orchards, more than a technical solution was needed. Farmers, nurseries, and laborers all needed to acquire the correct knowledge on harvesting and post-harvesting to move from a non-profitable activity to a profitable one.

### ***Training and knowledge sharing***

LIVCD reached out to growers and other value chain actors across the country to highlight the current problems, provide workable solutions, share acquired knowledge to rejuvenate the value chain, and introduce better production practices and new harvesting methods. As a result, nursery owners learned more about the different varietal characteristics and the production methods needed to grow productive trees. They also improved how they advised farmers. Orchard laborers were trained on good agricultural practices and the farmers who adopted avocado cultivation began to make profits for the first time.

LIVCD also trained farmers on the most efficient method of spraying for disease prevention using organic copper sulfate, which is also inexpensive. Part of the training also included how to measure dry matter content of fruit to determine the precise ideal time to harvest. As a result, farmers were able to keep avocado fruits on the trees for longer periods, prolonging the harvesting season and increasing the quality of the fruit, thereby increasing the price per kilogram.

Finally, farmers were also taught how to harvest the fruits in a more efficient way. Since they were harvesting different types of avocados at the same time, they were selling crates with Grade A and Grade B avocados combined. Following LIVCD's intervention, farmers started harvesting only ripened and large avocado fruit together, thus producing crates of homogeneous fruit and selling them as Grade A avocados. They retained the small avocados longer on the trees and waited for the right time to harvest them. The domestic market is robust, and the export market is promising. Currently about 90% of the national production is intended for the local market, which does not yet meet local demand. According to the Lebanese customs authorities, Lebanon exported 665 tons of avocado in 2014, which increased to 911 tons in 2017. After helping farmers produce high quality avocado fruit, LIVCD linked them with export markets in EU & GCC market and for the first time a full avocado container was exported from Lebanon. Lebanon's total production of avocado in 2016 was estimated to be 8,200 tons<sup>15</sup>.

## **Cherries**

### **Establishing a modern post-harvest facility for delivery of high quality cherries to local, MENA and international buyers.**

As ripe cherries have a short post-harvest life span, they are very susceptible to spoilage once harvested and left in the field at high temperatures. The high temperatures lead to the blackening of the fruit stem, weight loss and damage to the general appearance of the fruit. In addition, the prevailing low humidity and the high air temperatures are parameters, which lead to damage of the fruit quality.

Moreover, it is important to highlight that freshness and firmness are two characteristics that the consumer is looking for while purchasing cherries. One of the most important ways to ensure freshness is by following proper cooling and storage process after harvest. Cherries need to be cooled quickly and thoroughly to remove heat buildup and maintain their quality and taste, and to avoid stem discoloration as this will occur if proper post-harvest cooling practices are not implemented with rigor. Lack of each or any of these preferred visual characteristics – especially color and firmness will result in a product, which is less appealing and therefore less marketable to consumers.

## **Shapash**

LIVCD, in collaboration with the private company Shapash, implemented a pilot project where a controlled atmosphere storage facility for cherries was installed to increase the shelf life of cherries. The cold storage facility is used as a demonstration site for other cold storage facilities to encourage the adoption of this new technology, thus encouraging the upgrade of the competitiveness of the cherry value chain across the country. LIVCD upgraded the facility with Modified Atmosphere Bags (MAB). The MAB reduces the growth of *Botrytis cinerea* (Grey Mold Rot) and other decay organisms. It slows down the metabolism and the ripening process, maintaining the quality and condition for longer

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<sup>15</sup> <https://www.lorientlejour.com/article/1079815/pourquoi-lavocat-seduit-de-plus-en-plus-les-producteurs-libanais.html>

period. It reduces the respiration and softening rates, extending postharvest life and thus increasing the opportunity for the producer to get better prices for its product. This improved technology help in waste reduction caused by dried fruit and decay. It is an additional tool to manage market supply since it is possible to store the fruit for a longer period with atmosphere protection.

Shapash conducted two phases for cherry storage activities. In the first phase, they transported, hydro cooled, sorted, packed and stored under modified atmosphere conditions 5 tons of cherries. This quantity cost Shapash \$1 per kg, and the cost of transport, hydro cooling, sorting, and packing was \$0.40 per kg. After 2 weeks of storage, Shapash sold all the cherries except 20 kg for \$2.35 per kg, yielding a profit of \$0.95/kg. Shapash proved to the farmers that the technology used to store cherries only for 2 weeks was successful and could improve farmer's prices by almost 50%. By storing cherries for only 2 weeks, Shapash gained a 28% net profit – a very good percentage for the short period of storage.

Meanwhile, in the second phase of storage, 20 kg of cherries packed in 2 kg bags were stored for 45 days to test how long cherries can last while conserving a good condition. The result was successful and showed that 90% of the quantity was in perfectly good condition after 45 days, to be sold as fresh cherries. As of August 14, 2017, after 45 days of storage using modified atmosphere bags, cherries where sold for \$10.65/kg, yielding a net profit greater than 600%. Shapash is planning to store bigger quantities for the next year after the successful test.

### **Grabit - Cherry Good**

Cherry Good acts as an aggregator and purchases around 4 Tons of cherries per year from local farmers, total of eight farmers. Farmers dealing with Cherry Good are gaining an additional \$0.6 per kg as an average, from their direct sale to the company.



LIVCD supported the Mount Lebanon based private company, Grabit SARL/Cherry Good under a grant titled “Revitalization of the Cherry Industry in Hammana and Lebanon”, to increase its

sales and revitalize the value chain by increasing the quality of cherries. LIVCD helped Grabit establish a modern facility with a pre-cooling room and cold storage room. Cherry Good's cost-share included a truck and a van that were each equipped with a refrigerated box and refrigeration unit, as part of the LIVCD Grant.

Grabit/Cherry Good was able to extend the cherries' shelf life by adopting these new post-harvesting practices.



Having made these upgrades, Grabit/Cherry Good secured a 3-year contract with Spinney's Supermarket, which resulted in purchasing a total of 4,500 kg of sorted cherries for the 2018 cherry season. In addition, Grabit secured purchasing agreements with Karma (Mr. Khaled Sinno), and Abdul Basset Al Samad for Trading, Lebanese exporters. The agreements with the exporters lead to a total sale amounting to 1,920 kg of cherries. Furthermore, Grabit purchased 9,929 Kg of cherries at an average price of \$2.77/kg from 13 new farmers to meet market's demand.

### ***Abdul Basset Al Samad***

LIVCD worked on upgrading the cherries value chain in Lebanon also by partnering with the Bekaa-based company Abdul Basset Al Samad for Trading to establish a modern facility for the delivery of high-quality cherries to consumers in Lebanon and in the Middle Eastern countries. The facility upgrade included, a pre-cooling room, a cold storage room, a packing area equipped with stainless steel tables, and a mobile cooler. LIVCD organized a training at the upgraded facility for the process of sorting and precooling cherries. The cherry expert Ghassan Feghali conducted a training session for the company's staff on the Harvest and post-Harvest process, and the flow of receiving, pre-cooling and packing cherries. To close the grant, LIVCD and Abdul Basset Al Samad for Trading organized a closing event in Zahle, Bekaa. More than 150 persons from different regions in Lebanon, including cherry farmers, exporters, traders, and other stakeholders attended. The closing event was a good opportunity for the attendees to be introduced to the upgraded facility using the new precooling technology, and create linkages among main stakeholders working in the agricultural sector.

Watch the [“Hammana's Famous Cherries” Video](#)

# Product and Process Development

## 6. Product and Process Development

Early in the project, LIVCD determined that due to high costs of production, Lebanese products must compete in high-value markets. However, to do so, Lebanon has to produce added value products of high quality that meet market demand at competitive prices. One of the key constraints identified was the lack of investment in product and process development which was driven by lack of appreciating the need, and lack of adequate resources. Since most food processors operate on small margins with little available money for investment, resources are typically placed on activities that have high return on income with short recovery. As a result, Lebanese companies continued to lose market share, locally and in export markets.

### **Olive oil**

Farmers in Lebanon usually race against time to harvest their olives, so they can rush to an olive mill to produce extra virgin olive oil (EVOO). This makes the olive oil sector a major source of income in the northern district of Akkar and in the village of Kobayat, in particular. The Kobayat Agriculture Cooperative used to depend on traditional olive oil production,



Kobayat Mill

harvesting and milling techniques. With increased demand and awareness among local farmers about the high value of EVOO and the rigorous export market regulations, the Cooperative saw the need to improve the grade of the extracted olive oil and increase its milling capabilities.

LIVCD supported the Kobayat Cooperative to improve its milling practices, enhancing operational productivity and efficiency. As a result, the Cooperative managed to complete a feasibility study, which ultimately led to the bank's approval for a \$60,000 loan. Through a public-private partnership with LIVCD, the Kobayat Cooperative replaced its existing traditional production line with a new automatic milling line and upgraded its facilities to meet good manufacturing practices and standards, offering better olive milling services to more farmers in the region. The aim of LIVCD's intervention in Kobayat Cooperative was to replace the traditional olive mill, which produces average quality olive oil, with an automatic continuous line that has a high production capacity to extract high-quality EVOO.

The introduction of the new technology saw the coop's milling capacity increase by 50 percent, reduced milling costs by an impressive 17.5 percent and improved the quality of olive oil. The numbers speak for themselves. The cooperative, which used to serve 200

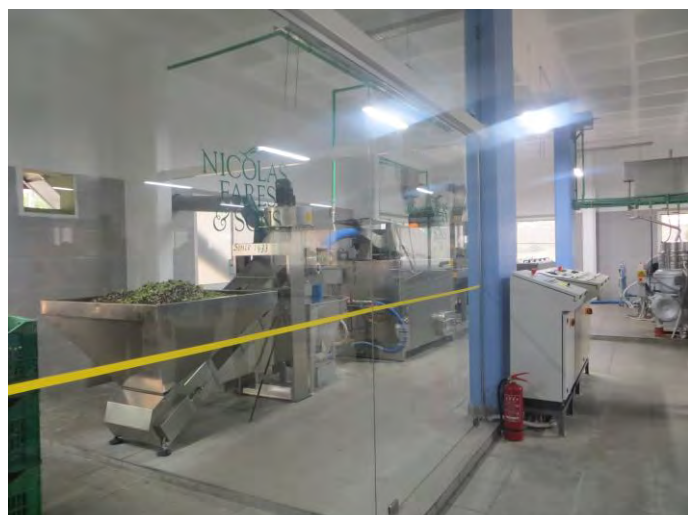
farmers and produced 2,000 tin cans (18 liters each) of olive oil per year, now serves more than 500 farmers and produces around 4,500 tin cans of olive oil. The new technology also decreased milling fees paid by farmers from \$8.00 to \$6.60 per tin can. By reducing costs, producing better olive oil, and increasing revenues, olive producers will have greater incentives to take better care of their land and improve their production practices.

The cooperative can now mill a larger quantity of olives and in turn will now be able to process a larger share of the olives from the surrounding villages and towns. In fact, today the cooperative is making average gross revenues of \$29,000 per season, representing nearly an 80 percent increase over operations before the new technology was installed.

In addition to the Kobayat Cooperative, LIVCD also helped the following partners improve their olive oil quality:

- **Al Rachid Mill:** A total of 271 olive growers benefited from the milling services, where 262 tons of olives were processed with a high percentage of extra virgin olive oil (EVOO). Oil extraction rates were high at 22.64%. Al Rachid Mill implemented Good Manufacturing Practices (GMP) on the mill premises with the assistance of LIVCD to ensure a safer and more hygienic milling process, which resulted in higher-quality oil. The company purchased a total of 506 tins (8,250 liters) of Extra Virgin Olive Oil from 71 growers who milled their olives in the Al Rachid modern mill. The company also purchased a husk logging machine that increased their income, where 80 tons of husk logs (the husk being a byproduct of the milling process – which is then compressed with a specialized machine to produce briquettes) were sold at \$150-\$200/ton, for heating purposes as an alternative to cutting down trees.

- **Nicolas Fares and Sons (NFS):** This company improved the productivity of their olive oil production with the introduction of a new technology, through a partnership between NFS and Olea Cooperative, where the cooperative's agricultural engineers provided technical advice and training to farmers. Secondly, the new olive mill contributed to increased oil extraction rate and increased production of extra virgin olive oil by 199 olive farmers (204.8 tons of olives) from Lebaa and neighboring villages (East Sidon, Jezzine caza, Nabatieh caza and Chouf) by improving olive milling and storage practices by implementing GMP standards. Thirdly,



Nicolas Fares Mill

NFS purchased 8,452.5 liters of EVOO from 51 farmers who pressed their olives in the mill. These farmers benefited from reduced milling fees and increased olive oil sales.

- **Willani SARL:** This firm increased the olive oil storage capacity at their facilities and upgraded their bottling line services.
  - Willani was able to export approximately 46,340 liters of olive oil at a total sales value of \$243,036 to the U.S., France, U.K. and Germany
  - Willani was able to sell domestically approximately 125,067 liters of olive oil at a total sales value of \$643,134.
- **Tripoli Cooperative and Jezzine And Zahrani Development Company (JAZ):** LIVCD provided both JAZ and Tripoli cooperative with mechanical harvesting equipment which reduced the harvesting costs by 50%, provided them additional incomes, improved the olive oil quality, introduced a new technology to their regions and preserved the health of olive orchards since the mechanical harvesters don't damage the olive trees and preserve the olive fruits. In addition to the mechanical harvesters, JAZ also benefited from other equipment at their service center: the Automatic self-adhesive Labeling Machine, the Filling machine for bottles, the Filling machine for Tins and the Capping Machine; all these machines enabled the company to preserve the quality of olive oil produced and helped them market their olive oil products at competitive prices in the local market. In addition to the mechanical harvesters, Tripoli cooperative also benefited from 16 stainless steel tanks (500 liters each) which helped them regulate the temperature, humidity and lighting to preserve the quality of Olive Oil; it also enabled the cooperative to market their olive oil products at competitive prices in the local market.

Watch the [“Automatic Olive Mills”](#) and the [“Entrepreneur”](#) Videos

### **Pine Nuts**

Jezzine pine nut producers harvest approximately 500 tons of black nuts (in shell) that typically sell for \$8 per kg for a total value of \$4 Million. These black nuts, if processed using proper techniques and high-quality equipment, can produce 100 tons of white nuts based on a 5:1 processing ratio. Currently, processed white nuts sell for \$60 per kg, for a total value of \$6 million. Rather than process the pine nuts locally, producers sell to traders who subsequently process the nuts and earn the bulk of the profit.



To address this situation and to capture the value of white pine nut in Jezzine area, LIVCD brought together a unique set of partners in the pine nut value chain: the Jezzine Grove (J. Grove) brand owned by Jezzine and Zahrani (JAZ S.A.R.); the Pine House, a facility built by the Union of Jezzine Municipalities (23 municipalities), and the Pine Nut Cooperative. LIVCD assisted the Pine Nut Cooperative by upgrading their processing and packing line, which produced better quality white nuts, and assisted the cooperative to rebrand its packaging, which provided added value to the end product.

## **Grape Syrup**

One of the main challenges grape farmers face is the inability to sell their Grade II grapes at a reasonable price. Royal Organics (RO), a producer of traditional grape molasses, located in Rachaya Al Wadi is addressing this challenge either by buying grapes to produce grape molasses, which is sold to supermarkets and bakeries as natural sweetener, or by providing the pressing service to grape farmers who sell the molasses in their villages. More than 200 farmers of Rachaya Al Wadi and surrounding villages press their Grade II grape crops at Royal Organics.



In 2014, RO's General Manager, Bahaa Kadamani saw the potential of creating the next best thing: "Grape Syrup", a healthy alternative to sugar-based sweeteners that maintained major nutrients and antioxidants for use in pancakes and bakery items. Even though Royal Organics produced excellent grape molasses, it did not have the knowledge and ability to produce the new product. Mr. Kadamani being aware of LIVCD's support in product development, reached out to the team which helped partner with a professor at USEK University who did the research and development. In addition to achieving the right taste and color, the team was challenged with the consistency of the product. After close to a year of research and development, an excellent product was produced that met consumer requirements in the local and export markets. In addition to support in product development, LIVCD cost-shared new equipment that was needed to produce the product, while RO invested in upgrading its facility to meet food safety requirements.

In 2017, RO introduced the product to the retail market via *Transmed*, one of the largest Fast-Moving Consumer Goods (FMCG) distributors in Lebanon. RO also sold the grape syrup to one of Lebanon's largest bakeries that uses it as a sweetening alternative to sugar in its line of healthy products.

As a result of developing and selling the new product, RO purchased, processed and pressed 430 tons of grapes versus 250 tons in 2017. The RO grape press is now recognized by Rashaya farmers as an alternative market and a reliable buyer of their Grade II grapes.

Watch the [“How it’s made – Grape Syrup” Video](#)

## **Pickles**

Pickle production is part of the agro-industrial sector, and is a major contributor to the Lebanese economy. Based on a survey carried out by LIVCD in 2017, the pickle sector, both formal and informal, is estimated to have a value of approximately US\$128 million of which \$54.6 are from export markets, \$39 million are local retail sales and \$34 million are from the food service sector.

From a development perspective, the agro-industrial sector offers significant potential. Not only does it establish linkages with the agriculture sector, but due to its low barrier to entry, it also has the potential to create job opportunities, mainly for women and rural communities, and in turn contributing to an improvement in their livelihoods.

Lebanese pickle processors have seen a decline of their market share, especially in the traditional export markets specifically in the GCC where they were leaders for several decades. This decline was mainly due to uncompetitive prices, limited product offerings, mediocre quality, and limited capacity that affected their economies of scale, while regional competitors have lower cost structure, larger capacities and quality that was on par with that of Lebanese pickles.

Lebanese pickle processors’ problems stem from the use of outdated processing technologies including manual sorting and old fermentation techniques. In addition, cucumber pickling was limited to one traditional variety of cucumbers that was not ideal for processing, had limited market demand with low productivity and high cost. In addition, the use of 200-liter plastic drums meant that a lot of space was required, production cycles were long and the quality of the pickles was not easy to control. This led to mediocre quality, high production costs, and limited capacity which led to reduced competitiveness in both local and foreign markets; hence, the inability to meet market demand. Furthermore, the geopolitical situation resulted in the closing of the Syrian border, leading to very high shipping costs. All of this affected the capacity and profitability of the Lebanese producers and their ability to compete in both domestic and international markets, leading to constrained resources available to invest in developing new products and upgrading their operations.

Constraints	Strategy
<p>Inability to meet market demand:</p> <ul style="list-style-type: none"> <li>• Low processing capacity due to traditional processes</li> <li>• Limitation of short cucumber growing season</li> <li>• Inconsistent and mediocre pickle quality</li> <li>• High production cost including labor, electricity and fuel</li> </ul>	<ul style="list-style-type: none"> <li>• Support conversion to food grade fiberglass tank fermentation technology. More than 100 times the capacity and an estimate of 30-50% lower cost</li> <li>• Support installation of solar system to decrease high energy cost</li> <li>• Support access to finance through support in loans and consultancy for basic accounting to decrease production cost and quantify waste</li> </ul>
<ul style="list-style-type: none"> <li>• Lack of new products/new cucumber varieties</li> </ul>	<ul style="list-style-type: none"> <li>• Introduce new cucumber varieties with longer season and export market interest</li> <li>• Train farmers in good agricultural practices</li> <li>• Collaborate with an input supplier to provide farmers with discounted prices on seeds and irrigation</li> </ul>
<ul style="list-style-type: none"> <li>• Competition from imported products reducing Lebanese pickle market share in export market</li> <li>• Closed borders leading to high shipping cost</li> </ul>	<ul style="list-style-type: none"> <li>• Rebrand to enhance brand position on retail shelves</li> <li>• Activate social media to increase brand awareness</li> <li>• Support new domestic and export market access through trade shows and marketing consultants</li> </ul>

As part of its strategy to improve the competitiveness of Lebanon’s pickles value chain and based on the above findings, LIVCD set an objective to assist pickle processors to improve quality, reduce costs and increase capacity with a minimal investment cost. LIVCD developed a strategy and a course of action with a significant multiplier effect. Farmers were introduced to new cucumber varieties to address farm-level productivity issues, and Lebanese industrialists were introduced to the fiber-glass fermentation tanks which were not available in the Middle East. This technology increased the production capacity of processors and the quality of produced pickles while reducing production cost, and meeting international food safety standards, as well as both market and consumer requirements.

**Introduction of new varieties**

The introduction of a new cucumber variety was necessary to change the game for cucumber farmers, to guarantee a larger supply for processors, and to give Lebanon a new edge on export markets. Cucumbers are found on every table across Lebanon and in most countries around the Mediterranean. The Lebanese, like most consumers, want their pickles to be crunchy. Knowing this, LIVCD set up farm trials on partner farmer demonstration plots to test 13 varieties of cucumbers and pickled each variety. Besides yield and adaptability, trials measured texture, flavor and crunchiness when pickled. As a result of the trials, the program introduced a *hybrid* cucumber variety commercially known as Artist. When harvested early, the Artist maintains a small size, is considered similar to cornichons, and is a highly desirable pickled product sold in local and export markets. When harvested



at a later stage, it is pickled with dill flavors and sold in the HoReCa (Hotel, Restaurant and Catering) sector as well as retail. The Artist is versatile and allows a varied market presence (retail and HoReCa) and has the potential to yield 100 metric tons per hectare, nearly twice the yield of traditional cucumbers.

After the adoption of the new variety, Judi Lebanon represented by Mr. Hatem Kaadan developed new products with different flavors using the Artist variety and introduced them to both local and export markets for the first time.

### ***Introduction of new equipment***

**Tank fermentation:** In 2015, LIVCD introduced fiberglass tank fermentation technology, which is new to Lebanon's pickling industry. While these tanks have been standard in developed countries for years, the concept was new to Lebanon and the region, where food processors still follow traditional methods and fear radical changes in production processes. This intervention resulted in a



Tank fermentation

major shift from a 100-year-old processing technology to a state-of-the-art technology that helps processors improve their competitiveness by reducing cost while improving quality and capacity in addition to creating new flavored pickled products. Each tank replaced 70 traditional drums (120-liters each), saving space, reducing the time of fermentation by 83% and decreasing the production cost by up to 40%. The fiberglass tanks increased the production capacity and upgraded the quality of the finished product while giving processors the ability to add flavors such as dill, which was not possible with the traditional method due to the extensive use of acetic acid that has a strong taste. Trials proved that the tanks could reduce operating costs by up to 40 percent, decrease production losses, and give pickle experts more control over quality and taste leading to products similar to freshly packed pickles.

USAID through LIVCD supported eight pickling food processors in Lebanon in acquiring the new technology. All together, these companies represent an estimated 60 percent of the country's pickle industry. One of these – Boutros Msallem EST – is a privately held family business and a leading local producer of pickled olives, cucumber, cauliflower, turnips, and other specialty products. Msallem saw the big potential of shifting to the new technology,

shifted most of his production to tank fermentation and invested in a new and modern food processing plant in line with international standards. As a result, Msallem won a bid to supply dill pickles for hamburgers to two major fast food chains, thus replacing imported pickles; a first for a Lebanese pickle producer. Seeing the increase in demand for their products, Msallem hired an additional 11 employees, signed forward contracts with farmers to purchase the new variety of cucumbers, and accelerated the shift to the new pickling technology and purchased an additional 80 fiberglass tanks, thus bringing the total number of tanks to 104. As a result of Msallem's big success, LIVCD expects that other pickle processors will also shift to this new technology.

**Brine recycling:** One of the problems facing pickle processors was the inability to reuse the brine used in pickling which in addition to financial loss, resulted in dumping each year approximately 300 tons of salt and thousands of tons of acidic brine on fertile land, rendering it unusable. The inability to recycle was due to two reasons, a logistical one regarding the impracticality of recovering the brine solution from a large number of small drums, and the other was the lack of know-how and associated risk of using contaminated brine. The large fermentation tanks resolved the first issue, while the know-how was provided by USAID through technical expertise and collaboration with the local, USAID-funded laboratory at the Chamber of Commerce Industry and Agriculture of Zahle. In addition, the tank allows processors to reuse the brine instead of dumping it into the soil. Chemical and bacteriological changes occur in brine during fermentation that renders pickles undesirable for consumers, therefore, LIVCD in collaboration with an FDA laboratory in the US, introduced a test called the "Softening Enzymes test" to the Chamber of Commerce and Industry of Zahle's (CCIAZ) laboratory to support brine testing for reuse. One processor has already invested in the new technology and is recycling its brine while using the laboratory's services to ensure that the brine meets required standards.

**Carbon dioxide (CO<sub>2</sub>) purging system:** To ensure consistent quality of pickled products during tank fermentation, LIVCD partnered with a US technology company, National Instruments (NI), and a Lebanese start-up company, Mekatranico, to create an automated CO<sub>2</sub> purging system using NI technology. This system monitors and regulates CO<sub>2</sub> levels in the brine solution and ensures that pickle fermentation is running at the optimal CO<sub>2</sub> level to minimize waste, enhance the pickles' texture, and results in consistent high-quality pickled product. This automated monitoring/purging system was created from scratch at an affordable price and is not available anywhere else in Lebanon.

**Sensor-based optical sorter:** LIVCD also partnered with National Instruments and a Lebanese start-up technology company, Engineer & Educate (E2), to create and introduce a sensor-based optical sorter using NI technology to sort cucumbers upon receiving them from farmers. The sorter helps improve the efficiency, capacity and final quality of the pickled cucumbers, while allowing the inspectors to perform more challenging and higher value-added activities for the company, such as packing pickles into jars, running equipment, and doing final quality inspection. The sorter also resolved a long-standing problem between processors and farmers by providing farmers with accurate and fast feedback on the quality of their cucumbers, which also resulted in fair and more accurate accounting of sales transactions.



Optical sorter

The Public-Private Partnership with National Instruments along with the combination of these various innovative interventions by LIVCD, resulted in improved competitiveness of Lebanese pickle processors and increased their capacity in both production and purchasing from farmers, thus improving economic opportunities, all while delivering safer and enhanced quality pickled products to consumers in Lebanon and beyond.

Replacing the traditional 120-liter drums with the 10,000-liter fiberglass tanks resulted in significant benefits on many levels for Lebanese processors that adopted the new technology. As shown below, each tank replaced 70 drums, reducing the time of fermentation by 83% and decreasing the production cost by up to 40%.

Outdated process using plastic drums	Food grade fiberglass tanks
Capacity of each drum: 120 L = 85 kg pickles	Capacity of each tank: 10,000 L = 6,000 kg pickles
Estimated production cost per ton: \$100	Estimated production cost per ton: \$60
Fermentation time required: 40 days	Fermentation time required: 7 days
Drum life span: 5 years	Tank life span: 20 years
Time required to fill 70 drums: 6 hours	Time required to fill 1 tank (equivalent to 70 drums): 2 hours if manual/0.5 hours when using a conveyor

Figure 11: Comparative table: plastic drums vs fiberglass tanks

The following results demonstrate the outcomes of LIVCD's collaboration with Boutros Msallem Est, a medium sized pickle producer that became one of the largest producers in Lebanon after being an early adopter of the new technology.

- ◆ LIVCD co-invested \$42,222 with Boutros Msallem, who invested US\$ 179,946, for a total investment of \$222,168
- ◆ Boutros Msallem Est. borrowed \$1.6 million from a commercial bank and used it mainly to establish a new and larger factory and allowing further business expansion
- ◆ 34 jobs were impacted, of which 11 were newly created
- ◆ Msallem's sales increased by 53% from 2015 to 2017 with significant further growth resulting from new contracts
- ◆ 50 farmers applied improved technologies on Good Agriculture Practices (GAP)
- ◆ For every \$1 invested by USAID with Msallem during the project period, the company invested \$42.16. Msallem invested \$179,946 in co-investment with LIVCD and \$1,600,000 on a new factory and equipment.
- ◆ For every \$1 invested by USAID with Msallem, \$15.1 were generated by the company<sup>16</sup>

Watch the following videos: "[Transforming the pickles Industry](#)", "[Pickles – How it's made](#)" and the "[Pickles Success Story](#)"

## Oregano

Oregano, which is grown in arid mountainous areas; typically, in the South of Lebanon, is an important herb in Lebanese cuisine with demand that far exceeds local supply. However due to improper harvesting and lack of adequate supply of seedlings, Lebanon has seen a systematic eradication of oregano with an increased dependence on imports. To counter this trend and create economic opportunities for farmers in South Lebanon, LIVCD assisted an oregano cooperative, Zawtar Coop, to modernize and expand its operation, which included a drying unit, packing and grinding equipment. Through a grant mechanism, LIVCD assisted the



Oregano orchard

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<sup>16</sup> Source: LIVCD 2018 economic impact analysis

cooperative to increase its nursery's capacity and insure compliance with Good Manufacturing Practices (GMP) by providing training and replacing non-compliant equipment.

LIVCD also assisted the cooperative to increase its processing capacity and improve quality while at the same time reduce processing costs. To achieve all this, LIVCD assisted the cooperative in acquiring a shaded green house for drying oregano, an oregano grinder, oregano sieve, a sesame roaster and a packaging machine.

As a result of the support given to Zawtar cooperative, farmers in the region were assisted in planting oregano in arid areas and processing it at the cooperative. New and existing farmers are now able to sell their fresh and processed oregano directly to consumers, and any excess oregano is sold to the cooperative that has a market beyond what its existing members can supply.

Also as part of the collaboration with Zawtar Coop, LIVCD facilitated the introduction of modern production techniques for planting oregano in arid areas by co-investing with 40 new oregano farmers from different villages in southern Lebanon. As its contribution, the cooperative provided oregano plants and cultivation services to the 40 farmers, each receiving 5,000 oregano seedlings at 25% of market price valued at \$33,333.

In addition, LIVCD supported 20 farmers who already planted oregano to expand their planted areas by providing them with technical support on good agricultural practices, processing and marketing; and linking them with the cooperative, which would sell their excess output in their existing markets.

Because of LIVCD interventions, farmers' revenue increased after planting new oregano fields in arid areas. In addition, the cooperative's income increased due to sales of oregano plants, fresh and processed oregano and processing services to oregano farmers. Finally, the new equipment improved the quality of processed oregano, while the cooperative became more efficient and productive.

### **Freekeh**

*Freekeh* is a roasted green durum wheat native to the Levant region in Lebanon. It has become increasingly popular all over the world in the last few years thanks to its many nutritional benefits and good taste. Lebanon has produced this healthy grain for hundreds of years and is increasing its production to meet growing demand in both, domestic and international markets. Cultivating freekeh is extremely beneficial for farmers since the



season only lasts for 6 months and this allows them to cultivate another crop after harvesting the freekeh. However, the conventional production methods used by cooperatives and other producers limited their production capacity and prevented cooperatives from responding to increased market demands.

LIVCD observed the growing demand and through its research learned that production in Lebanon was constrained by:

1. Inefficient production methods yielding low volumes from the input
2. High cost of production which contributed to high retail prices,
3. Poor quality, safety, and consistency of the end product due to traditional roasting and drying methods; and
4. Absence of a local and international freekeh quality standard.

Knowing the constraints and prevailing production practices, the LIVCD team designed a new production process that eliminated the shortcomings of the traditional process while maintaining the desired health benefits and flavor of the freekeh. The project also made improvements upstream and downstream in the value chain – from working with wheat varieties to national policy, and with end consumers.

To ensure consistent high-quality freekeh in the new process, LIVCD introduced automation to eliminate the chance for human error. LIVCD partnered with National Instruments ([www.ni.com](http://www.ni.com)) to benefit from its advanced technological solutions and its corporate social responsibility (CSR) program “Planet NI”, and to leverage NI’s public-private partnership with USAID through the Partnerships for Enhanced Engagement Research (PEER) science program. NI’s partner Mekatroniko used NI technology to design and build two affordable machines – a roaster and a dryer. The equipment automated the freekeh production process in a way that allows economical production at high capacity.

Upstream, LIVCD collaborated with the Lebanese Agricultural Research Institute (LARI) to introduce a new variety of durum wheat to farmers, developed by the International Center for Agricultural Research in the Dry Areas (ICARDA). The wheat has a desirable large grain and high yield in arid regions. This variety is suitable for rural areas in the south, which has arid conditions that are typically left uncultivated.

To eliminate the problem of cheap, low-quality Freekeh and improper labelling, exemplified by non-freekeh products being sold as freekeh in high-value markets such as the US and Europe, LIVCD worked with the Lebanese Institute of Standards (LIBNOR), to create Lebanese freekeh standard. This standard is a necessary step to creating an international Codex freekeh standard, which does not yet exist. Codex standards are internationally recognized standards, codes of practice, and guidelines relating to food production and food safety.

Marketing to end consumers, to assist cooperatives and farmers with entering new markets and creating linkages in existing ones, LIVCD partnered with the Rural Delights cooperative to establish a freekeh website that increased awareness of freekeh and promoted its benefits ([www.freekehfacts.com](http://www.freekehfacts.com)).

**LIVCD impact on freekeh value chains<sup>17</sup>:**

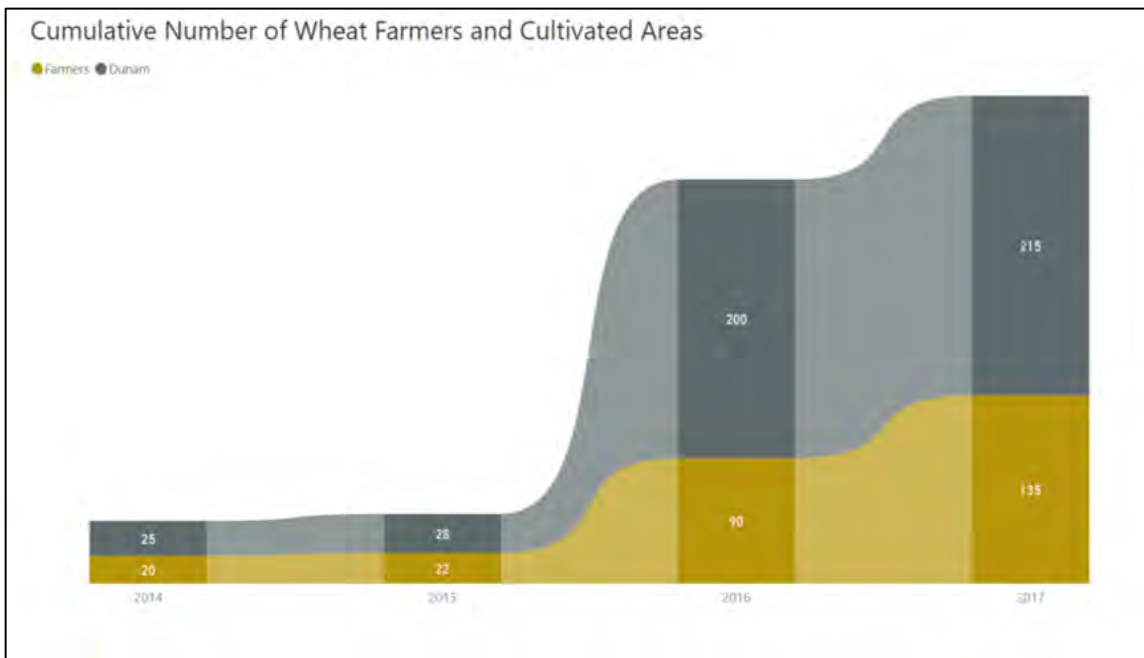


Figure 12: Number of freekeh farmers and cultivated dunams in South Lebanon and Bekaa

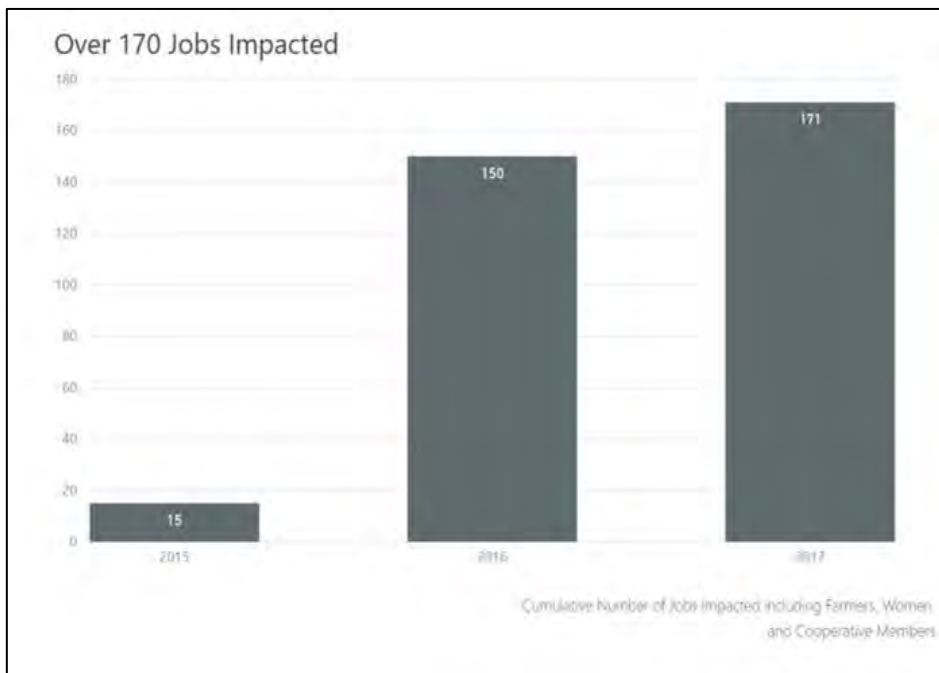


Figure 13: Number of jobs impacted by LIVCD, including farmers, women, and cooperatives members

<sup>17</sup> Charts taken from LIVCD records – Activity results, Processed Food Value Chain, September 2017.

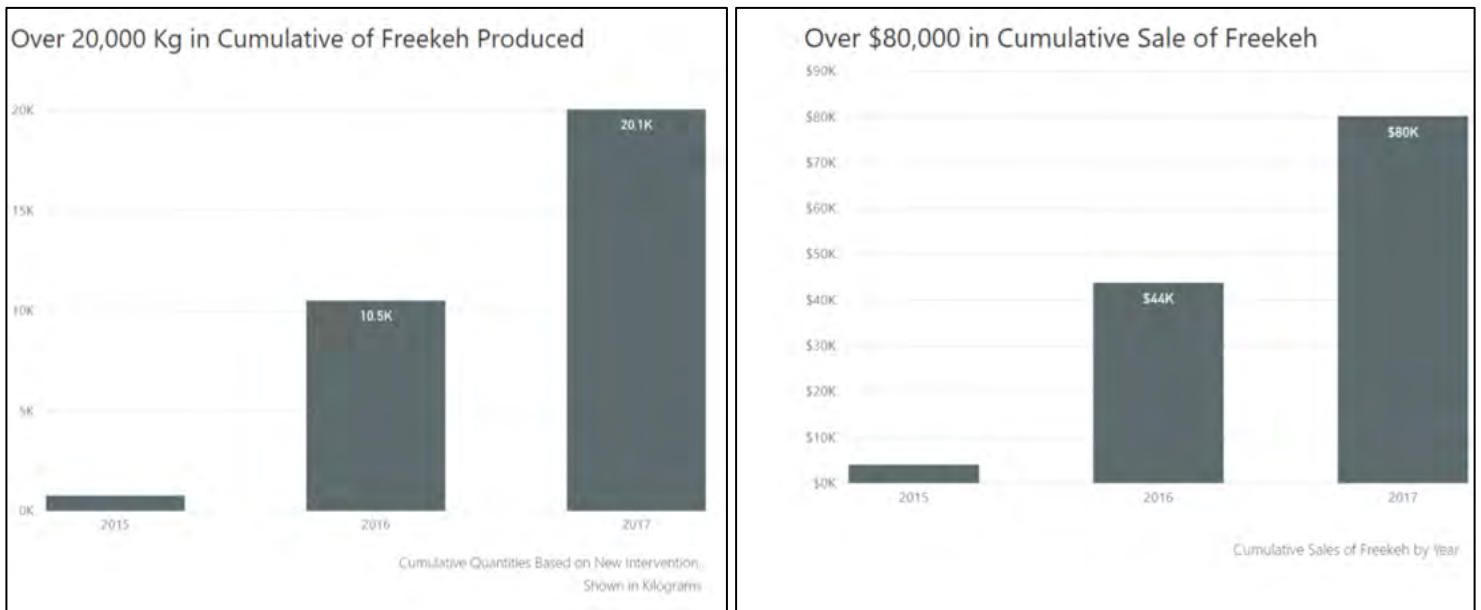


Figure 14: Freekeh production and sales increases 2015-2017

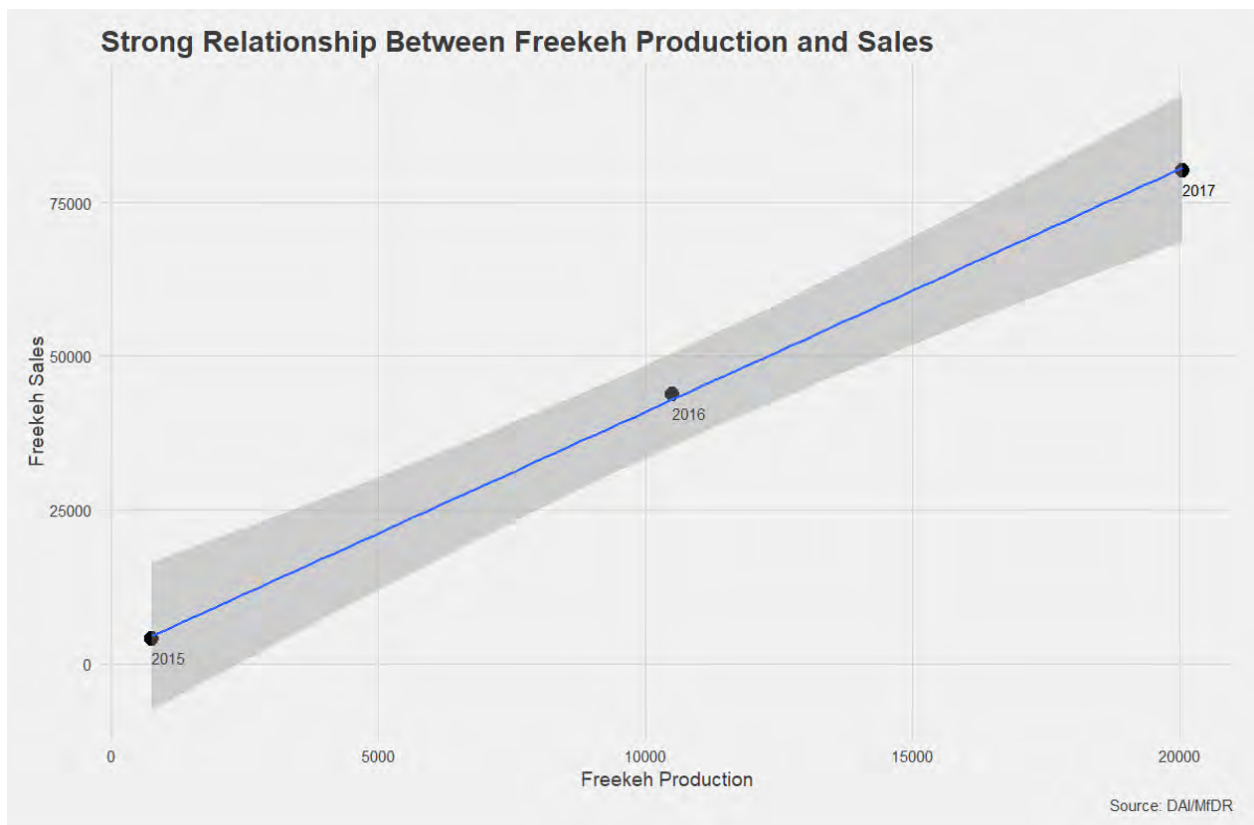


Figure 12: Freekeh production and sales, 2015-2017

LIVCD provided freekeh roasters, dryers, grain grinders, and vacuum machines with proper packaging to upgrade the 10 concerned cooperatives' production lines and help them meet processors' demand. Adoption of the newly developed equipment by these cooperatives has been rapid and the new process has been transformational: production and revenue rose from 757 kg/year (valued at \$4,012) in 2015 to 10,503 kg/year (valued at \$43,766) in 2016



and 20,050 kg/year (valued at \$80,200) in 2017. With the new equipment and wheat varieties, freekeh yield increased from 100 to 250 kg/dunam and production costs went down from \$4 to \$1.8 per kg.

Watch the [“Freekeh” Video](#)

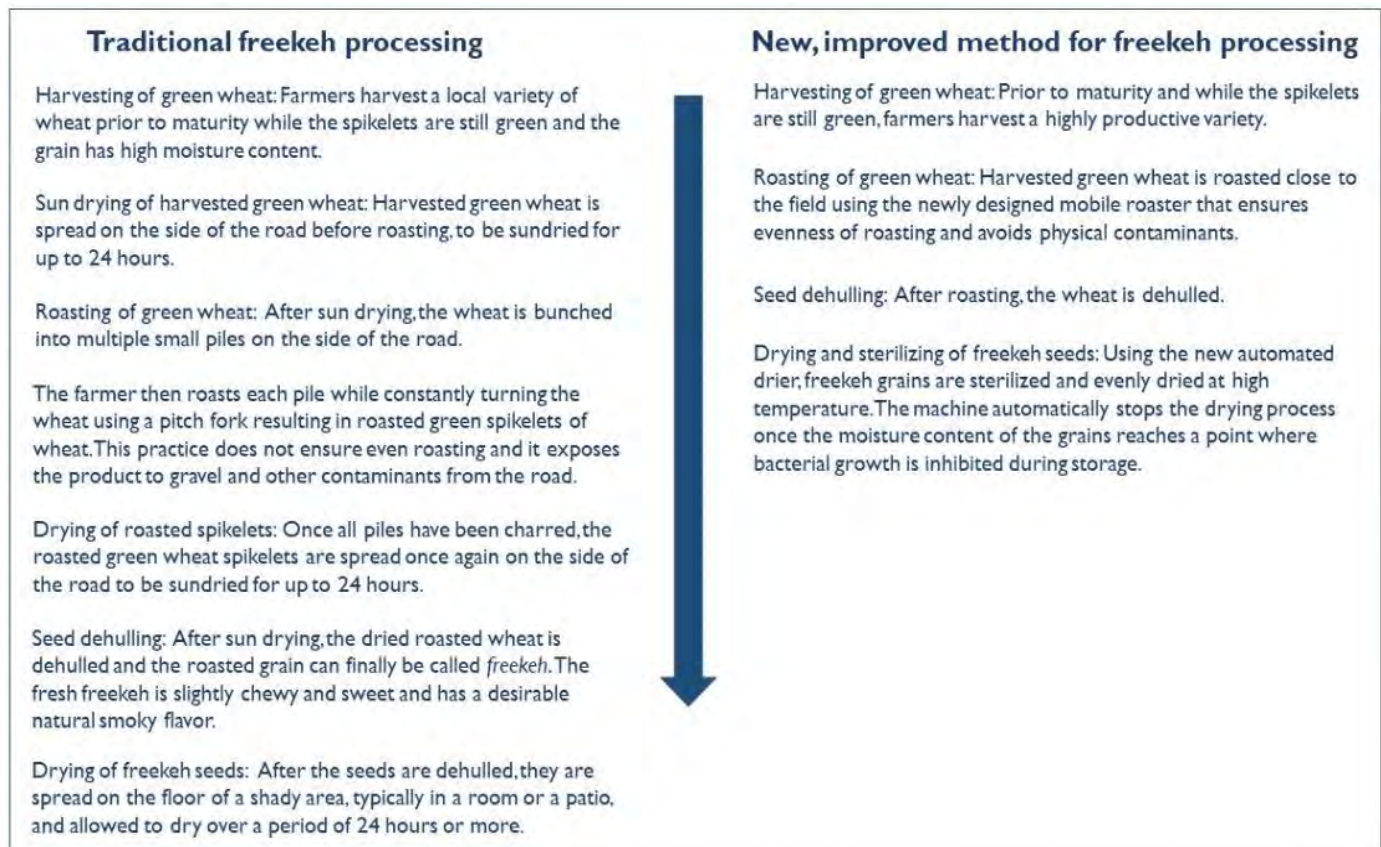


Figure 13: Traditional versus modern processing techniques (see [Freekehfacts.Com](#))

## Honey

LIVCD engaged over 7,500 rural Lebanese households in honey production. Beekeeping carries many advantages since the initial investment costs are low and it is not necessary to own or lease land to manage beehives. Data from the Ministry of Agriculture stated that the number of beehives in Lebanon increased by 114 percent from 2011 to 2016, from 168,214 to 360,179. Annual production increased accordingly to 3,500 tons<sup>18</sup>, which had a market value of \$65 million in 2016.

Lebanon recently started to update its policies to promote higher product standards and specifications and to modernize the honey sector. As a result, over the past two years, the

<sup>18</sup> Based on MOH data: in 2016, number of hives amounted to 360,179, each hive producing 9kg/year, so total annual production equaled 3,241,611 Kgs. Price per KG amounted to \$20 and the total value of the honey production was 64,832,220, rounded to \$65 million, note that the beehives generates other products that have value that we did not include in this estimation, so most probably the value of this sector is higher than the 65 million (including Royal Jelly, propolis, queen bees, beehives sales, and more.)

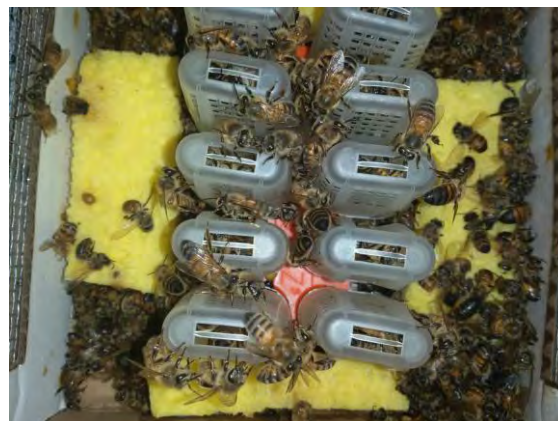
private sector has made significant additional investments to improve the quality and quantity of honey produced in Lebanon.

In 2012, LIVCD identified important points of intervention, which would lead to a sustainable and improved honey value chain. The project worked on increasing the quality of input material, production services, and aggregation, and developed marketing campaigns for commercial and non-commercial honey brands.

### **Product development: introduction of new technologies**

The quality of queen bees is directly linked to high honey production. Prior to the 1982 war, Lebanese beekeepers were able to access high performing queen bees that led to production as high as 50 or 60 kg of honey per hive. However, in the past few decades and at the time the LIVCD project started, honey production in Lebanon was highly variable, and poor management of honey bees resulted in yields as low as 5 kg per hive. Undeniably, the queen bee is the origin of all genetic traits, which influences the colony's defensiveness, adaptation to different ecosystems, rate of population growth, and resistance to pests and diseases. Some parasites, such as the Varroa, feed and reproduce on adult honey bees and their larvae as well as pupae and can decimate a colony. Due to the intensive use of pesticides, Varroa mites have over time become resistant to chemicals. LIVCD therefore identified an alternative solution to overcome the disease: to introduce breeding stocks that are resistant to the mites.

**Low-quality queen bees:** Typically, Lebanese beekeepers have struggled to obtain high quality queen bees, since the lack of regulations on imports make it both risky and costly, and travel weakens the bees, often killing them. Queen bees often come from non-trusted sources with unreliable information on their origin and type. The introduction of low-quality queens has harmed the honey value chain; many beekeepers have experienced reduced hive productivity, which has damaged the quality and reduced the quantity of honey produced in Lebanon. As a result<sup>19</sup>, beekeepers import approximately 15,000 queen bees every year, and since each queen bee costs an average of \$20, the total annual import cost is approximately \$300,000.



Queen bees imported from the US

Moreover, the native honeybee subspecies in Lebanon is the *Apis mellifera Syriaca*. Although it is adapted to its environment, it produces only average quantities of honey, is known to be aggressive, and is not resistant to Varroa mites. To improve the quality of the local stock, a fundamental element of the honey value chain, the honey stakeholders and LIVCD identified breeding queen bees in Lebanon as an important area of work.

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<sup>19</sup> As a result of the low productive queen bees

**Introducing and raising the Varroa Sensitive Hygiene queen bees:** LIVCD partnered with the Lebanese company Afif Abi Chedid Enterprises to establish the first artificial insemination laboratory in the Middle East region (described below) and to import several Varroa Sensitive Hygiene (VSH) queen bees through formal channels. Newly developed, VSH Ligustica pedigree bees are not only resistant to Varroa mites, but also possess defenses against wax moths and small hive beetles. Developed by the United States Department of Agriculture Bee Breeding Laboratory, these queens have the potential to increase the productivity of beehives, enhance disease resistance, and decrease or eliminate antibiotic usage and chemical treatments on beehives, thus reducing the cost of beekeeping.



Queen bee artificial insemination

LIVCD collaborated with the proprietor of the company, Mr. Afif Abi Chedid, for many reasons including his capacity to manage over 2,000 beehives and to operate sustainably and maintain a breeding center complying with international standards. Mr. Chedid and his enterprise are well known among beekeepers in Lebanon and the Middle East. The demand for queen bees in Lebanon is increasing fast as beekeepers commonly split hives every spring. Each time a hive is split, a new queen bee is required. Afif Abi Chedid Enterprises' services are therefore in demand. Once trained, beekeepers can produce and raise their own queen bees, thus reducing costs and avoiding delays in acquiring the bees when they are most needed at the beginning of the honey season. Beekeepers can also sell queen bees as a side business, providing an additional source of income. LIVCD's introduction of higher-quality bees in collaboration with Afif Abi Chedid Enterprises has therefore had ripple effects among beekeepers.

**The Golden Queen Center:** Having a specialized center for beekeeping and queen bee breeding in Lebanon is a critical upgrade to the Lebanese honey value chain. With LIVCD assistance, Afif Abi Chedid Enterprises established the Golden Queen Center in 2016. By June 2018, the center was fully equipped and is now providing Lebanon's beekeepers with information on modern and best beekeeping practices. In addition, the center has become a meeting point and venue for the Syndicate of Beekeepers in Lebanon who previously lacked a location to conduct and hold regular meetings and training sessions. In 2016, the center hosted the first Middle East Beekeepers meeting in Lebanon, and it is planning to host the 2020 International Center for Young Beekeepers convention also for the first time in Lebanon.

**Queen bee insemination laboratory:** LIVCD also collaborated with Afif Abi Chedid Enterprise to create the first queen bee artificial insemination laboratory in Lebanon and the

Middle East, to give Lebanon's beekeepers access to more productive bee strains. Raising queen bees requires a significant level of experience and resources to produce good quality mated queen bees. LIVCD supported a month-long, in-country training, on bee artificial insemination, conducted by an expert from the U.S. who trained Afif Abi Chedid and his team.



Wax Center

In early 2016, with assistance from LIVCD, Afif Abi Chedid Enterprises established the new laboratory facility equipped with high-end technology. LIVCD contributed \$69,348 while Afif Abi Chedid invested almost twice as much, \$136,494, in this facility. It is housed at the Golden Queen Center.

In June 2016, LIVCD imported ten VSH queen bees imported from United States to the Golden Queen Center, with an objective to test them in Lebanon's climatic conditions and to assess whether they could reproduce and maintain their original characteristics through their progeny. The progeny adapted well to the local environment breeding successfully while preserving their desired characteristics.

The establishment of the center allowed Lebanon's beekeepers access to a high-quality local source of queen bees. In addition, the buyers can now check the bees before they purchase them, thus reducing the transaction risk. As a result of this intervention, by June 2018:

- The queen bee multiplication successfully produced 6,000 queen bees, of which 250 were artificially inseminated;
- At the Golden Queen Center Jbalna Apiary, beekeeping expert Afif Abi Chedid manages 2,000 hives, each with VSH queen bees. The average honey production has increased to 30 kg of honey per hive per year at the center compared to the national average of about 12 kg per hive.
- To date, the center has sold 4,000 of the highly productive queen bees to beekeepers in Lebanon, Jordan, Egypt, and Syria.
- Honey prices in Lebanon have increased from \$20 to \$35 per kg when purchased directly from beekeepers.

Watch the [“Afif Abi Chedid Success Story” Video](#)

**HOSCO Recycling Center for Wax:** Sterilized bee's wax is a crucial honey production input material because it reduces the spread of diseases and reduces beekeepers' cost of production. In addition, bees benefit from using recycled wax instead of spending energy to produce it biologically.

Good beekeeping practices recommend that a third of the brood frames in beehives be replaced on a yearly basis for optimum honey production. Beekeepers have the traditional option of melting the old wax and remolding them into sheets without decontaminating them, but this allows diseases and fungi to linger. Beekeepers can instead purchase new low-quality wax sheets at a very low price, or high-quality sheets at a high cost. But a better alternative is to recycle wax properly while sterilizing it to eliminate disease residues.

LIVCD and partner Dr. Chadi Hosri identified the need for a wax recycling service center, which would provide good services at a reasonable cost – this did not exist in Lebanon. This service would improve the quality of honey produced and limit the use of chemicals to control pathogens in hives. Through LIVCD, the idea was realized through the creation of the Hosco Agri Center. Dr. Chadi Hosri, the Director of the center, is an authority in the beekeeping sector in Lebanon and the Head of the Veterinary Medicine Department at the Lebanese University. Dr. Hosri is also the main author of the honey training program materials developed by LIVCD, which has been disseminated to over 3,000 beekeepers. The Hosco Agri Center, with its unique wax processing equipment, currently serves hundreds of beekeepers in Lebanon, from the Bekaa region to the South and Mount Lebanon, who now benefit from purchasing excellent quality recycled wax at an affordable price.

Watch the [“Wax Recycling” Video](#)

## **Apple juice**

### ***Introducing fresh apple juice to the Lebanese market:***

Every year, Lebanese apple producers relive the same misfortune: thousands of crates of apples end up wasted. In fact, approximately 20 percent of Lebanon’s total annual production ends up in landfills. A more competitive Lebanese apple sector requires alternative marketing strategies, especially in light of recent market deterioration into the traditional export market. The growing domestic demand for fresh apple juice provides a viable and timely alternative market. LIVCD analyzed the sector and its players through a market systems lens and identified this as an opportunity for farmers to sell more second-grade apples to processors with access to cash flow, thus eliminating waste and improving multiple parties’ profitability.



In 2014, Bcharre-based Businessman Dany Tawk, CEO of Al Mitra company, saw the economic potential of fresh apple juice and looked into acquiring and running a processing facility located in his hometown of Bcharre. However due to his lack of knowledge in food processing, including apple juice, and the non-operational condition of the factory, he was not able to make any progress until he reached out to LIVCD. In June 2015, LIVCD assessed Al Mitra's juice operations and saw the potential to include the firm in a broader apple value chain operation. LIVCD linked Al Mitra with Balkis—Lebanon's only large-scale fresh juice producer and distributor—to gauge the potential for cooperation. At the time, Balkis produced fresh citrus juices including orange, mandarin, grapefruit, and lemonade. The company distributes juice daily to over 800 points of sale, and more than 1,100 in summer when the demand increases. LIVCD suggested based on market study that by partnering with Al Mitra, Balkis can capitalize on its brand recognition and distribution network to expand its business by adding fresh apple juice to its product offering. Since Al Mitra had the facility and equipment, the venture would require little capital investment by both parties and would be of little risk. Balkis' extensive knowledge in juice processing was critical for Al Mitra to operate the factory and understand the business. Both companies reached an agreement whereby Balkis would provide the knowhow to bring the factory to an operational mode and will buy the semi-pasteurized juice at prices that are profitable to both parties. Balkis will then pasteurize the juice at its facility, pack it, and sell it across Lebanon through its distribution channels.

After some factory upgrades and investment in equipment, Balkis began purchasing Al Mitra's semi-pasteurized juice, and packaged and distributed the apple juice in the Lebanese market. By February 2016, the company purchased 120,000 liters of apple juice (12,000 crates) from Al Mitra, valued at more than \$55,000. To produce the juice for Balkis, Al Mitra purchased thousands of crates of apples from over 60 nearby farmers.

In the following year, after understanding the business and seeing significant demand for fresh apple juice, Al Mitra decided to sell directly to retailers in the Bcharre region. After seeing firsthand the financial returns of adding fresh apple juice to its product offering, Balkis invested over \$500,000 in cold storage and an apple press to develop their own apple juice production line. With the additional storage capacity, Balkis can store approximately 15,000 crates of apples and offer fresh apple juice throughout the entire year. The investment and subsequent sales in Lebanese supermarkets gave Balkis the financial justification to further invest and expand its apple juice sales. In 2016, through grant support of \$61,743 by LIVCD and a cost-share of \$71,886 by Balkis, the company acquired an industrial juice decanter to ensure a high quality, consistent product and launched a marketing campaign to increase awareness of apple juice in Lebanon. The expansion led Balkis to procure apples from 100 new farmers located in the north and south of Lebanon. In addition, in early August 2017, Balkis exported its juice products to Qatar for the first time, and they are now available in more than 40 points of sale in Qatar. As a result of its successful venture outside of citrus juice, Balkis has added, with the encouragement and support of LIVCD, pomegranate juice to its product offering.

Another success story of the Lebanese apple juice sector is a collaboration between LIVCD and the company Les Vergers des Cèdres , which was founded in May 2016 by Dr. Issam Tawk, an engineering professor at Balamand University. The company sought to take advantage of the oversupply of apples from growers in Bcharre and decrease apple waste, especially after the 2016 apple crisis caused by the collapse of the Egypt market. They attempted to create new markets for apples by processing second-grade apples into apple vinegar and good quality fresh juice with a shelf life of up to 6 months without using any additives or preservatives.

In 2016, Les Vergers des Cèdres started its operation in a small facility in Bcharre with limited equipment. The company pressed 25 tons of Bcharre apples and introduced their juice product to the local retail market. In October 2016, LIVCD assessed Les Vergers des Cèdres and linked it with Middle East Airlines and assisted the company to rebrand its logo and conduct in-store promotion events in the retail market. As a result, the company was introduced to the market with a new look and brand image, “Pomariis”.

Based on the high demand witnessed in 2016, especially after the company got a contract to provide Middle East Airlines with fresh apple juice, in 2017, they invested in a new apple-pressing machine and a new production facility. Juice sales increased from \$19,596 to \$85,564 in one year and reached 19 new point of sales all over Lebanon. Les Vergers des Cèdres is a growing company that showed commitment by investing in equipment and a new production space, and introducing new products such as vinegar, to address the apple crisis faced by Lebanese farmers.

Watch the [“Apple Juice – How it’s made”](#) and the [“Balkis”](#) Videos

**Marketing:  
Business  
Linkages &  
Access to  
Market**



## 7. Marketing: Business Linkages & Access to Market

Early on, LIVCD recognized the importance of insuring the existence of market demand and as such took a market-pull approach across all its value chains. The different local and export market channels were studied in collaboration with stakeholders to determine which were the most appropriate for each value chain, and what specific product was most appropriate for the selected market channel. For example, high value grapes meeting international standards can be sold in the European market, however not all varieties produced in Lebanon can be sold in that market. Factors that were studied to determine appropriateness of products for specific markets included market demand, consumer preferences, competition, harvest period, and adequacy of supply. Based on these factors, LIVCD took a different market approach for each of the nine different value chains, and even for different products within a value chain. In some value chains, focus was placed on local market to replace imports – this was the case for avocados – while the honey value chain team worked on local and export markets; mainly, GCC markets. For grapes, LIVCD worked on both local and European markets, while in the apple value chain the project worked on making the product market-ready to shift from the low value Egyptian market to GCC markets. The processed foods team successfully targeted the high value US specialty food market.

LIVCD worked on meeting market demand and on creating market awareness through marketing campaigns, however, LIVCD did not invest resources in *creating* market demand that would not have given the appropriate return on investment. LIVCD also worked extensively with beneficiaries to upgrade logos, labels, packaging, in addition to creating brand recognition through billboards and in-store promotions in local and export market. Following are examples of marketing support provided to different beneficiaries:

- Branding activities for:
  - o Karma – Sinno (apples)
  - o Balkis (fresh apple juice)
  - o Les Verges des Cedres (apple juice)
  - o Judi-Lebanon (jams, syrups and pickles)
  - o Sonaco Alrabih (canned products, jams, pickles, distillates)
  - o Msallem (pickled products, olive oil)
  - o Mymoune (canned products, jam, syrups, vinegars, etc.)
  - o Food processing Cooperatives: Jana al Ayadi, Wadi al Taym, Al-Imad
- In-store promotions:
  - o Lebanese Mezze in 5 locations of Spinney’s supermarket in Lebanon
  - o Kaddoum Honey
  - o Good Grape by Royal organics in two locations of Spinneys’ in Lebanon
  - o Les verges des Cedres in 5 locations of Spinney’s in Lebanon
- Billboard campaigns:
  - o Balkis apple juice - as part of their cost-share

- Lebanese honey awareness campaign
- In collaboration with Federation of Chambers of Commerce, Industry, and Agriculture in Lebanon (FCCIAL), a national campaign was held to promote all fresh and processed food value chains worked on by LIVCD.

Following successful product readiness and branding upgrades, LIVCD linked beneficiaries with distributors, wholesalers, exporters, and importers in export markets. Following are a few examples:

- Lebanese Mezze was connected with local distributor “Sell in Sell Out” in Lebanon
- Lebanese Mezze was linked with Trio in UAE, Kosmonte foods in Qatar and Miles ltd (Al Mayas) in Kuwait
- Mechaalany, Sonaco Al Rabih, Second House Products, Msallem, Royal Organics were connected with Ziyad Brothers in the U.S. specialty food market.

In the following sections, we will discuss two value chains – processed foods and honey – that had a strong export focus due to existing market demand and relative product readiness.

### **Processed Foods: Agro processors**

#### **Fancy Food Show- Facilitating Market linkages to the US specialty market**

A major focus for LIVCD was upgrading the processed food value chain by expanding exports and entering new markets such as the specialty markets. LIVCD along with Lebanese processors identified the



need for strong market intelligence and linkages with key actors in these markets. Lebanese exporters have limited knowledge of the competitive elements of the US market, which needed to be addressed. Over the years, Lebanese processors have been losing their market share, locally and in export markets, to regional processors that have lower operating costs. In high value markets such as the US and Europe, Lebanese processors sell their products almost exclusively in the ethnic market, which is price sensitive. Moreover, Lebanese processors over the years lost their comparative advantage to regional ones producing similar products after these companies improved their products, packaging and labeling, thus eliminating any differentiation with Lebanese products. Lebanese processors’ only remaining advantage was the regional, and to a lesser extent, international recognition of Lebanese cuisine; a product made in Lebanon had an advantage in GCC countries over

one made in Egypt, however that by itself was not good enough when the Egyptian product is at half the price.

To address this disadvantage, LIVCD worked with processors on two fronts; 1) to shift exports to high value markets away from the limited and price sensitive ethnic market, to the specialty markets, 2) to ensure that the processors are capable of consistently supplying competitive products that meet the high consumer expectations in specialty markets.

LIVCD worked with companies to develop new products that meet demands of specialty



Lebanese processors preparing for the Fancy Food Show with LIVCD consultant

markets in terms of form, fit and function, while also meeting market regulations. After LIVCD's interventions, six companies are now ready for the US specialty market: Mechaalany, Second House products, Msallem, Willani, Sonaco Al Rabih and Royal Organics. In Year 6, LIVCD organized, for these processors, a visit to New York to attend the Fancy Food Show and meet importers. This trip helped provide these processors with a better understanding of the U.S. market and linked them with

importers, brokers and distributors. The trip also showed them the importance of E-Commerce, which allows a faster entry in the US retail market, the importance of kosher certification for a significant market segment, and the importance of developing new products that follow the latest trends and meet US consumer expectations.

As a result, three companies were able to secure deals with one of the leading distributors in the US, Ziyad Brothers: Mechaalany produces ready-to-eat simmering sauces and dressings by mixing and sourcing powder mixes and spices from Second House Products, who will also supply Mechaalany the mixture base and powder for the food service segment with the American distributor. Ziyad Brothers were so pleased with the new products that they displayed them under their Wild Gardens brand in the Winter Fancy Food Show in San Francisco held between January 13 and January 15, 2019.

Currently, two other processors are in discussion with the US distributor to supply other products.



Lebanese products in the Winter Fancy Food Show held in San Francisco

### **Processed Foods: Small farmers and cooperatives**

LIVCD assessed cooperatives throughout Lebanon and addressed major constraints limiting their access to markets, which included:

- Water safety by cost sharing water filtration systems and recycling systems to ensure safe water for the final product and promote reuse of water in arid regions,
- Equipment automation to increase capacity and decrease production cost to meet both consumers and processors demand and price;
- Product development such as dried fruits and Freekeh;
- Labeling to comply with regulatory requirements
- Implement GMP and GHP (Good Hygiene Practices) to meet food safety requirements.

LIVCD's interventions facilitated many sustainable linkages between farmers, cooperatives and processors to access new market opportunities. For example, in the freekeh value chain, LIVCD facilitated linkages between farmers, cooperatives, and processors, which aimed at generating additional income for all parties. LIVCD also facilitated a linkage between food producer/marketer Adonis Valley and Caritas where Adonis Valley purchased 100 kg of freekeh from the farmer, which will be ground and packed at Caritas' facility in Deir al Ahmar. LIVCD also facilitated a linkage between Adonis Valley and the Kfardounin Cooperative where Adonis Valley purchased an additional 200 kg of freekeh.

LIVCD's interventions facilitated many sustainable linkages between farmers, cooperatives and processors to access new market opportunities. For example, in the freekeh value chain, LIVCD facilitated linkages between farmers, cooperatives, and processors, which aimed at generating additional income for all parties. LIVCD facilitated linkages between food producer/marketer Adonis Valley, Caritas and Kamil Akoury (Freekeh farmer) where Adonis Valley purchased 300 kg of freekeh from them both, and ground and packed them at Caritas' facility in Deir al Ahmar. LIVCD also facilitated a linkage between Adonis Valley and the Kfardounin Cooperative where Adonis Valley purchased an additional 200 kg of freekeh. Another linkage with Sonaco Alrabih and Kfardounin cooperative was initiated for the purchase of 220 kg of freekeh. Furthermore, LIVCD facilitated a linkage between Caritas and Judi-Lebanon for an additional 5,000 kg of freekeh.

Moreover, seeing freekeh expansion and the growing freekeh demand, and as part of processed food team exit strategy, LIVCD linked several cooperatives to other donors. LIVCD introduced a USAID-OTI-funded project to the General Agricultural Cooperative in Aرسال, which granted the cooperative a freekeh processing line including a roaster, a dryer, a thresher, a harvester and a vacuum packaging machine for a total value of US\$35,000. LIVCD also linked Al Imad Cooperative to UNDP, which assisted the organization with new freekeh processing equipment valued at \$6,000.

### **Ready-to-Eat**

Ready-to-eat meals (powder and can) and frozen food products such as pastries and kebbeh are high added value products with a rapidly expanding market. These products have significant demand in both local and export markets. Lebanese gastronomy is well known

regionally and growing internationally, thanks to the wide and growing presence of Lebanese restaurants and Lebanese diaspora.

The ready-to-eat meals sector has many constraints and challenges to overcome: high production costs, difficulty to achieve new business linkages in both local and export markets, a significant lack of information on market dynamics, and absence of specialty food products suitable for export markets, and to top it all, most Lebanese processors do not comply with all regulatory requirements.

LIVCD defined these challenges and developed multi-axis interventions to tackle them by:

- Introducing automation to decrease production costs and ensure consistent quality;
- Supporting the existing businesses to increase their brand and product awareness through branding and marketing strategies and tactics;
- Providing insights through market studies and participation in trade shows;
- Developing new products to meet market demand; and
- Training the concerned parties on the new regulatory requirements of the US market.

### **Lebanese Mezze (LM)**

Lebanese Mezze (LM) is a family business founded by Mrs. Siham Khalil, who came up with the concept while volunteering at Caritas-Lebanon. Lebanese Mezze created job opportunities, otherwise non-existent or highly saturated by foreign workers, for Lebanese women with modest backgrounds and minimal education to help them provide for their families and take part in



Training on Sambousek machine functioning – Lebanese Mezze

work opportunities. This has always been one of the main pillars of Mezze's values: 100% Lebanese crafters providing 100% traditional Lebanese food from Lebanese raw materials. In August 2011, Lebanese Mezze realized that they could not compete with low cost, low quality products, and their only means of continuing their business was to expand into regional export markets, maintain the highest quality while reducing operating costs by improving production efficiencies. This was done by investing in more efficient equipment and upgrading their facility to meet international food safety standards. LIVCD supported Lebanese Mezze in improving its process efficiencies and increasing its production capacity by introducing new technologies and supporting it to access the GCC market:

- Introducing a kebbeh producing machine to its production line;

- Setting up a freezer to maximize the storage space to support the production of large orders for export.
- Building new linkages between LM and new markets (domestic and UAE market) and expanding the domestic market through promotional campaigns.

In 2016, LM closed new deals in the UAE and increased their sales by 20%; however, this upsurge did not last long as another Lebanese producer introduced similar products at lower prices due to the products' lower weight, lower quality ingredients and lower packaging cost. LM could not sell its stock fast enough and risked losing it due to imminent expiration dates, which would have a significant financial impact on the company.

Following this crisis, LM sought LIVCD's advice in September 2017, which called for a full assessment of LM's operation to identify constraints that limited its competitiveness and created a plan to address these constraints. This was achieved between October 2017 and January 2018 as follows:

- A subcontract with a local distributor to decrease distribution costs and expand the product reach in the domestic market;
- Decrease production costs by changing raw materials and production schedule; and
- Secure new deals with Wooden Bakery and Kosmonte Foods

As a result of LIVCD's intervention, LM set an action plan on ways to further increase production while decreasing production costs through automation. It was necessary to acquire a sambousik machine which allowed the company to meet the demand and supply. All this led to increased sales, which subsequently increased the impact for all the value chain actors from the processors to the farmers.

Due to LIVCD's intervention, Lebanese Mezze increased sales by 50 percent, decreased production cost by 25 percent, hired 4 new staff, increased local procurement by utilizing good agricultural practices for growing vegetables, formed a new distribution agreement and four new business linkages, the three listed above and a new agreement reached with Wadi Akhdar to supply them with their frozen ready-to-eat meals. These successes helped Lebanese Mezze sustain and grow their business, and most importantly supported and empowered women.

## **Honey**

LIVCD provided marketing support to several partners in the honey value chain to increase their sales in both domestic and export markets. There are substantial opportunities for Lebanese producers; the increase in local production and in imports is still insufficient to meet both national consumption and demand in export markets.

Lebanon exports a relatively small volume of honey to a diverse set of trade partners around the world. When designing LIVCD's early interventions in 2012, the project sought to take advantage of the demand in export markets. LIVCD began by supporting a leading

honey brand, Jabal el Sheikh, in organizing a product promotion at the Carrefour hypermarket chain in the United Arab Emirates (UAE). This initiative opened the door to the first large export to the UAE in November 2013, which has continued since and is clearly reflected in a spike in Lebanese honey exports. According to Lebanese Customs, the overall value of exported honey amounted to \$223,000 in 2012. It went up to \$629,000 in 2014 following LIVCD interventions, and kept on increasing. The last available figures show a total amount of \$1,245,000 in 2017:

	2012	2013	2014	2015	2016	2017
Value of honey exported from Lebanon	\$223,000	\$598,000	\$ 629,000	\$ 680,000	\$ 680,000	\$ 1,245,000

In the domestic market, LIVCD spearheaded interventions to improve branding and labeling of local honey brands along with promotional campaigns to increase market awareness and hence market share of Lebanese honey. LIVCD supported cooperatives with no existing brand, such as Maten el Aala Honey, to create one and to start selling to supermarkets in Lebanon.

LIVCD also worked with the major brand Kaddoum Honey, which is available in most retail shops around Lebanon, to rebrand and upgrade its image to increase its share of both Lebanese and export markets. LIVCD also helped Kaddoum increase its exposure abroad, especially in GCC countries. In this multi-pronged approach, LIVCD and Kaddoum developed new packaging, labels, online and social media presence, and in-store marketing strategies that allowed the brand to compete with imported brands in the Lebanese market and to reach a wider range of customers locally and abroad.

LIVCD played a key role in increasing the volume of Lebanese honey sold in the local market. LIVCD partnered with the Syndicate of Dieticians in Lebanon to run a national honey awareness campaign between January and March of 2017. The campaign raised consumer awareness about Lebanese honey and ran on billboards and social media and was promoted on television and radio. The campaign came on the heels of a new regulation issued by the Lebanese Standards Institution (LIBNOR), setting requirements for the quality of Lebanese and imported honey brands sold in Lebanon. The regulation is enforced through store audits by the Ministry of Economy, thus ensuring that no local or foreign brand of honey fails to meet the required quality standards.

LIVCD also facilitated market linkages between beekeepers with over 25 hives and commercial honey brands, such as J. Grove, Jabal el Sheikh, Kaddoum, Maten el Aala Honey, B. Balady, and L'Atelier du Miel. These companies with relatively large distribution can absorb surplus honey production that is not sold directly to consumers, which is the common practice of small-scale honey producers. LIVCD also partnered with L'Atelier du

Miel to open a new workshop and café in Mar Mikhael, a busy area of Beirut. Honey products and derivatives are promoted and sold in this trendy new space, whose kitchen takes a creative approach to main dishes, desserts, and beverages using several kinds of Lebanese honey. In addition, the workshop produces innovative honey-based delicacies, such as nougat. As part of a grant, the kitchen was equipped with USAID funding, and LIVCD supported marketing efforts including developing a website and promotional materials such as a brochure.



**Rural  
Tourism:  
A More  
Competitive  
Value Chain**

## 8. Rural Tourism: A More Competitive Value Chain

Rural tourism has grown by leaps and bounds over the last decade in Lebanon and the cooperation between LIVCD and the Lebanese company Hospitality Services accelerated the progress achieved over the past five years. At the beginning of the project, “rural tourism” was barely differentiated as a touristic category; now, it is recognized and marketed as an attractive tourism experience.

LIVCD played a leading role in supporting rural tourism initiatives and contributing to the growth of Lebanon’s tourism sector. LIVCD facilitated the development of the National Rural Tourism Strategy in collaboration with Lebanon’s public and private tourism stakeholders, which the Lebanese Government adopted in 2014. Furthermore, LIVCD actively participated in the implementation of the action plan in coordination with the Ministry of Tourism, including developing local tourism strategies at the village level.

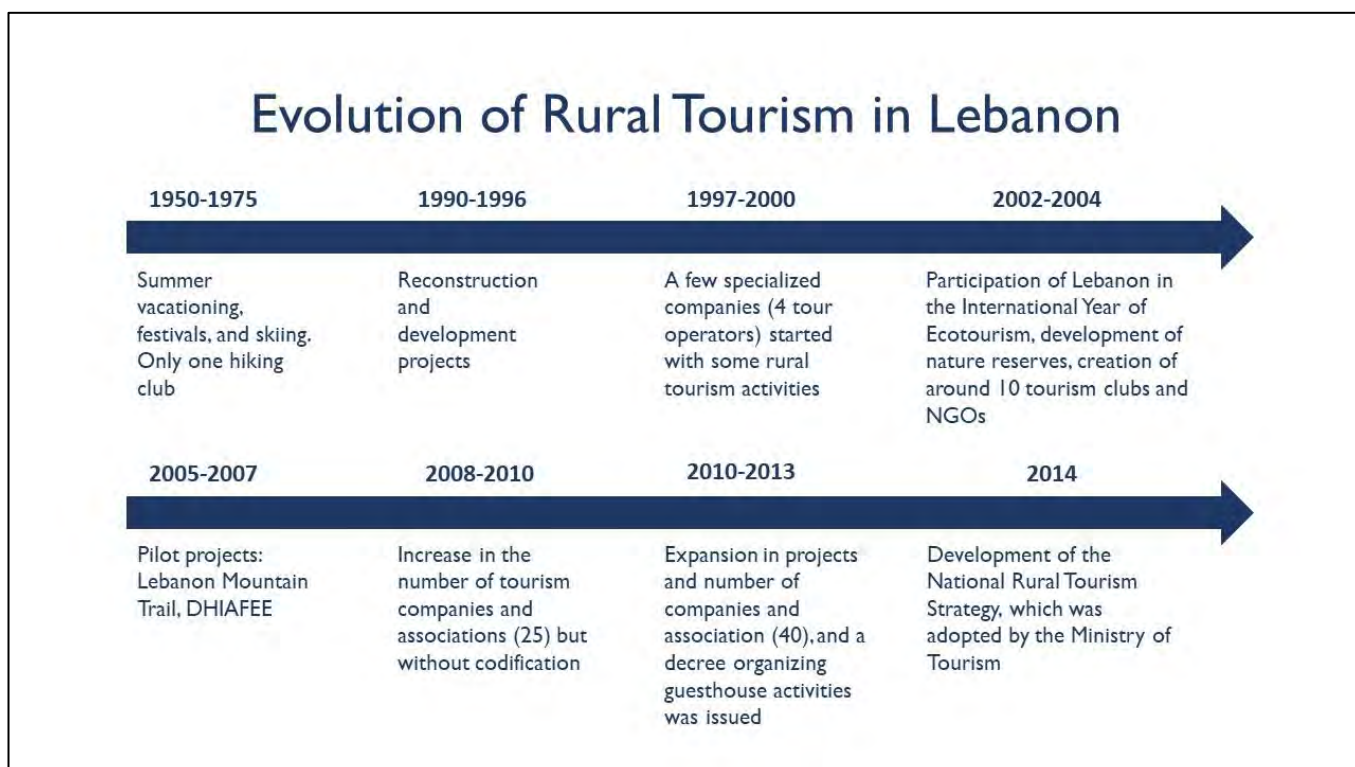


Figure 14: Rural tourism in Lebanon has evolved significantly since 1950 and especially in the past ten years.

**Rural Tourism Value Chain Development Objectives:** LIVCD partnered with private sector tourism actors to expand economic opportunities, increase incomes, and create job opportunities in rural areas. Partnerships aimed to:

- Improve the quality and diversify the range of rural tourism products and services through partnerships and leveraged investments with local tourism partners; and

- Create synergies resulting in the upgrade and expansion of projects along the rural tourism value chain.

**Project Highlights:** It is not possible to describe all LIVCD's work in this report; therefore, what follows are some highlights and four interventions that exemplify the project's approach and results, with special emphasis on integration with other LIVCD value chains. Throughout the years, LIVCD:

- Supported the development, launching and implementation of the National Rural Tourism Strategy in collaboration with the Ministry of Tourism;
- Assisted the Rock-Climbing Association for Development in installing 177 climbing routes and officially opening their climbing site in Tannourine in June 2016 – a one-of-a kind facility in the Middle East;
- Developed local tourism strategies: Baskinta Rural Strategy and Action Plan for Menjez, Hadath El-Jebbeh, Rashaya Al Fakhar, Hammana, Aley, Rashaya El-Wadi, Maghdouche, Batloun and Deir el Ahmar; and
- Supported the development of rural tourism clusters of associations, municipalities, and service providers in Batroun/Jbeil, Zahle/Bekaa, Jezzine and Hadath El-Jebbeh/Ehmej/Tannourine/Douma.

### **Travel Lebanon**

Previous efforts of Lebanese rural tourism actors were dispersed, and activities were nominal, but Joumana Dammous-Salame, Managing Director of the company Hospitality Services saw the potential for creating something authentically Lebanese. LIVCD developed Travel Lebanon, an annual exhibition and a web-based travel platform, in collaboration with Hospitality Services, who already had a strong web presence through the Lebanon Traveler Magazine.

For five years in a row, LIVCD and Hospitality Services, in collaboration with the Ministry of Tourism, organized the Travel Lebanon exhibition in parallel with the Beirut Garden Show and Spring Festival to highlight rural tourism. The initiative promoted rural tourism in Lebanon by bringing operators from across the country to a pavilion in Beirut. Over five days, approximately 25,000 visitors had the chance to stop at kiosks and booths to discover Lebanon's unique outdoor beauty and culture in rural areas. The annual event was complemented by the improvement and promotion of the Travel Lebanon website and mobile application.

Over time, this promotional and outreach activity has driven investments in rural tourism ventures, thus creating jobs and economic opportunities in rural areas. As the movement became more mature, cross-linkage with the other value chains were created to add agro-tourism activities to trip packages to the countryside. For example, during the annual cherry festival in Hammana and apple and olive harvesting periods, Lebanese people from crowded coastal cities now venture out to the mountains and join in these activities. Rural tourism

has also become increasingly popular with international tourists – a trend helped by the Travel Lebanon initiatives.

### **Bcheale**

Bcheale is a beautiful old town boasting ancient olive trees and access to the Lebanese Mountain Trail. At a meeting between LIVCD and the municipality's mayor and his team, it was clear they were ready for grant and co-investment opportunities. Their goal was to restore the old character of the community by resuscitating their old walking paths.



The ancient olive trees of Bcheale

Under the grant activity, the team worked to restore and upgrade the hiking trails in the village that had fallen out of use after the establishment of asphalt roads. One of the trails led to a set of olive trees that were thought to be between one and two thousand years old. LIVCD engaged the University of Arizona's Laboratory of Tree-Ring Research to date the trees, and one tree was found to be 2040 years old. LIVCD also hired a professional mountain guide, who trained 15 local hiking guides, thus giving the municipality the ability to offer new services to tourists and creating income-generating activities for 15 people in the village.

The community is starting to change their attitude and vision regarding ecotourism and welcoming people in their homes. Bcheale is now looking to expand accommodation and services, and local inhabitants are now open to the idea of using their homes as guesthouses.

As a result of LIVCD's initiatives, the municipality itself invested in new infrastructure including solar powered energy for the whole town (it is now the first totally green village in Lebanon) and a new sewage system, and have developed ambitious plans for tourist accommodations. The developments have yielded quick results: in 2018 the area received 5,000 tourists, compared to the expected 500 as per the local actors. The nearby ancient Roman castle ruins are now being carefully excavated and marked, the municipality building is being refurbished, and a new restaurant is going to open. The mayor stated, "This will be a reality the next time you visit."

### **Ehmej**

In the hopes of finding a better way of life, many inhabitants of Ehmej, a small rural town located 60 km from Beirut in Mount Lebanon, move to Lebanese cities. Ehmej has lost many of its community members to such urban migration. To deal with this growing trend, Ehmej found long-lasting innovative solutions to bring back its inhabitants and provide them with economic opportunities.

Starting in 2014, the LIVCD project collaborated with the Ehmej Municipality and the Ehmej Development Association (EDA) – a local association that works on the socio-economic development of the area – to improve the town’s economy and deliver high quality services throughout the year. The journey, which began with a simple idea and a handful of ecotourism activities, has turned into a complete and sustainable project that will run not only during the summer season but also all year long. LIVCD invested more than \$183,000 to refurbish the Arz Ehmej Park’s kitchen and to build four new holiday cottages as well as a winter venue to serve food and organize events. Existing hiking trails were improved, and a new side trail linked to the Lebanon Mountain Trail was created. The income of Arz Ehmej restaurant went from US \$25,000 in 2014 up to US \$125,000 in 2016. A total of 30 new permanent and seasonal jobs were created in a year as they reached 50 in 2016. Finally, the total number of visitors doubled in 2 years as it went from 6,000 in 2014 up to 12,000 in 2016.



Ehmej bungalows

### ***Hadath El-Jebbeh***

Hadath el Jebbeh is a village situated in the Bcharreh District in the North Governate of Lebanon, next to the country’s famous cedar forests, which is one of the main tourism attractions of the country. As with Ehmej, many inhabitants migrated from the village to cities because they no longer had sustainable incomes and saw no economic opportunities in their village. The village has all the heritage and natural components for rural tourism infrastructure and the potential to create job opportunities, increase the number of tourists, and boost the village’s economy. Through LIVCD’s financial contribution and technical assistance to create a clear tourism strategy, it was possible to establish the tourism infrastructure and services within the village.

A stop in the middle of the town brings tourists in contact with Ward Sfeir, shop owner at Ward Café Trottoir. She wanted to earn a living in her town and through a grant from LIVCD; she found a way to open the café. The grant also included:

- Installation of a tourism office to manage the rural tourism network in the area;
- Training for the local guides;
- Creation of a network of 6 hiking trails, including winter trails;
- Development of a brand identity;
- Creation of 6 seasonal packages; and
- Installation of a gate facility in Hadath el Jebbeh’s cedar forest.

Previously, summers brought relatives back from overseas to visit parents in the villages, but they brought their own food and did not interact with local villagers. This is now changing, along with the mentality of the people in the coastal cities who are willing to drive a few hours to escape the cities and enjoy the mountains and local cuisine. People are now coming all year round and as a result, the residents of Hadath El-Jebbeh are creating more activities to draw them up into the mountains.



Ward Café Trottoir

The efforts are revitalizing these mountain towns through eco-tourism, but Ward did not go so far as to say it is a transformation. Rather, it is an expansion of a philosophy. Ten years ago, Hadath El-Jebbeh was not on the tourism map, but now it and other smaller towns clustered in the mountains are increasingly popular destinations due to their specific characteristics and individual stories. The next phase will be an expansion of accommodation, such as bed and breakfast options and guesthouses in villagers' homes. As in Bcheale, residents were initially fairly reserved about renting rooms in their homes, but that, too, is starting to change.

Watch the [“Rural Tourism Value Chain” Videos](#)

# **Women's Participation**

## 9. Women’s Participation

The development literature is clear that empowering women to become entrepreneurs and make independent economic and financial decisions is critical to the well-being of families. The LIVCD project thus made concerted efforts to include women in all value chains. The project worked with small business and cooperatives to create opportunities for women and assist women entrepreneurs to upgrade their businesses to achieve greater efficiency in production and marketing.

Approximately 20 percent of LIVCD’s total number of beneficiaries were women (4,729 out of 23,109), and this participation was largely consistent through every year of LIVCD activities. Not surprisingly, women were the majority of beneficiaries in processed foods and rural tourism, while other value chains that focused more on agricultural production had a majority of men as beneficiaries.

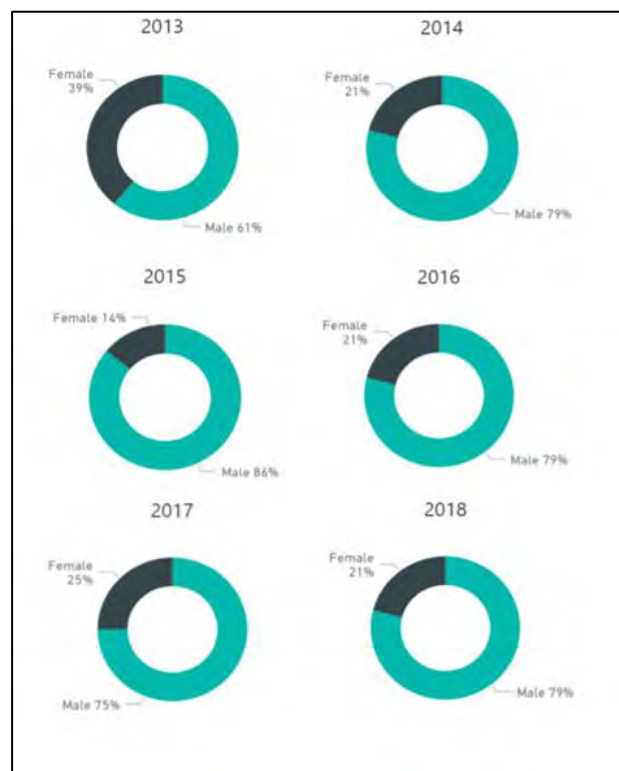


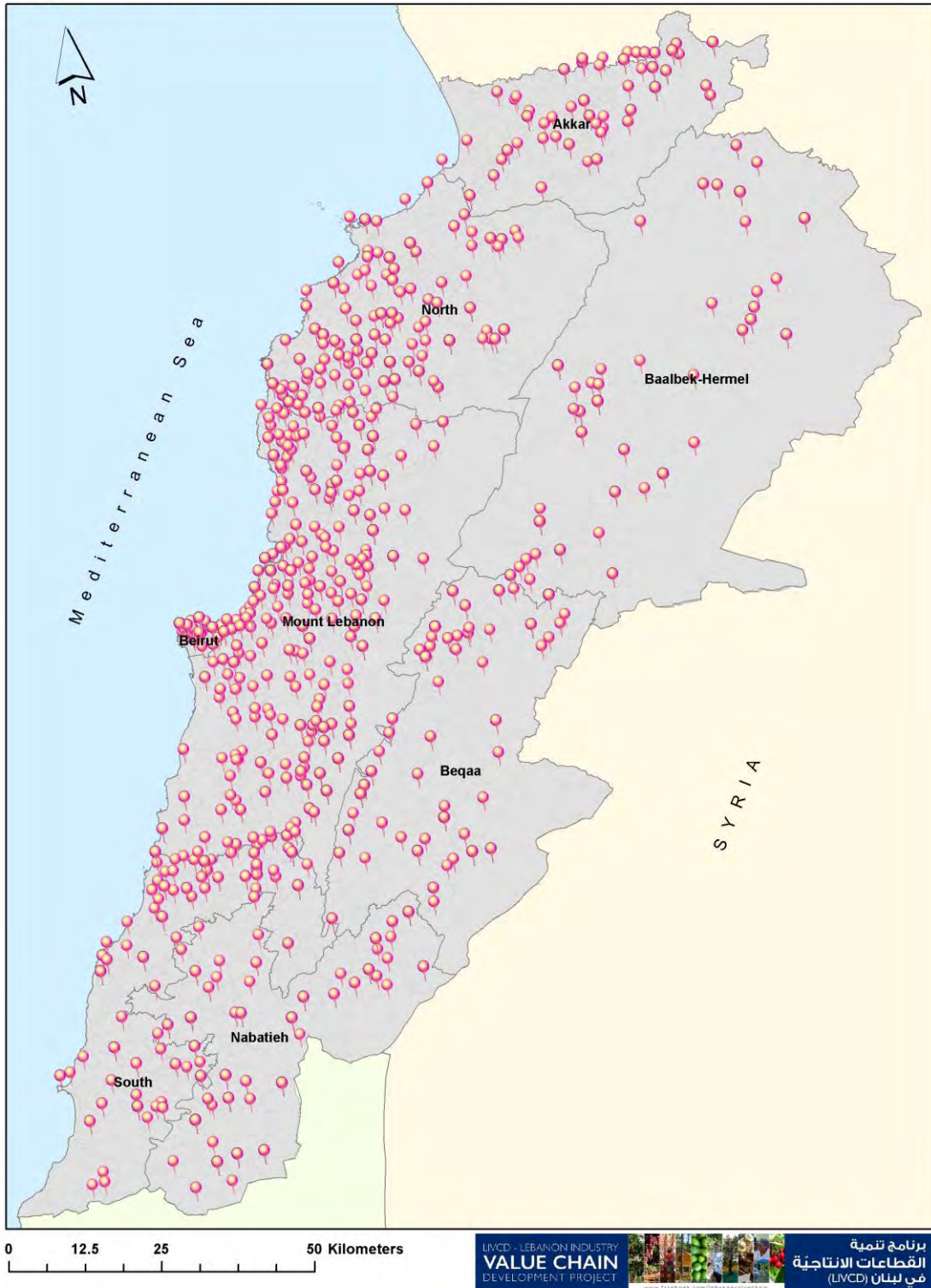
Figure 15: Female participation throughout the life of LIVCD

Value Chain	Total LIVCD beneficiaries (MSMEs, farmers, individuals)	Women beneficiaries	Proportion of women
<b>Grape</b>	1,538	185	12%
<b>Olive Oil</b>	7,279	1,444	20%
<b>Apple</b>	2,156	236	11%
<b>Processed Foods</b>	1,516	829	<b>55%</b>
<b>Rural Basket</b>	1,148	344	30%
<b>Honey</b>	4,682	498	11%
<b>Rural Tourism</b>	2,015	933	<b>46%</b>
<b>Avocado</b>	1,298	157	12%
<b>Cherry</b>	1,477	103	7%
<b>Total</b>	<b>23,109</b>	<b>4,729</b>	<b>20%</b>

Figure 16: LIVCD women beneficiaries



# LIVCD women beneficiaries



## **Processed Foods**

As noted above, women make up a large portion of total employment in the processed foods value chain. LIVCD's interventions in processed foods resulted in 829 women benefiting: 137 jobs were impacted, 204 women benefited from business development services, 215 benefited from new improved technologies and 705 women were trained in good manufacturing practices and food safety.



Lebanon Mezze's women employees have job security

For example, the Managing Director at Lebanese Mezze, Rania Chbat, employs a staff of 15 women. Ms. Chbat is committed to providing continued employment to these women. Unfortunately, the company was facing financial difficulties in spite of high quality products. LIVCD thus worked with the Managing Director and the owners of Lebanese Mezze to develop a plan to upgrade its position in the market through a public-private partnership that included acquisition of modern equipment that complies with food safety regulations; training in good manufacturing practices; and steps to reduce production costs and expand sales. In addition, LIVCD worked with the company to develop new ready-to-eat products with new ingredients such as freekeh. This resulted in a new line of healthy products. The result of these several interventions turned around the prospects for Lebanese Mezze. The company now has large contracts for its products and has expanded its market reach considerably. Most importantly, it saved the jobs of 15 women employees.

## **Rural Tourism**

In the rural tourism value chain, both women and men benefitted from LIVCD interventions. Women play major roles in several portions of this value chain including hospitality services, management, food processing and handicrafts. One of the main objectives of LIVCD's rural tourism value chain was to create jobs and expand economic opportunities in villages in order to reduce rural-urban migration. The project engaged in several public private partnerships to train local trail guides and upgrade restaurants and small hotels, many of which employ women as managers. Moreover, LIVCD worked closely

with local partners to create and upgrade hiking trails in villages across Lebanon, with the aim to provide additional sources of income from new job opportunities for both men and women. In terms of marketing and promotion, LIVCD supported women to interact directly with potential customers during exhibitions, which helped them build the confidence needed to make additional improvements to their businesses.

933 women benefited from LIVCD interventions:

- 475 jobs were impacted
- 475 women benefited from Business Development services
- 236 women benefited from new improved technologies and finally,

786 women were trained on different topics including eco-guiding, communication and leadership, food quality and hygiene, marketing and promotion and hospitality management.



PRODES Training

**LIVCD  
Training  
Program**

## 10. LIVCD Training Program

One of the main objectives of LIVCD was to strengthen the capacity of value chain partners and actors to collaborate effectively and manage the flow of products, information, and funds. Poor capacity to manage their businesses or substandard production practices has hampered companies and organizations' ability to maximize their output and sales. To address this, LIVCD used flexible and responsive training programs that targeted key value chain partners. For each value chain, LIVCD designed and implemented a training program based on the sector's level of maturity and competitiveness and main challenges. Training activities usually complemented technical assistance, grant agreements, or co-investments. The programs took many forms: in some value chains, it meant training producers in the use of new technology and methods such as harvesting equipment or pruning practices; in others, focus was on food processing methods. And yet in other sectors, it was more important to train partners in business management and accounting. More than 16,000 people were trained in these different areas through the life of LIVCD, as shown in the figure below and the detailed table later in this section.

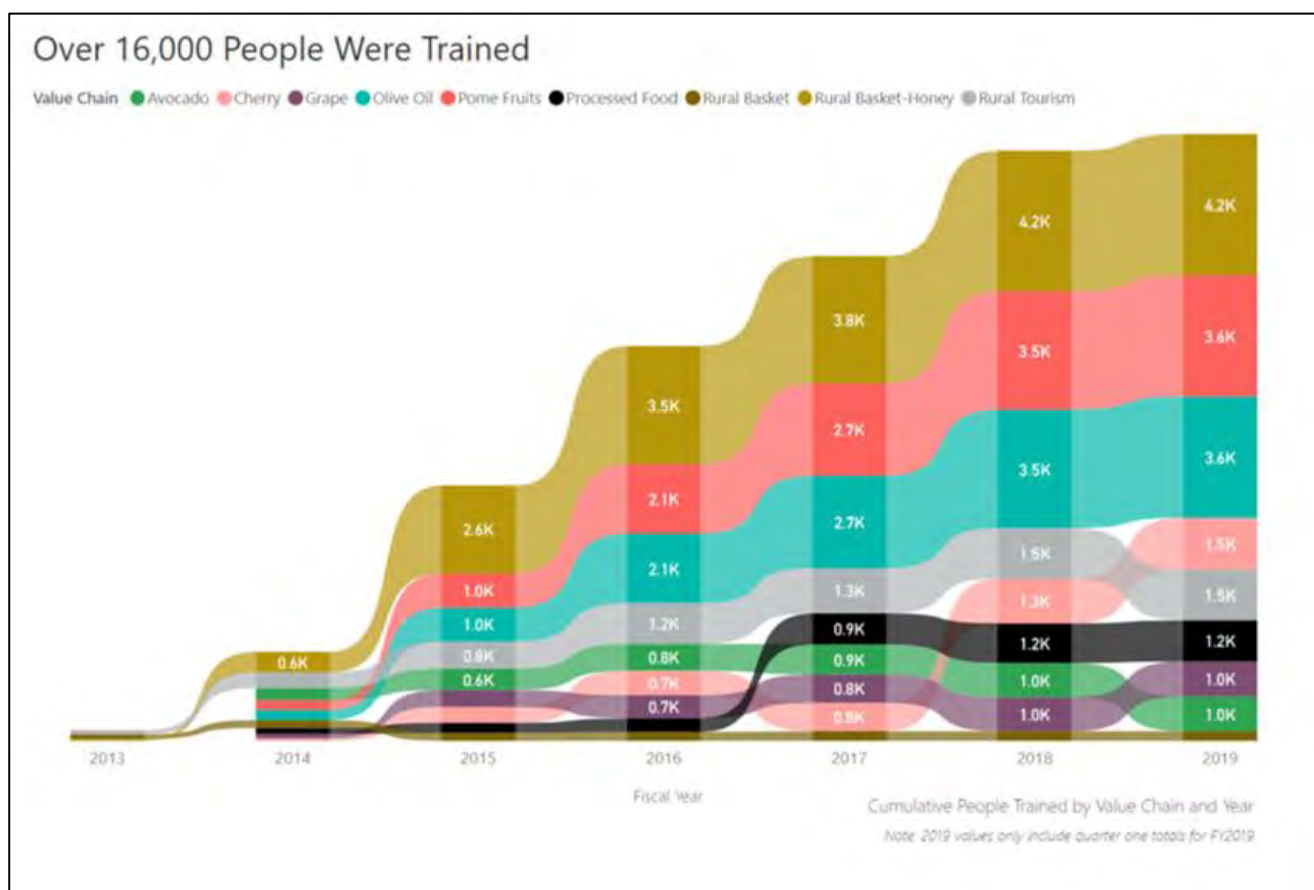


Figure 17: Number of people trained by LIVCD

It is through training and technical assistance that LIVCD was able to promote the adoption of new technologies, innovations, best agricultural practices and best manufacturing

practices, including the use of new product varieties demanded in export markets. Most importantly, it gave value chain actors access to learning opportunities and material to improve their operations and products. The LIVCD team created training curricula for the various value chains, which cover good agricultural practices, cold storage, access to markets, new technologies, and guidance on what is needed to meet local and export market requirements. The curricula were developed into both written materials and videos.

There was, however, great diversity among value chains in their overall training needs due to:

- (1) differences in technology requirements, with some more extensive and others much more limited and targeted;
- (2) differences in the audiences for training, with some focusing on multiple small-scale actors, and others on a few large-scale actors; and
- (3) differences in the likely trainers, ranging from NGOs, to fee-for-service contractors, to other value chain actors such as wholesalers or input suppliers.

Each LIVCD value chain team assessed the technology requirements within their value chain upgrading strategies and determined:

- (1) if any off-the-shelf trainings already existed that could fully address these requirements;
- (2) if existing trainings need to be modified or adapted either to strengthen their technical content or to enhance their inter-activeness; and
- (3) if new training materials needed to be developed with input from technical specialists and training designers to fill in key gaps in existing technology transfer packages.

Based on the results, a series of trainings for each value chain was developed, tailored to generate buy-in and interest on the part of participants, and to ensure the comprehensive application of the knowledge, skills, and attitudes introduced via trainings, coaching, training-of-trainers (TOT) sessions, and workshops. Select examples and focus areas for each target value chain are presented below.

### **Value chain training priorities**

The orchard management capacity building program for the **apple** value chain was prepared to improve the productivity of farmers. An interactive training component – conducting trainings on demonstration plots with active involvement from farmers – was designed with input from orchard management consultants and the organization Making Cents International. The interactive nature of the trainings was important for transferring the ultimate responsibility for making orchard improvements from consultants to farmers. The training on the demonstration plots generated buy-in and interest on the part of participants, and the training sessions and extension services provided step-by-step introduction to orchard management trade-offs and decision-making processes. Through these demonstration plot activities and one-one-one extension services, LIVCD beneficiaries became more efficient consumers of information that they could apply in their own farming.

In the **avocado** value chain, training was developed for avocado producers on how to choose the best plant variety to increase production and meet high value market requirements, and increase production of high-quality avocados in Lebanon. Farmers also adopted improved production practices in their orchards, introduced by LIVCD, which lead to higher volumes of output and increased incremental sales. Additionally, LIVCD created a training manual with technical curriculum and published a booklet on orchard establishment, technical orchard management practices, seedling selection, and harvesting/post-harvesting practices. These materials will continue to be used by relevant Lebanese institutions and organizations for training purposes following the end of LIVCD.

In the **honey** value chain, LIVCD determined that improving the skills of Lebanese beekeepers was a key priority. To address this, LIVCD sought out the country's highest level of beekeeping expertise to write a beekeeping training curriculum. The curriculum is divided into 5 parts:

- 1) Hive management;
- 2) Diseases;
- 3) Raising bee queens;
- 4) Increasing production; and
- 5) Development of other products to increase beekeeper revenue.

In addition to developing the curriculum, LIVCD's honey production expert developed a training-of-trainers course. LIVCD determined that to ensure sustainability of the honey production training program, it was necessary to give local beekeepers the capacity to train their peers. Thus, the backbone of the training program is made up of local beekeepers, many of whom are officials in beekeeping cooperatives who are intimately familiar with local conditions and are committed to advancing appropriate beekeeping techniques among their neighbors and friends.

In the **processed foods** value chain, focus was on food safety, including internationally accepted approaches such as Good Hygiene Practices (GHP), Good Manufacturing Practices (GMP), and Hazard Analysis and Critical Control Points (HACCP); and regulatory requirements such as the U.S. Food Safety Modernization Act (FSMA) and the international Food Safety Systems Certificate (FSSC). Focus was also placed on product and process development necessary to help Lebanese companies introduce new products to new markets. Without knowing the requirements and regulations applicable in export markets, Lebanese producers are cut off from those markets. LIVCD's trainings, combined with other assistance such as improving packaging and nutritional labels, has allowed food processors access to several new markets, including Qatar, UAE, Kuwait and the U.S. specialty market.

**In the apple, grape, and cherry** value chains, the LIVCD team focused on good production practices, farm management, pruning, harvesting, post-harvesting, cold storage, Integrated Pest Management (IPM), use of advanced pesticide spraying technologies; water, soil, and nutrient management; and canopy and crop management. New techniques were often introduced in collaboration with local farmers on LIVCD-established demonstration plots. This work is described in more detail in the earlier report



Grape Value Chain Manager conducting a training

sections on *Orchard Establishment* and *Harvest and Post-harvest*. The introduction of new equipment, plant varieties, and methods to farmers were always accompanied by comprehensive training programs. This ensures that methods are applied correctly for the best results with no adverse environmental impact

The **olive and olive oil** value chain trainings focused on olive harvesting and post-harvesting, and olive oil processing and quality assessment and enhancement. On the production side, LIVCD collaborated with farmers' cooperatives to organize a multi-year, expansive program to introduce mechanical harvesting equipment to olive farmers in Lebanon. Participating farmers were all trained in using the new mechanical harvesters, which are available to them through their local cooperative. In addition, farmers were trained in good farming techniques such as tree pruning and Integrated Pest Management. LIVCD also worked with olive mills. Here, trainings focused on best practices for milling and extraction, storing, and preserving olive oil. On the processing side, LIVCD gave trainings to olive oil producers on chemical and organoleptic analysis of their oil, to help them assess the quality of their olive oil. Lastly, educating consumers about Lebanese olive oil helped create increased awareness of the locally produced, high-quality olive oil. At public events such as olive harvesting festivals, visitors were given demonstrations and classes on olive oil tasting and testing.

Under the **rural tourism** training program, the value chain team worked with Lebanese partners such as tourism associations, bed and breakfasts, tour operators, and NGOs. Tour operators and hospitality service providers like bed and breakfasts were often in need of more basic business skills trainings such as bookkeeping, which LIVCD provided, in addition to food safety trainings for companies that serve food to tourists. The project also organized cooking classes for rural women, teaching them how to make traditional Lebanese products such as pickles and preserves, which they could sell to local hospitality businesses. LIVCD also collaborated extensively with the Lebanon Mountain Trail Association (LMTA) and other local development and environmental preservation associations to expand the network of hiking trails in Lebanon. This work included training trail guides in a range of Lebanese villages. They were trained in tour guiding techniques, group management, wilderness first aid, local flora, and responsible tourism. These trainings



were part of the larger effort to attract more tourists to rural areas of the country by creating more attractive and complete tourism experiences.

In the **apple, avocado, and grape** value chains, LIVCD sent three groups of Lebanese farmers, agricultural engineers, academics, nursery owners, and input suppliers to California for individual value chain training programs in 2016, 2017, and 2018. The study tours were hosted by the Uman Davis Sister City Project, a non-profit organization with close ties to the University of California (UC), Davis – a world leading institution in agricultural research located in one of the world’s most productive agricultural regions. The training programs for all three study tours were extensive. The groups were connected with experts on new plant varieties, production techniques, best harvest and post-harvest practices, and product processing and packaging. They also met and observed the methods of Californian growers, producers, and processors and learned about their approaches to business management and marketing their products.

The study tours were helpful for Lebanese producers to both understand standards and requirements of international markets, and be exposed to new methods of production, handling, and processing. During the apple training program in 2016, participants met apple breeders to discuss pruning, plant varieties, and seed and rootstock development; they met other growers to learn about mechanization and management of fruit cooling, sorting, and sizing; they toured a packing house; they learned about organic farming and certification from a Californian family farm; and they discussed many of these topics in addition to plant diseases and soil health with extension advisers and experts from the UC Davis. The Lebanese avocado sector is young, so the 2017 avocado study tour focused mostly on sourcing the appropriate plant varieties for different export markets; soil and orchard management; disease- and virus free cultivars; and the latest and most effective pre-cooling, cold storage, and refrigeration methods for avocado. The grape sector in Lebanon is much more mature, but few Lebanese grape growers are capable of consistently supplying export markets with grapes that meet quality demands and requirements. The 2018 grape study tour therefore focused on proper cultivation, harvest, and post-harvest practices that ensure high quality exportable grapes. The participants partook in sessions with university experts and visited their laboratories; toured vineyards, nurseries, and cooling and packing facilities; visited an Integrated Pest Management company, and observed a local farm market in Fresno, California.

The study tours served as training-of-trainer programs, where participants held subsequent seminars and workshops for farmers, agricultural engineers, input suppliers, and university students in Lebanon. There were notable outcomes of this information sharing. For example, during the 2016 apple study tour, participants were introduced to “V-shaped” trellis systems, which allow for a much higher density of tree planting than systems typically used in Lebanon. The “wall-shaped” trellis system – also high-yielding and demonstrated extensively by LIVCD – allows 3,000 trees per hectare, while the V-shaped system permits 6,000 trees per hectare. The LIVCD team therefore worked to adapt the V-shaped trellis

system to Lebanese conditions in an apple demonstration orchard. Following this successful LIVCD intervention, many farmers engaged in replicating the exact same fruitful work and many more are currently working on doing the same.

Cross-cutting training was done for all value chains and included marketing and access to finance. For example, LIVCD worked for partners to better understand available financing, how to invest, and how to secure a loan. And as described in the *Access to Finance* section below, LIVCD also held workshops to educate lenders; bank employees were trained to better understand investments in agriculture and why they may be less risky than commonly perceived. LIVCD has also brought together financiers and companies to inform them about environmentally friendly solutions for production facilities such as solar water heating, lighting, cooling, and heat recovery.

LIVCD's training materials – booklets, guides, and videos – have been made readily available following the end of the project. LIVCD's collaboration with and handover of materials to institutions such as universities, agricultural cooperatives, the Ministry of Agriculture, and local organizations has been key to achieving sustainability of project activities.

As shown in the table below, a total of 16,200 people were trained during the life of LIVCD.

Value Chain	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	Results Achieved LOP
<b>Grape</b>	-	137	355	190	154	157	46	<b>1,039</b>
<b>Olive Oil</b>	-	295	709	1,050	673	767	84	<b>3,578</b>
<b>Apple</b>	-	299	283	192	289	628	183	<b>1,874</b>
<b>Processed Foods</b>	-	171	126	107	508	252	48	<b>1,212</b>
<b>Rural Basket</b>	130	102	-	30	26	-	-	<b>288</b>
<b>Honey</b>	55	554	1,990	887	272	392	15	<b>4,165</b>
<b>Rural Tourism</b>	132	326	334	401	137	161	-	<b>1,491</b>
<b>Avocado</b>	-	356	282	157	95	127	-	<b>1,017</b>
<b>Cherry</b>	-	75	402	243	116	485	215	<b>1,536</b>
<b>Total</b>	<b>317</b>	<b>2315</b>	<b>4481</b>	<b>3257</b>	<b>2270</b>	<b>2969</b>	<b>591</b>	<b>16,200</b>

Figure 18: Number of people trained by LIVCD, by year and value chain

# Outreach and Communication

## 11. Outreach and Communications

LIVCD's interventions improved the lives of thousands of Lebanese citizens, from farmers to small producers, rural residents, women, and at-risk youth. The project's initiatives have been well documented in many formats and shared widely, to tell the story behind every intervention. To do this effectively, LIVCD's Communications team deployed a host of strategies. Among other things, they filmed over 60 videos, co-organized 160 major events, published more than 400 media articles, organized interviews, and launched six national communication campaigns to increase the visibility of the work done by the project and to promote value chain products and partners. In addition, LIVCD created its own YouTube channel including the full library of videos shot during the project. The channel is titled [“The LIVCD project”](#).

Described below is a handful of interventions which had important impacts on LIVCD beneficiaries.

### **Exhibitions**

#### **HORECA Lebanon**

LIVCD participated in the HORECA exhibition 5 years in a row from 2014 to 2018, both by hosting a project stand and supporting project partners to attend the trade show. HORECA is the region's largest annual meeting place for the hospitality and foodservice industry with over 15,000 visitors attending in 2018. HORECA is an opportunity for companies to make connections with retailers and distributors in the food and beverage sector, as well as interfacing with consumers, chefs, and journalists. Project partners were able to showcase their products at the event, and their participation resulted in vertical and horizontal linkages within and across industries.

In 2015, four olive oil producing cooperatives, Darbehtar, Olea, Deir Mimes, and Akroum participated in HORECA and the national olive oil competition was hosted there. During the competition sponsored by LIVCD, Darbehtar and OLEA's olive oils were voted as the best Extra Virgin Olive Oil by Lebanese chefs.



**OLEA Cooperative (Grantee) at Horeca 2016**

“It became a tradition at HORECA to host an annual national olive oil competition, initially sponsored by LIVCD. In 2017, more than 30 olive oil producers from all over Lebanon presented their olive oils to compete for the award of “Best Extra Virgin Olive Oil”, judged by top Lebanese chefs. Awards were

distributed to 4 LIVCD partners: Douma cooperative, Willani, Adon & Myrrh, and Boulos. Other project partners who participated in 2017 – 2018 and won the top awards were the Darbechtar, OLEA, Deir Mimes, and Akroum cooperatives. The awards and attention help to boost the reputation and brands of the producers in both domestic and international markets.”

### **TRAVEL LEBANON – The Garden Show**

The Lebanese company Hospitality Services, with the support of LIVCD and the Ministry of Tourism, organized the annual Travel Lebanon exhibition in 2014 – 2018. The event took place at the Garden Show and showcased Lebanon’s richest tourism destinations, with the aim of increasing people’s knowledge and appreciation of Lebanese tourism destinations and thus contributing to the growth of investments, jobs, and revenues in the sector and Lebanon as a whole. The event brought together tour operators, NGOs, associations, and municipalities in support of domestic tourism. Approximately 25,000 visitors explored 400 square meters of exhibition space and discovered more of Lebanon’s beautiful hidden spots, where tourism specialists offer a range of exciting packages.

With LIVCD’s support, Hospitality Services developed a trip planner feature for the Lebanon Traveler mobile phone application. This will allow rural tourism providers already using the Lebanon Traveler application to increase their market outreach.

In 2018, the LIVCD stand gathered 18 rural tourism organizations, which displayed various marketing tools, including 7 promotional videos shown on 4 screens, and several visuals, brochures and flyers to visitors. These marketing materials were developed through a grant aiming to increase the organizations’ visibility, entitled ‘Supporting Hospitality Services to increase the access of rural tourism MSME’s to market opportunities. The event has become high-profile: The official opening ceremony in 2018 took place in the presence of Mr. Avedis Guidanian, Minister of Tourism; USAID Mission Director, Dr. Anne Patterson; and several members of Parliament and Heads of Municipalities. The event provided a good opportunity for Dr. Patterson to emphasize continuous U.S. Government support for Lebanon’s economic growth, and the importance of increasing employment and income generation through key sectors such as tourism. The event drew attention to the wide range of Lebanese domestic destinations and was in the month of May well timed to launch the year’s tourism season.



**Travel Lebanon opening ceremony**



Billboard campaign promoting rural tourism and reference website

### Press Outreach

LIVCD, its partners, and related value chains were featured in several local and international media outlets including TV stations, radio, newspapers, and online portals. Throughout the years, LIVCD interventions in rural tourism and agriculture sectors were highlighted in several newspapers and magazines such as An Nahar, Al Balad Newspaper, L'Orient Le Jour, Le Commerce du Levant, The Daily Star, Al Joumhouria, Al Mustaqbal Newspaper, Ad Diyar, National News Agency and Executive Business Magazine.

The LIVCD project was also highlighted by television broadcasters such as LBCI News, OTV, MTV Alive, and Future TV's Akhbar Al Sabah program as well as online portals such as Women Economic Empowerment Portal, Lebanon Files, Al Mughtarab, Kalam Akhbar, Al Anwar, Hospitality News magazine, Al Anbaa, NoGarlicNoOnions, Beirutfoodporn, and Fooradise.

In addition, the LIVCD Facebook page gained over 7,500 followers. The page is regularly updated with project news, pictures, and videos. It allows the project to interact with a large audience of stakeholders, partners, beneficiaries, and the general public in Lebanon and abroad.

### Campaigns

#### Syndicate of Dietitians and beekeepers launched honey awareness campaign in collaboration with LIVCD

From January to March 2017, LIVCD and the Lebanese Syndicate of Dietitians (SoD) ran a national honey awareness campaign to promote and raise consumer awareness about Lebanese honey. The campaign involved multiple mainstream media outlets, outdoor billboards, and social media.

In parallel, a social media campaign was launched on LIVCD and the Syndicate of Dietitians' Facebook pages, which reached 314,000 users. The different posts included animated images, small quizzes on honey's health benefits and recipes, and general information on beekeeping. The campaign generated about 24,400 likes, comments, and shares.



Billboard campaign promoting Lebanese natural honey

## Visibility tools and campaigns for rural tourism partners

In the spring of 2018, LIVCD implemented a large-scale marketing campaign aimed at raising public awareness of rural tourism in Lebanon, and facilitating access of rural partners and services to a large audience. The campaign sought to boost the [LebanonTraveler.com](http://LebanonTraveler.com) website to become the reference platform for rural tourism in Lebanon. The platform features over 3,000 Lebanese actors in the tourism sector, and provides information about events, trip destinations and guides to local regions, traditions, and special experiences like eco-tourism, religious tourism, and outdoor adventures.

## Supporting Lebanese agriculture awareness campaign

In October 2018, the Federation of Chambers of Commerce, Industry and Agriculture in Lebanon (FCCIAL) and LIVCD partnered to promote Lebanese agriculture and agro processed food products: The campaign entitled 'Tabi3e Zebb Baladi', which translates into 'Naturally, I love my country's products', highlighted the quality and health benefits of Lebanese produce and the varieties grown in Lebanon. In the weeklong national campaign, 500 billboards were displayed in cities and along main roads between Beirut, Saida, Tripoli, and Zahle, providing wide exposure across the country. The campaign was also hosted for one month on the FCCIAL website and follows the hashtag #men\_baladi which translates into 'from my country'. Some of the posts were viewed over 30,000 times.



Main visual of the campaign promoting Lebanese products: "Naturally, I love my country's products"

## Grant Closing Events

LIVCD organized several events, which were attended by high-level representatives of USAID and the Lebanese Government. The following is a selection of these events:

- **Opening of the Jabal Moussa Biosphere Reserve (JMBR)** on June 15<sup>th</sup> 2017, LIVCD and JMBR inaugurated a new network of five hiking trails which were added to the five existing ones to diversify the hiking experience, including during winter, and attract more tourists to this rural area of the country.
- LIVCD with partner association Promotion et Développement Social (PRODES), launched the **second phase of the "Rural Routes between Jbeil & Batroun" project**, and inaugurated in Batroun the new Batroun Tourism Information Center on June 20, 2017. This project linked 20 villages from the districts of Byblos and Batroun, expanded economic opportunities, particularly for women, and created jobs in these villages.
- On May 16, 2018, the Lebanon Mountain Trail Association (LMTA) and LIVCD organized a closing ceremony for the activity **"Improving the Lebanon Mountain**

**Trail as a Rural Tourism Destination**”, in Falougha, Mount Lebanon, which gathered more than 60 local rural tourism experts. During the ceremony, certificates were distributed to local guides who were trained to improve their guiding services on the LMT and its side trails. LIVCD has supported the LMTA to develop new hiking trails, train trail guides, and improve the organization’s marketing and communications materials.

- LIVCD and the Chamber of Commerce, Industry, and Agriculture of Zahle and the Bekaa (CCIAZ) launched on June 19, 2018, a **new food quality services laboratory** at the Chamber to serve the agro-food industry sector in the region. The laboratory offers quality control and assurance and food safety, microbiological, and physico-chemical testing, which will allow agricultural producers in the Bekaa to access new markets by meeting regulatory requirements.
- LIVCD and the Al-Hourouf Association organized on June 22, 2018, the opening ceremony of the **healthy food snack and picnic area, the Green Shell Restaurant** in Bentaël, Mount Lebanon. This completed the activity to introduce rural tourism attractions in the Bentaël Nature Reserve. More than 50 local rural tourism experts participated in the event, which included a guided hike in the Bentaël Nature Reserve.
- On October 25, 2018, LIVCD and Shapash SARL, a local private sector firm that specializes in the processing and storage of fruit, inaugurated the **'Cedrine' apple sorting and packing facility** in Beit Mounzer, Bcharre district, North Lebanon. The inauguration event was attended by U.S. Ambassador to Lebanon, Ms. Elizabeth Richard; several Members of Parliament; mayors of neighboring municipalities; and apple traders, exporters, cooperative members, and service providers. The one-of-a-kind facility will sort and pack the produce of 200 apple farmers in the current season and is projected to serve 1,000 farmers, producing around 17,000 tons of apples annually, over the next five years.
- On December 6, 2018, LIVCD held its final event that was attended by U.S. Ambassador to Lebanon, Ms. Elizabeth Richard, USAID representatives and over 300 beneficiaries, partners and stakeholders. The event presented an opportunity to highlight LIVCD’s achievements since inception in 2012



**Access to  
Finance/  
Leveraged  
Investments**

## 12. Access to Finance/Leveraged Investments

One of LIVCD's crosscutting focus areas was "Access to Finance" and, more specifically, supporting farmers and MSMEs in applying for loans necessary to start or expand their businesses. LIVCD's assistance revolved mainly around supporting farmers and MSMEs to learn about sources of financing available for their investments, developing feasibility studies for specific investments, guiding farmers and MSMEs in applying to loans, and training loan officers in financial institutions to better understand the opportunity and risk associated with lending to MSMEs working in LIVCD's nine value chains. LIVCD also facilitated contacts between potential farmers/MSMEs and financial institutions through workshops and seminars.



Creating linkages between farmers and banks

In 2012-2013, LIVCD conducted assessments during the initial six months of the project to determine the financial needs of MSMEs in Lebanon, evaluate existing providers of financial services, analyse the gap between the supply and demand for these services, and make recommendations on how to improve access to finance for those enterprises that are capable and willing to utilize available financial products.

LIVCD knew that local actors in rural communities struggled to obtain loans from financial institutions. Smaller farmers lacked the financial capacity to self-finance and banks refused to fund farmers because they considered the agricultural sector risky since it is affected by weather and natural disasters. Farmers also lacked knowledge of how to access finance, while most loan officers were not familiar with farmers' technical needs. It was therefore crucial to share knowledge with all parties and establish a platform through which both farmers and loan officers would speak the same language. LIVCD organized technical workshops that bank representatives attended, so that stakeholders, from large processors to small-scale beekeepers and grape producers, would understand what types of loans might be available for their projects.

LIVCD worked with companies and individual investors on feasibility studies that could be presented to banks. LIVCD's cost sharing mechanism in MSMEs' projects acted as a signal to the banks that LIVCD considered such projects as worthwhile investments. Similarly, the fact that LIVCD was involved as a partner with the company, even if no grant funds were involved, helped companies acquire loans. Banks considered LIVCD's involvement a risk-

mitigating factor. A long list of companies, from pickle processors to avocado investors, benefited materially from LIVCD's efforts to help them develop realistic and bankable feasibility studies. All LIVCD grant applicants also had cost-benefit analyses carried out on their projects.

LIVCD also worked on prospectuses to attract private sector investors into agriculture and rural tourism projects, as well as helped farmers and companies to develop business plans and loan or grant applications. LIVCD helped MSMEs apply for both loans from financial service providers and LIVCD grants. The project would often identify and facilitate links between private equity funds, investors and value chain companies served by LIVCD.

During the life of the project, 1,255 MSMEs were assisted through the following types of assistance:

Value chain	Workshops	Grants, loans or private equity	Feasibility studies	Total
<b>Grape</b>	220	34	4	<b>258</b>
<b>Olive oil</b>	259	84	1	<b>344</b>
<b>Apple</b>	83	27	3	<b>113</b>
<b>Processed Foods</b>	25	26	1	<b>52</b>
<b>Rural Basket</b>	-	8	-	<b>8</b>
<b>Honey</b>	37	43	1	<b>81</b>
<b>Rural Tourism</b>	7	13	2	<b>22</b>
<b>Avocado</b>	214	32	17	<b>263</b>
<b>Cherry</b>	106	8	-	<b>114</b>
<b>Total</b>	<b>951</b>	<b>275</b>	<b>29</b>	<b>1,255</b>

Figure 19: Number of MSMEs assisted to improve access to financial services under LIVCD

**Workshops:** LIVCD partnered with financial institutions (the BLC Bank and others) to hold workshops on accessing finance and making investments in the project's target value chains. The number of workshop participants is indicative of the level of interest LIVCD created in each value chain. The bulk of the workshops focused on the following value chains: olive (259 trainees), grape (220 trainees), avocado (214 trainees) and cherry (106 trainees) sectors. Farmers in these sectors had a clear interest in learning about new technologies that could bring better returns to their enterprises. The financial institutions also presented farmers with information about their loan products appropriate to invest in LIVCD-promoted technologies and upgrades, such as beehives and new equipment in the beekeeping sector; and new plant varieties, equipment, and other orchard upgrades for avocado and grape producers. 951 MSMEs, including farmers, attended workshops on how to apply for and access financial services and loans.

LIVCD was also able to improve bankers' technical agricultural knowledge and to help them understand the technical underpinnings of the requested loans. One very successful set of

workshops is worth mentioning: LIVCD organized a series of workshops for a commercial bank, BLC Bank, on “Everything you need to know to fund farmers” which attracted 60 employees including branch managers, deputy branch managers, and credit loan analysts. The objectives of the workshop were as follows:

- Provide an overview of technical agricultural practices and financial returns in the avocado, honey, apple, cherry, and grape value chains;
- Help loan officers better appraise loan applications for agriculture related investments;
- Provide information on the key risk factors and mitigation measures for the targeted crops/products;
- Promote a better understanding of the potential investment opportunities that exist in the targeted value chains; and
- Facilitate increased numbers of agricultural loans.

**Grant/loan application facilitation and private equity:**

LIVCD assisted MSMEs directly with applications for loans or, in some cases, LIVCD grants. LIVCD contributed by identifying the required documents, assisting MSME on assembling the necessary documents, and in some cases facilitating directly with financial institutions ensuring a smooth and successful loan process. In total, 275 MSMEs, including farmers, received help preparing grant or loan applications.

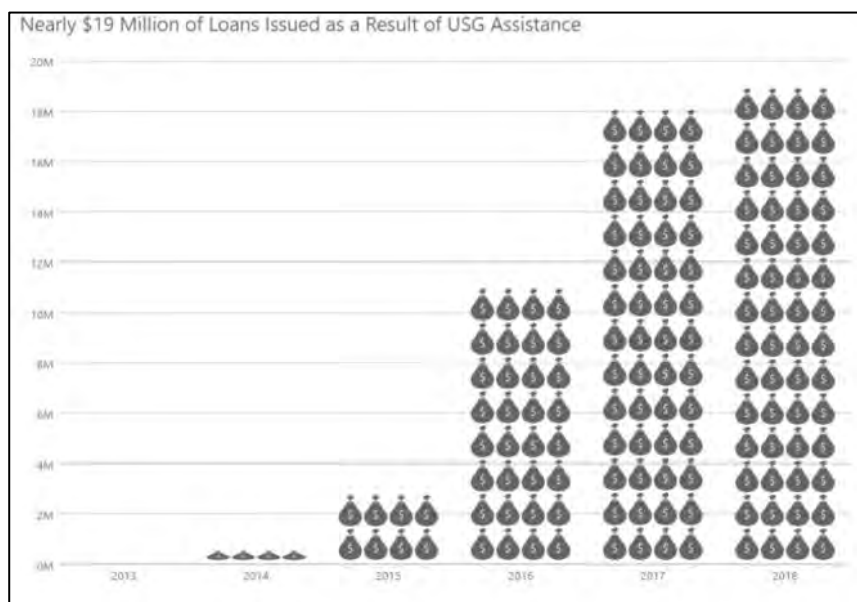


Figure 20: Loans issued as a result of USG assistance

**Feasibility Studies:** LIVCD developed feasibility studies to help farmers and other MSMEs determine whether investments under consideration were commercially viable. The feasibility studies were used to support loan applications. LIVCD conducted such studies for 29 MSMEs, including farmers.

**Value of leveraged investment:** LIVCD was successful in turning the 1,255 financial interactions with partners into cost-shared contributions to activities on the ground. The total leveraged investment value amounts to more than \$41 million, which is close to the \$46.2 million value of the LIVCD project and a very good result for USAID given requirement of only a 50% cost share for businesses and 25% for farmers organizations. The biggest total investments came from the avocado value chain (42 percent of the total or

\$17.2 m), which is a result of wealthy land owners deciding to invest in avocado because of the convincing demonstrations and outreach by the LIVCD team. The second largest total investments (18 percent of the total or \$74 m) came from the processed foods sector, which includes pickles. Through direct collaboration with half a dozen pickle producers responsible for about 60 percent of commercial production in Lebanon, LIVCD revolutionized the pickle value chain in Lebanon. For the company Msallem alone, USAID invested \$204,568 and the partner’s investment/cost share amounted to \$2,019,540. The most significant investment was made in switching pickle production from using 120 L plastic barrels to using 1,000 L fiberglass fermentation tanks, which decreased fermentation time from a month to a week and decreased costs by 40 percent. The third largest total investments (15 percent of the total or \$6 m) was related to the rehabilitation of the grape value chain, which required a host of post-harvest technologies and cold chain improvements. The fourth largest total investment (13 percent of the total or \$5.6 m) was related to the resuscitation of the apple value chain, which required investments in fruit varietal development, trellising, pruning and orchard management, post-harvest handling/sorting, and cold chain development for a large number of apple growers.

Value Chain	Loans	Partner Cost Share	Private Equity	Total
<b>Apple</b>	\$ 2,806,333	\$ 1,345,446	\$ 1,403,853	\$ 5,555,632
<b>Avocado</b>	\$ 4,241,600	\$ 361,813	\$ 12,640,398	\$ 17,243,811
<b>Cherry</b>	\$ 150,000	\$ 555,220	-	\$ 705,220
<b>Grape</b>	\$ 4,275,733	\$ 1,726,794	-	\$ 6,002,527
<b>Honey</b>	\$ 1,126,667	\$ 839,869	\$ 130,749	\$ 2,097,285
<b>Olive Oil</b>	\$ 395,000	\$ 672,869	\$ 297,900	\$ 1,365,769
<b>Processed Food</b>	\$ 5,892,702	\$ 1,278,209	\$ 225,130	\$ 7,396,041
<b>Rural Basket</b>	-	\$ 374,290	-	\$ 374,290
<b>Rural Tourism</b>	-	\$ 599,915	\$ 33,284	\$ 633,199
<b>Total</b>	<b>\$ 18,888,035</b>	<b>\$ 7,754,425</b>	<b>\$ 14,731,314</b>	<b>\$ 41,373,774</b>

Figure 24: Investments leveraged by LIVCD

# Conclusions and Recommendations

### 13. Conclusions and Recommendations

Lebanon's abundant natural resources, ecological diversity, proximity to lucrative markets, rich cultural heritage and a talented and well-educated workforce offer tremendous opportunity for rural economic growth. The complexities of the business environment and decades of economic disruptions have stifled the growth of rural value chains. Rural value chains with significant growth potential were functioning with old technologies and limited access to market information. These value chains were serving legacy markets with dated products. The U.S. Agency for International Development (USAID) recognized that by investing in key value chains, the Lebanese agricultural sector and rural economy could contribute to meeting expanding demand in both domestic and export markets, and thereby create economic and social stability in rural areas. The Lebanon Industrial Value Chain Development (LIVCD) project played a catalytic role to make that happen.

LIVCD improved the competitiveness of Lebanese firms, products, and services by identifying early in the project, constraints and methodically addressing them in nine promising value chains. LIVCD leveraged private sector finances along with top local and international talent, and forged solid connections between micro, small, and medium-sized enterprises (MSMEs) as well as larger producers, aggregators, and exporters that had more direct access to markets and greater capacity to invest in building essential upstream and downstream value chain linkages. LIVCD built managerial, marketing, and production skills to enable MSMEs to meet quantity and quality standards. By fueling entrepreneurial activity along the value chain, LIVCD expanded rural incomes and purchasing power, created job opportunities, especially for women, and attracted new investments that expanded the radius of LIVCD benefits.

Based on results and independent evaluations, LIVCD was a successful project. Several technical and operational factors have contributed to this success. These factors are summarized as follows, with some elaborated on in the *Recommendations* section below:

- 1) An initial assessment phase created a well-informed foundation for the project. It allowed the project to carefully select its target value chains and initial group of partners. It also allowed the project to take into account the Syrian crisis and resulting border closure and its impact on the Lebanese economy in the first project work plan – events that were not anticipated during the design of the project. Since Lebanon and the region frequently experience significant geopolitical changes, this initial assessment phase was valuable to address such changes.
- 2) The project took a market-led approach. Actors along the value chains are linked, and problems or challenges at any level have repercussions for all. LIVCD's approach emphasized and facilitated the efficient and ongoing flow of information, products, and money. Every LIVCD activity was designed with two criteria in mind: how the activity fit within the whole initiative, and how it facilitated the development of a player or key

channel in a value chain. The project began with identified end-markets and worked backwards to the producers, ensuring that all activities addressed specific elements that fit seamlessly into a coordinated strategy, achieving desired results. This unified approach created integrated, market-driven value chains that fueled entrepreneurial activity and created demonstration effects.

- 3) The project was Lebanese-owned approach. LIVCD was successful and sustainable because Lebanese firms, cooperatives and farms took ownership of the value chain upgrading efforts. LIVCD's approach, which was entirely private sector-driven, began by building critical partnerships and playing a facilitating role rather than inserting the project into the value chain. From day one, LIVCD engaged value chain lead partners as the key voices for mobilizing stakeholders in support of value chain upgrading efforts.
- 4) Interventions were based on evidence and driven by intelligence. Because lack of agribusiness intelligence was a binding constraint, LIVCD invested in market research, which was incorporated into value chain upgrading strategies and work plans that were tied to both project- and firm-level budgets.
- 5) The project focused on high-value markets and shifted towards value-added products and services while assisting processors and producers to reduce costs to achieve competitive cost structures. This resulted in successes; for example, four food-processing companies secured contracts with a large US importer that sells to the high-value US specialty food market.
- 6) Early in the project, LIVCD adapted quickly to geopolitical changes resulting from the Syrian crisis and unrest in Arab countries, many of which served as Lebanon's most important foreign markets. As a result, the project facilitated entry into new markets for many of the value chains.
- 7) LIVCD used grants as an effective means to leverage private sector investments benefiting thousands of people across Lebanon. Using large or small grants combined with facilitation techniques and training allowed LIVCD to stay nimble and respond quickly to the exact needs of project partners.
- 8) LIVCD was deliberate in its use of funds for technical assistance, training, and grants. While the project took financial risks with its partners, it acted based on good evidence of partners' commitments and likelihood of successful outcomes.
- 9) Working with value chains partners, LIVCD introduced new technologies to upgrade value chains. Some examples of new technologies are trellising in the apple and cherry sectors, artificial insemination of queen bees, mechanical olive harvesters, tank fermentation of pickles, automated freekeh processing, and many more.
- 10) Establishing Public Private Partnerships with partners possessing niche capabilities, such as with the global US technology company National Instruments, resulted in successfully implementing three significant project activities.
- 11) There was a focus on strengthening the ecosystems in which value chains function through:
  - a. Establishing or strengthening service centers;
  - b. Widening the services of laboratories for honey, olive oil and processed foods;
  - c. Improving the services of nurseries;



- d. Supporting the creation of two engineering design and implementation companies; and
  - e. Spreading knowledge to universities and input suppliers.
- 12) Stakeholders were involved in designing and implementing activities. For example, the approval and adoption of a national rural tourism strategy by the Ministry of Tourism helped propel the rural tourism sector to new levels.
  - 13) Collaboration with other donor-funded projects, including UNDP, EU, UKAID, and other USAID projects helped leverage additional resources and avoid duplication of efforts.
  - 14) Careful selection of partners optimized the use of resources and insured excellent and sustainable results. The best incentive for partners to assume business risk was confidence that things can work. LIVCD prioritized opportunities and implemented activities that were scalable and replicable and created visible, demonstrable impacts that caught the attention of value chain actors and potential investors. LIVCD quickly identified and worked with “first mover” entrepreneurs who were less risk-averse and willing to use their farms or operations to demonstrate replicable models.
  - 15) To keep energy and commitment high, LIVCD communicated successes widely and often. Value chain-specific public awareness activities ensured that priorities, initiatives, and successes were disseminated to the widest audience of stakeholders; including value chain actors, the public, and investment and entrepreneurial partners in Lebanon.
  - 16) Careful evaluation of grant equipment and service procurements insured that USAID money was properly invested.
  - 17) The project made use of the strong pool of Lebanese consultants but used international ones when local expertise was not available. In addition to insuring successful implementation of activities, this helped transfer knowledge to local experts, farmers, engineers and other stakeholders.
  - 18) LIVCD handed over knowledge and materials to Lebanese private and public-sector partners, including universities, research organizations, business associations, chambers of commerce, commercial enterprises and cooperatives, and producer organizations.
  - 19) The project placed a premium on facilitating strong horizontal and vertical collaboration and linkages between value chain stakeholders.
  - 20) LIVCD facilitated the rigorous and ongoing flow of information among value chain actors through both formal and informal means, not only to support the decision-making process, but also to play a critical role in strengthening horizontal and vertical linkages. For example, LIVCD facilitated the development of professional networks where value chain actors came together to exchange ideas, share knowledge, and take part in learning events. LIVCD also supported the development of a distributive database of network partners, market demand, consumer preferences, price points, export/import regulations, competitors and their behavior, business processes, and logistics. For example, LIVCD supported the Federation of Chambers to update and add to its portal that is accessible to farmers and food processors, export regulatory information on fresh and processed fruits and vegetables for all export markets.

- 21) The project benefited from a competent and cohesive implementation team and excellent home office support, and close collaboration with USAID/Lebanon.

LIVCD improved the lives of thousands of people across Lebanon by implementing hundreds of activities that contributed to the successful upgrades of nine value chains. However, more needs to be done by current and future projects to continue the momentum created by LIVCD and build on these successes. Following is a list of key recommendations based on the project's successes and lessons learned.

**Specific recommendations:**

- 1) Based on LIVCD's experience during the initial assessment phase of the project, our first recommendation is that future projects of LIVCD's size and complexity start with a period to conduct a thorough assessment of the markets and production potential of value chains or market systems. As mentioned earlier, LIVCD benefited from a six-month value chain assessment period. The purpose of the assessment phase was to consider which value chains held the most promise in terms of impact and achieving project objectives and deliverables. During the assessment period, LIVCD evaluated the potential for selected value chains to enter new markets or expand in existing markets and calculated cost structures and prices needed to create competitive value chains. This period also included an assessment of the key stakeholders and potential partners in a given value chain. For example, there are over 120 registered agro-processing cooperatives in Lebanon, however, the project identified only 15 that showed sufficient managerial capability and commitment to growing their businesses.
- 2) To insure successful interventions, LIVCD highly recommends a market-pull approach. This approach will:
  - a. Identify the markets that the specific value chain can compete in and avoid wasting resources on those that it cannot compete in. For example, Lebanese apples cannot compete in the US market; however they have the potential to compete successfully in African markets in addition to existing ones.
  - b. Identify the needs and expectations of target markets.
  - c. Identify the constraints that limit access to these markets.
  - d. In collaboration with stakeholders, set action plans to eliminate constraints by focusing on actions that give the highest return on invested resources within a reasonable timeframe.
- 3) For agricultural projects with tree crops, consider longer projects. If not feasible, consider having projects running back to back to insure momentum and continuity of longer term activities that are typical of agriculture. New techniques or technologies may take several years to yield positive results. Risk averse producers or processors may take time to adopt new technologies. It takes time to create the necessary momentum for change.
- 4) It is recommended that USAID-funded projects hold quarterly or bi-quarterly coordination meeting with other donor-funded projects to insure resource leverage and

avoid duplication. Throughout the life of the project, LIVCD collaborated with other USAID and other donor funded projects to leverage resources and avoid duplication. Toward the end of the project, several donor-funded projects approached LIVCD to build their future activities on LIVCD's work. For example, Expertise France built their activities in grapes and cherries based on the knowledge gained by LIVCD. Similarly, UNDP and UKAID built on and continued LIVCD's work in the freekeh and pickles value chains. UNDP is also building on LIVCD's work in the olive value chain. The USAID-funded LED project has stated its interest in working with food processors that have gained access to the US market.

- 5) For value chains and sectors to grow sustainably, there needs to be a robust agro-business cluster/ecosystem. LIVCD assisted in the growth of several such business and the growth of knowledge in the different value chains. For example, several service centers were established and/or expanded, nurseries were assisted in growing their services; services of regional laboratories were expanded; two engineering companies were started; and knowledge was passed to educational institutions and service companies. We recommend that such work continue, as a robust agro-sector ecosystem is imperative to the growth of Lebanon's agriculture sector.
- 6) Grants under Contract are good if used carefully; however, in some instances grants can create dependencies. LIVCD utilized a cost-sharing philosophy throughout the project to determine who would contribute what elements to each activity. The private sector will invest if it is within their financial capability and will contribute to profitability. The fiberglass pickle tanks are a good example – large pickle processing firms invested in them on the basis of LIVCD's technical assistance. The investment paid off. It was better for LIVCD to co-invest with the private sector on a new technology – like CO<sub>2</sub> monitoring/purging – where producers might not invest without evidence of success.
- 7) Future projects should not purchase sophisticated and expensive scientific equipment unless there is capacity to operate and maintain the machines. It is important to guard against thinking of grant money as free – i.e. the partners might conclude that since it is grant money they might as well buy the most expensive equipment. However, any investment, even through grant funds, has associated costs. For example, there may be a shortage of staff with the right skills living close to the facility where the machinery is housed, which means large recurrent costs of getting staff to the location where the equipment will be used. As an example, LIVCD opted not to co-invest with the Chamber of Commerce, Industry, and Agriculture in Zahle (CCIAZ) to purchase pesticide analytical equipment even though it is highly needed. A thorough assessment with expert opinions showed that the costs of operating such equipment was beyond CCIAZ's available resources. Such an investment would have drained the Chamber's resources and diverted USAID funds to an expensive, non-sustainable activity. In this potential activity and other highly technical ones, LIVCD benefited from getting the advice of specialized technical consultants. This insured that investments were made appropriately and that equipment procured was put to good use.
- 8) LIVCD found that in many instances, such as the pesticide lab equipment mentioned above, beneficiaries ask for equipment that is either unnecessary, incomplete, or not

possible to operate sustainably. Project management should resist the pressure of beneficiaries and perform thorough technical and economic feasibility studies to avoid paying for equipment that will not be used. LIVCD has seen plenty of such examples and where possible tried to make use of equipment that had been purchased by previous projects but were not used properly or fully. A good example is the apple juice facility in Bcharre that was put back in operation with support from LIVCD and two private sector partners. LIVCD also invested with a private sector company to utilize pine nut processing equipment in Jezzine.

- 9) Floriculture was examined as a potential target value chain early in the project, but it was subsequently dropped. A second assessment of the value chain found that the costs of heating greenhouses in the winter and cooling them in the summer prevented operators from improving their competitive position in export markets. Moreover, too much of the value chain was under the control of a very small number of distributors, which created a monopoly and diminished potential impact of the value chains. LIVCD does not recommend working on this value chain unless these issues are addressed.
- 10) There is a need to expand laboratory testing for pesticide residues on fresh produce to assure unimpeded export flows to Europe, Gulf Cooperation Council (GCC) countries and domestic markets (listed in order of regulatory strictness). The challenge lies close to home because of the tendency of uneducated farmers to apply more pesticides than needed; resulting in high health risks in Lebanon. The GCC countries are putting in place stricter regulations and testing; the European Commission (EC) is already strict with GLOBALG.A.P. regulations. However, as stated earlier, such an investment has to be very carefully studied due to its high initial and running costs, and requirement for highly qualified staff.
- 11) Festivals and trade shows such as Fancy Food and GulFoods shows, were excellent for developing linkages. Many good marketing opportunities were created that would not have been possible without these kinds of gatherings. As seen with most value chains, opening one's eyes to innovation is good for business through transformation of new ideas into new products. However, careful selection of attendees and early preparation is imperative to insure successful outcome.

### **Value chain-specific recommendations:**

#### **Avocado**

In the avocado value chain, more work is needed on marketing, quality assurance, harvest, and post-harvest management. Prior to LIVCD, avocado production was chaotic. Farmers were unsure of varieties and had little technical knowledge to achieve good yields. LIVCD thus focused primarily on production and helped to establish this as a competitive value chain. A key constraint that could hamper the growth of the avocado value chain is the premature harvesting of avocados rendering the fruit inedible even if consumers wait for an extended period before eating them. LIVCD had started addressing this constraint; however more work needs to be done, as this is a problem that requires a methodical approach.

As the sector develops and the premature harvesting problem is resolved, it will be necessary to increase the focus on developing reliable export markets, especially in the EU. The domestic market consumes most of the 8,000 - 10,000 tons of avocados produced in Lebanon every year, but production will increase rapidly as new orchards (currently 219 ha with a production potential of 2,628 tons per year) reach maturity. Many smaller farmers are now joining the avocado value chain. Countries of the Gulf Cooperation Council (GCC) and Jordan imported a total of 600 tons in 2017 and are expected to continue increasing their imports of Lebanese avocados. The avocado value chain is also targeting the EU as an export destination with good prospects because of market demand and attainable standards. Because avocados are not subject to too much pesticide application, it should be relatively easy to obtain GLOBALG.A.P. certification for shipments to Europe. The key will be to get the commitment of farmers to maintain proper documentation and farm management as required by GLOBALG.A.P., produce consistently, and insure quality shipments that lead to a good reputation for Lebanese avocado producers.

A last, specific recommendation is to have a one-stop shop to collect, sort, pack, and export avocados from Saida. This city is a central marketplace for approximately 80 percent of Lebanon's avocado production, and having such a facility there would help consolidate the delivery of avocados from small farmers.

### **Cherries**

The cherry value chain should build on the results of the 12 demonstration plots that were established by LIVCD. In the demonstration plots, LIVCD introduced new root stocks and varieties, as well as the trellis system. Future initiatives should continue extending these methods and technologies to farmers and making sure the demonstration plots are maintained and used for continued training on new varieties and methods. The difference in fruit yield and quality between traditional orchards and those using trellis and new varieties and rootstock is starting to have dramatic impact on the value chain, which should be seized upon.

We recommend that work continue with established and active cooperatives and private companies to widen the scope of apple service centers to also cover cherries, especially since apples and cherries tend to be grown in the same areas. These would assist cherry farmers to use good agricultural practices and access efficient technologies, technical advice, and knowledge about recent developments in the sector.

Lastly, cherries have the potential to become a very lucrative crop, especially when focus is applied to improving cold chain management, which maintains product quality for longer periods. LIVCD began introducing cold chain systems, including precooling rooms, cooling rooms, and mobile cooling. This work should continue in collaboration with farmers and other stakeholders.

## **Apples**

The apple value chain was challenging because it is large, highly fragmented and dominated by traditional practices. The service centers established with LIVCD support addressed this by introducing new practices and technologies. They offer important services to apple farmers and will provide a natural entry point for future support to the sector.

Encouraging more farmers to start growing new apple varieties should continue to be a priority; but regions of Lebanon vary in their usage of modern varieties, so in some regions, quality management will require more emphasis, to reduce the production of low-grade fruit resulting in high rejection rates in post-harvesting sorting of apples. A case in point is the high incidence of apple scab in Hadath El-Jebbeh in 2018, where a low percentage of Grade I apples were produced.

With increased demand for apple juice seen in 2017, LIVCD aimed to increase the production capacity of Lebanese processors. This will consequently allow the companies to buy more apples from local farmers, which is one of the main sources of revenue in rural regions of Lebanon, including Bcharre, Tannourine, Jezzine, and Akoura. We recommend continued work with apple juice companies to maintain momentum and growth.

LIVCD also assisted in the establishment of an apple chips processing facility in the Chamber of Commerce, Industry, and Agriculture of Tripoli (CCIAT) that provides the services of freeze drying and hot drying of apple chips. Since the facility was established towards the end of the project, little time was spent on growing market linkages. LIVCD recommends that further work be done to develop local and export market linkages.

## **Processed foods**

The processed food value chain will benefit from continued support that builds on LIVCD's work to help Lebanese producers compete in domestic and international food markets. Potential areas of future work include supporting processors through business development services (BDS) to improve their product development, cost accounting systems, marketing, and access to finance.

With the talent resident in Lebanon, it is almost certain that local consultants can continue to effectively support companies to improve their operations and products. However, LIVCD found areas where appropriate, well-known technologies had not been introduced in Lebanon, such as the 10,000-liter fermentation tanks for pickle production, where international technical experts were needed to demonstrate viability. There are likely additional examples of technologies that have not yet found its way to Lebanon, where immediate adoption will lead to cost savings, and thereby improved competitiveness.

Continuing to encourage collaboration between processed foods companies is likely to strengthen the value chain as a whole. As an example, two Lebanese food production

companies that attended the 2018 Fancy Food Show in New York with LIVCD assistance, were faced with a critical situation: collaborate to develop and produce new products, or go home with no orders. Each had something to contribute to a US buyer, but neither had a strong enough product that has demand in the US market. Together they created for a US importer several new products branded as “Authentic Middle Eastern” targeting the Specialty Food Market. As a result, both companies signed long term contracts with the US-based buyer. This was a definite win-win-win for the two processors and the buyer – and the US consumer. Such innovations can continue to be spurred when producers are brought together.

There are many additional interventions that will lead to further growth. In the production of freekeh, for example, future projects should continue to work with cooperatives to establish collection centers to facilitate purchasing by players in both domestic and international markets. In addition, there are many opportunities to develop new products based on freekeh.

LIVCD also found that many processing companies can introduce new equipment to cut costs, especially for vegetables that are frozen or pickled. Freeze drying fruits has great potential in Lebanese and export markets, and could be a means of absorbing additional lower grade fruits. Lebanese processors also need to emphasize the importance of quality packaging and labeling.

While introduction of new equipment and product development are fundamental to growing food processing companies, there needs to be continued emphasis on financial accounting and marketing. LIVCD discovered that processed foods companies are skilled at making excellent products, but their businesses are undermined by poor business operations. This should be a focus for future projects.

### ***Olives and olive oil***

Olives and olive oil have limited potential for expanded sales in Lebanon because of high local costs and tough international competition. It is therefore recommended that future projects continue to work on reducing the cost of harvesting olives and improving the quality of harvested olives and processed oil. There is also an opportunity to build on LIVCD’s work with CCIAT to collect and certify olive oil. This will continue to improve the quality of olive oil and to market it to consumers accordingly. In addition, continuing to look for niche export markets beyond the Lebanese diaspora markets could yield opportunities for increased exports.

## **Honey**

Honey deserves additional attention because it can readily impact the poorest of the poor in Lebanon. Cost of entry is low, and land ownership is not required; demand is strong and prices are going up even with an expanding supply.

LIVCD recommends additional investments in producers. High prices reflect robust demand. There is ample scope for additional producers or for current beekeepers to expand their apiaries. Further, future projects can capitalize on the LIVCD training program to extend it to more beekeepers. There should also be programs to ensure that as many beekeepers as possible have access to high quality queens, either through government regulations to prevent the import of low quality bees, or through the expansion of local queen producers.

Exporting honey on a larger scale will require additional certification and testing laboratories to provide full reports on physiochemical and nutritional characteristics. As a corollary to this, there should be greater testing of imported honey so that adulterated or impure honey, which is often low cost, is labeled properly.

A balanced eco-system increases pollinations, plant diversity increases and beekeeping remains healthy and productive. Municipalities can work with beekeepers to set aside areas for pollinating plants and reduce deforestation. Municipalities should also consider increasing pasture as this will increase honey yields.

## **Grapes**

The grape value chain succeeded in expanding the ability of grape farmers to export to high value markets. In the future, we recommend continuing with the introduction of improved cultural practices for existing and new varieties, and expand GLOBALG.A.P. certification to medium and large-scale growers. There should be a focus on upgrading nurseries specialized in grapevine stock to improve their seed production and plant material qualifications. This would include improving the plant material by introducing modern nursery equipment, traceability and certification.

LIVCD succeeded in upgrading the grapes cold chain, interventions that should continue with pre-cooling units, refrigerated packing rooms and mobile cold storage facilities. As a corollary, technical assistance is still required to extend improved procedures to harvest, sort and pack grapes at the farm. Future work should also consider improving packing and labeling for target markets.

## **Rural Tourism**

The rural tourism sector in Lebanon has great opportunities and current momentum to continue expanding. LIVCD has boosted emerging tourism trends in various local sites, and



there are opportunities to replicate these across Lebanon. For example, hiking has increased in popularity in targeted areas after LIVCD's considerable efforts to improve trails and services around them. Adding and upgrading cottages and Bed & Breakfast inns along with creating services and attractions in rural areas could also be replicated in new sites/villages. Seasonality will cause variability in demand, but new tourism sites and activities are now drawing guests to the countryside more evenly across all seasons. This can be seen in the steady high prices for bed and breakfast-type accommodations and the expansion of high-end touristic housing rentals.

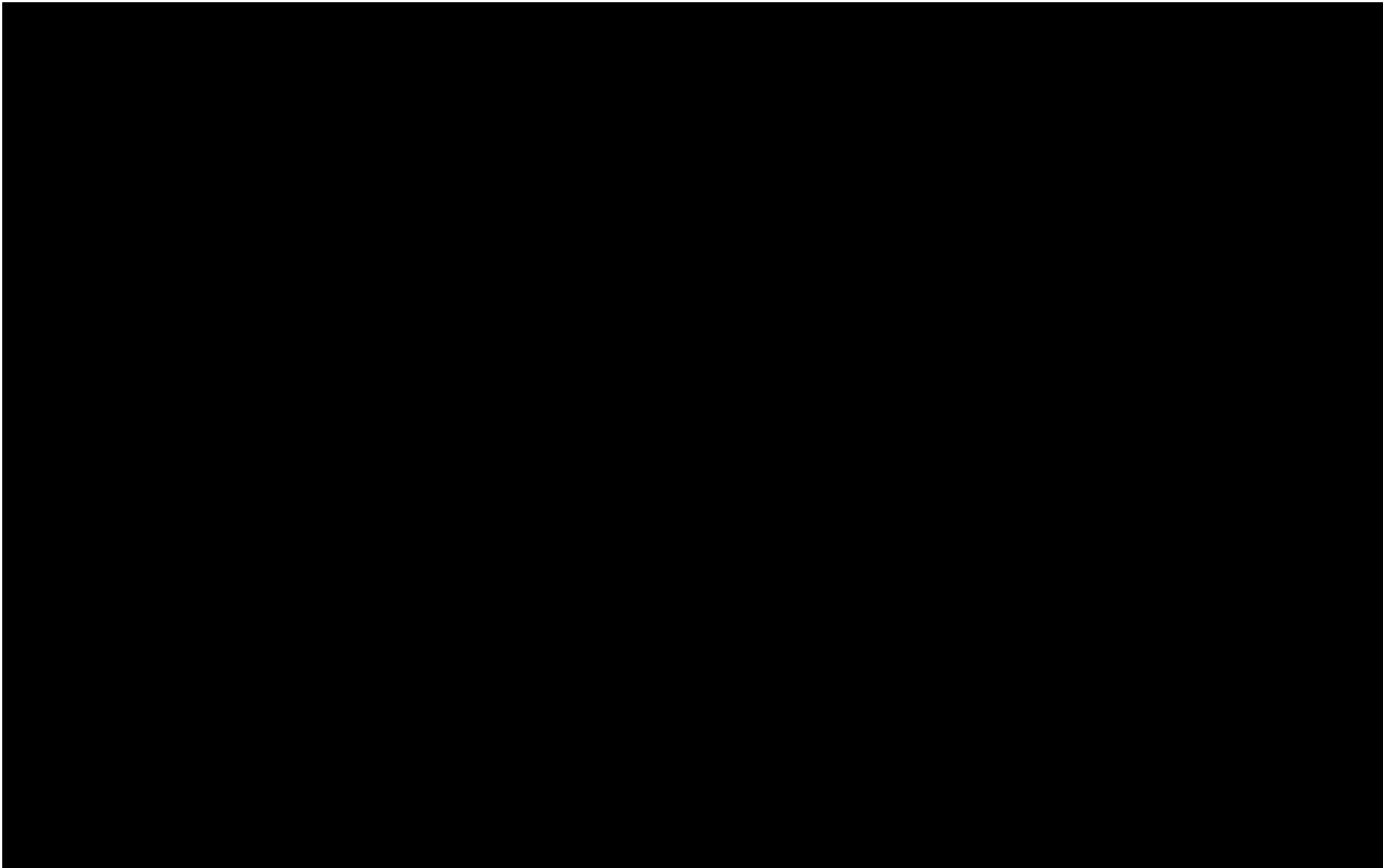
Measuring the economic impact of LIVCD interventions in the rural tourism value chain was a complex task, especially with the lack of available data on the sector. This issue remains one of the major weaknesses of the sector and should be addressed in the coming years, particularly to facilitate monitoring of the evolution of the industry and to help decision makers better plan and manage future projects and funds. Based on LIVCD's observations and economic impact results, a set of recommendations for future rural tourism initiatives is presented below:

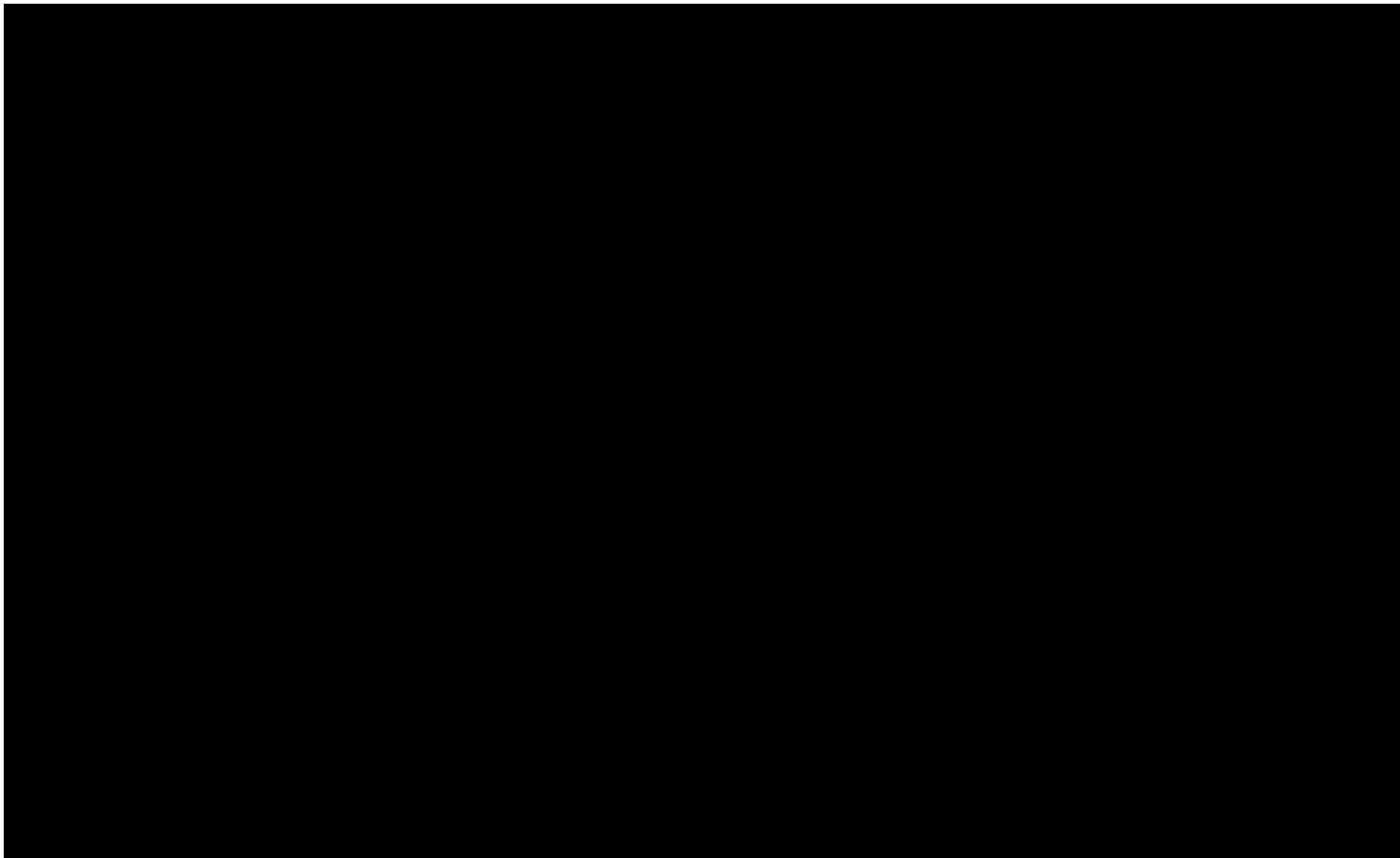
- *Regulation and business environment:* reinforce existing regulations and develop new ones, especially for official recognition and categorization of nature and rural tour operators, rural and mountain guides, and rural accommodation. This will create fair market competition and will guarantee the quality of services and activities with clear norms and standards. A long-term goal could be developing certification and labeling programs.
- *Management and human resources:* adopt continuous training programs for staff working in the management and provision of rural tourism services and activities; equip them with simple and clear manuals to do their jobs.
- *Cultural and natural resources:* emphasize the importance of preservation and protection of natural and cultural heritage resources that are used as rural tourism attractions. Promote responsible and environmentally friendly practices by rural tourism value chain operators.
- *Coordination between projects:* create a coordination mechanism between all stakeholders involved in the funding of rural tourism projects and local authorities. This will eliminate duplication and help complete and replicate successful projects that may serve as pilot models for other regions.
- *Promote clustering and regional cooperation:* this approach proved to have high economic impact, thus more clustering should be promoted on the district level, between districts, or even on the governorate level.

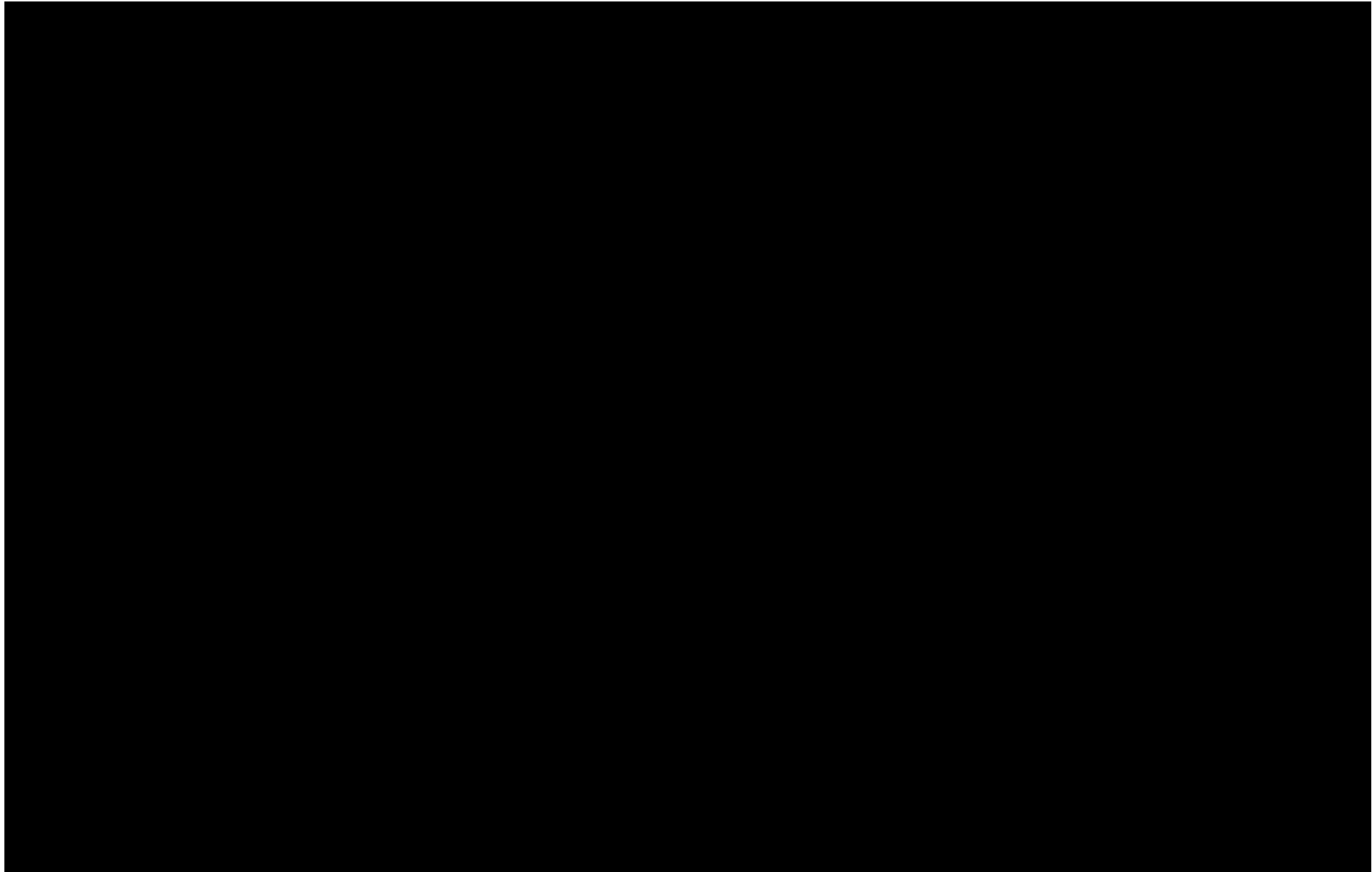
## Annex A: List of LIVCD Grants

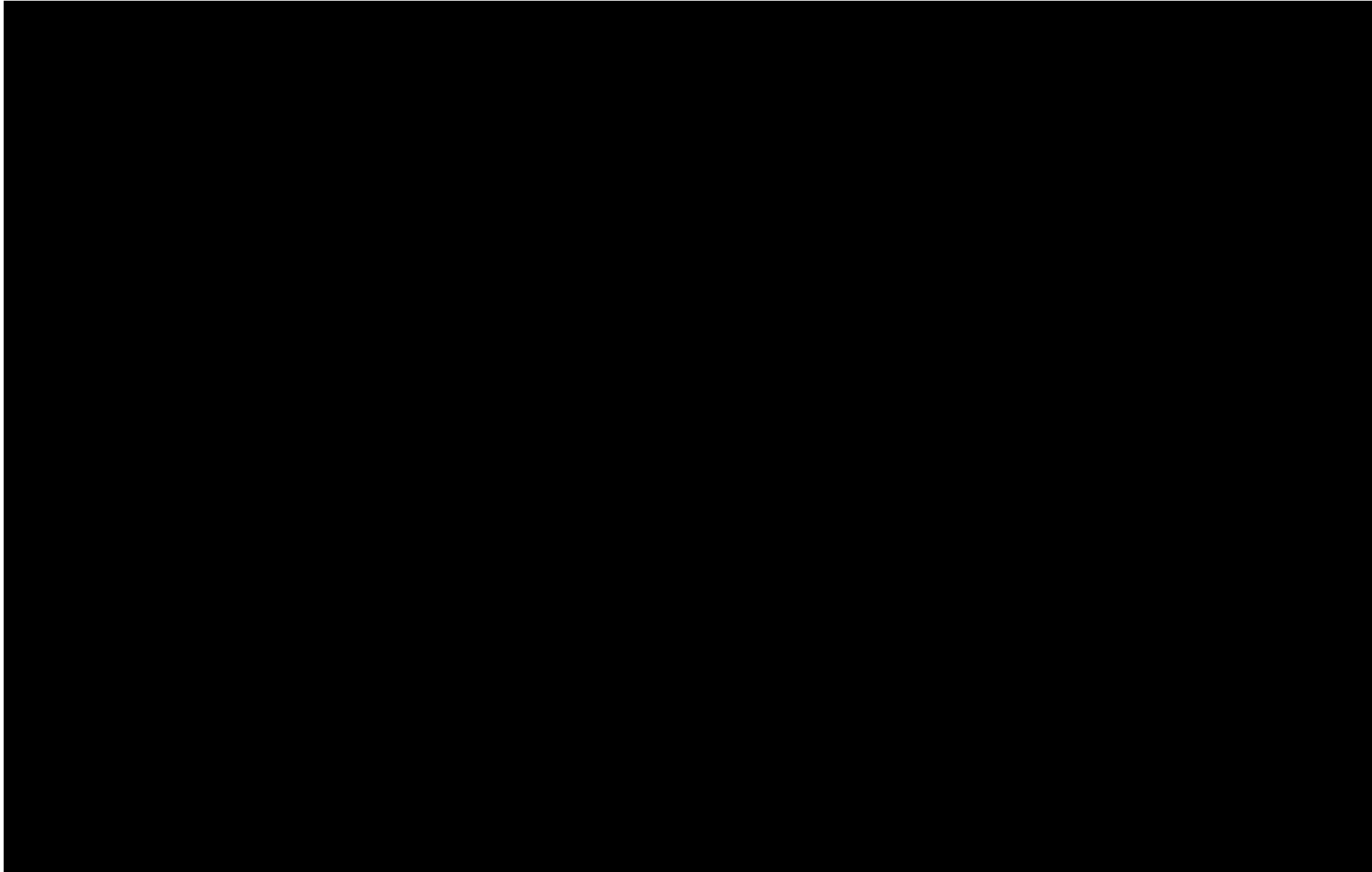
LIVCD facilitated a total of 211 grants. However, the table below lists 249 grants which include 38 (in red) that are duplicates. They were created for internal organizational purposes by the LIVCD grants team.

Grant #	Grant Title	Grantee	Value Chain	Start Date	End Date	LIVCD Award Amount (USD)	Grantee Contribution (USD)	Total Budget (USD)	Grants to which the Duplicated Grants are related
[Redacted content]									

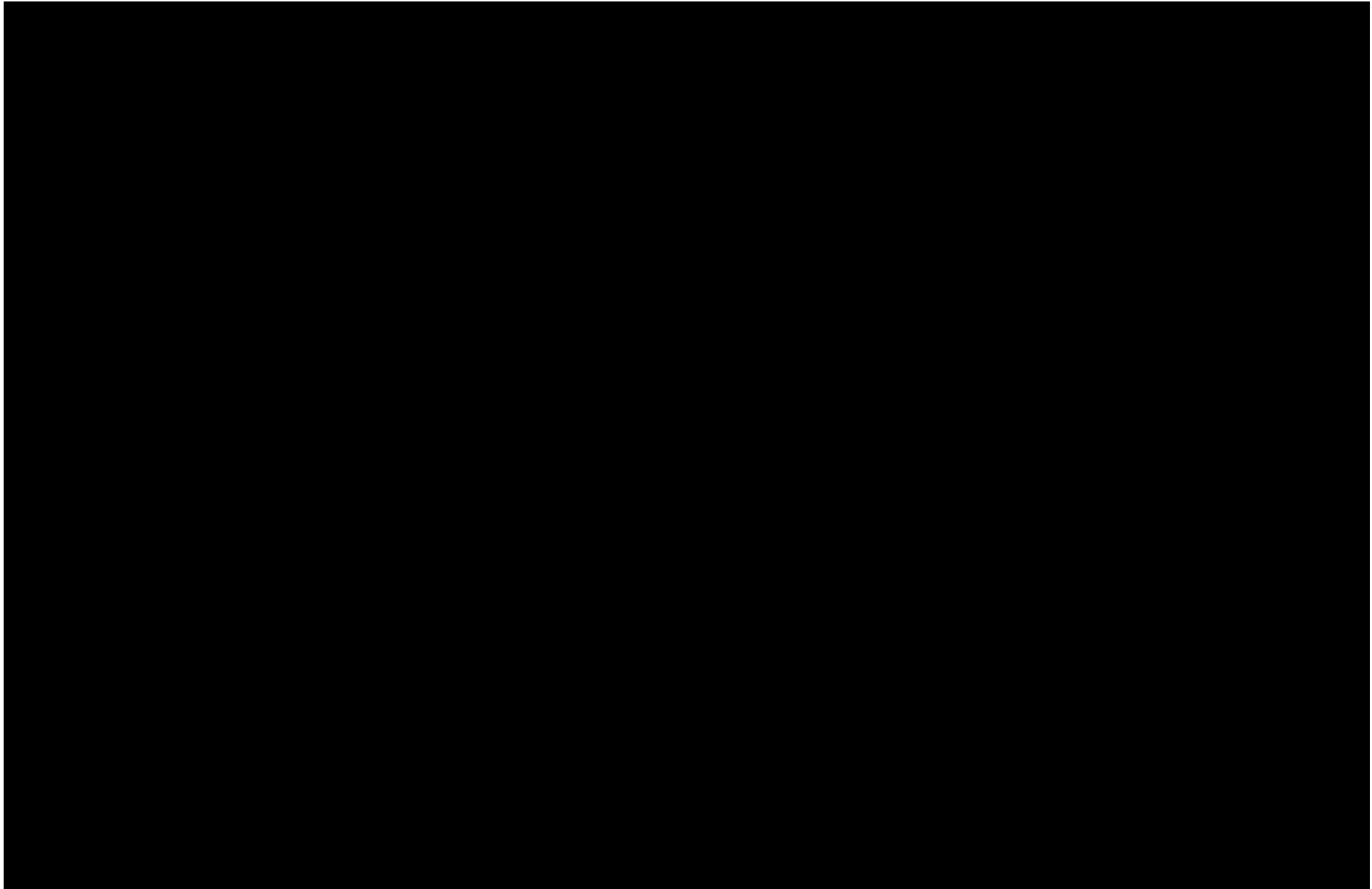




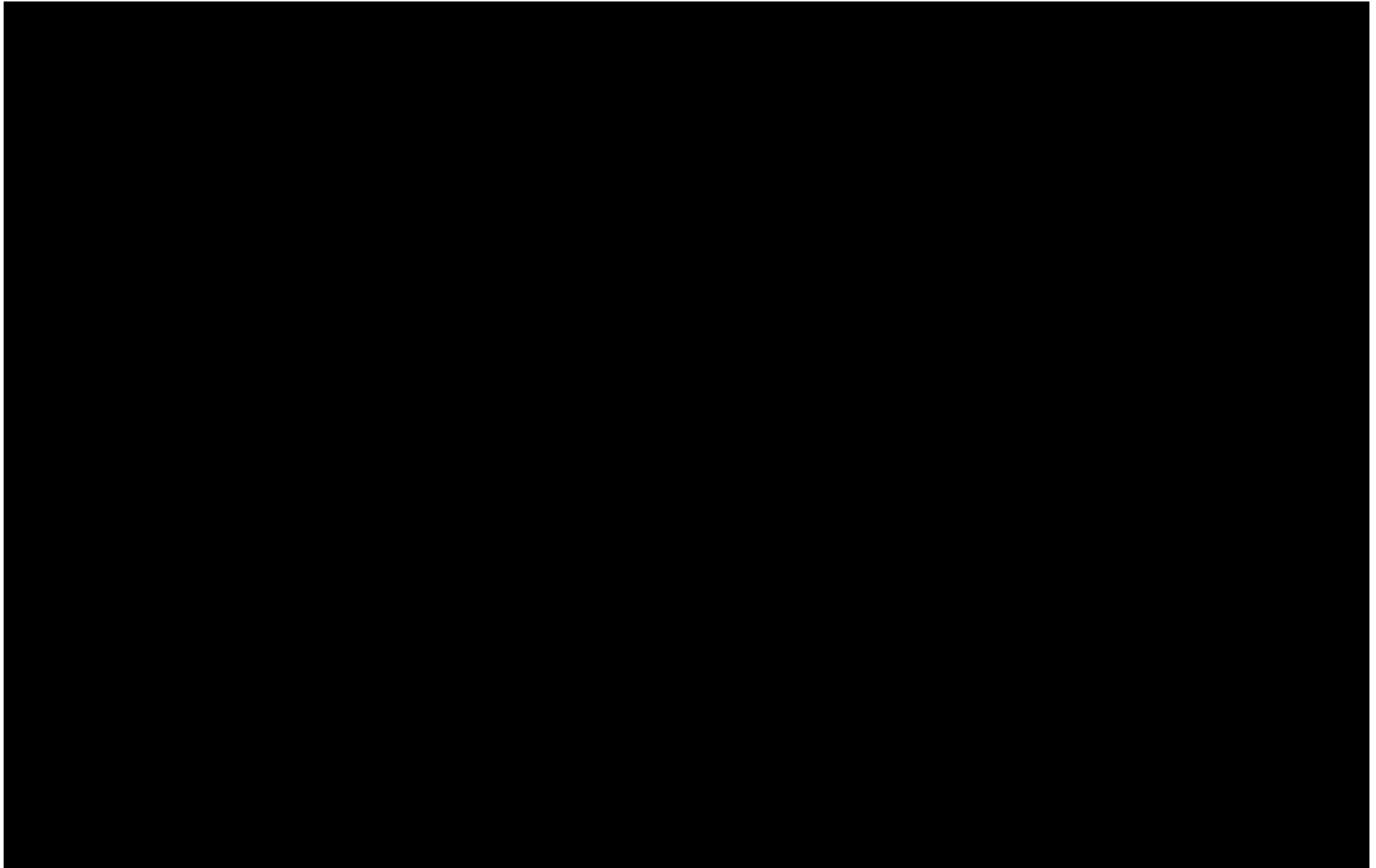


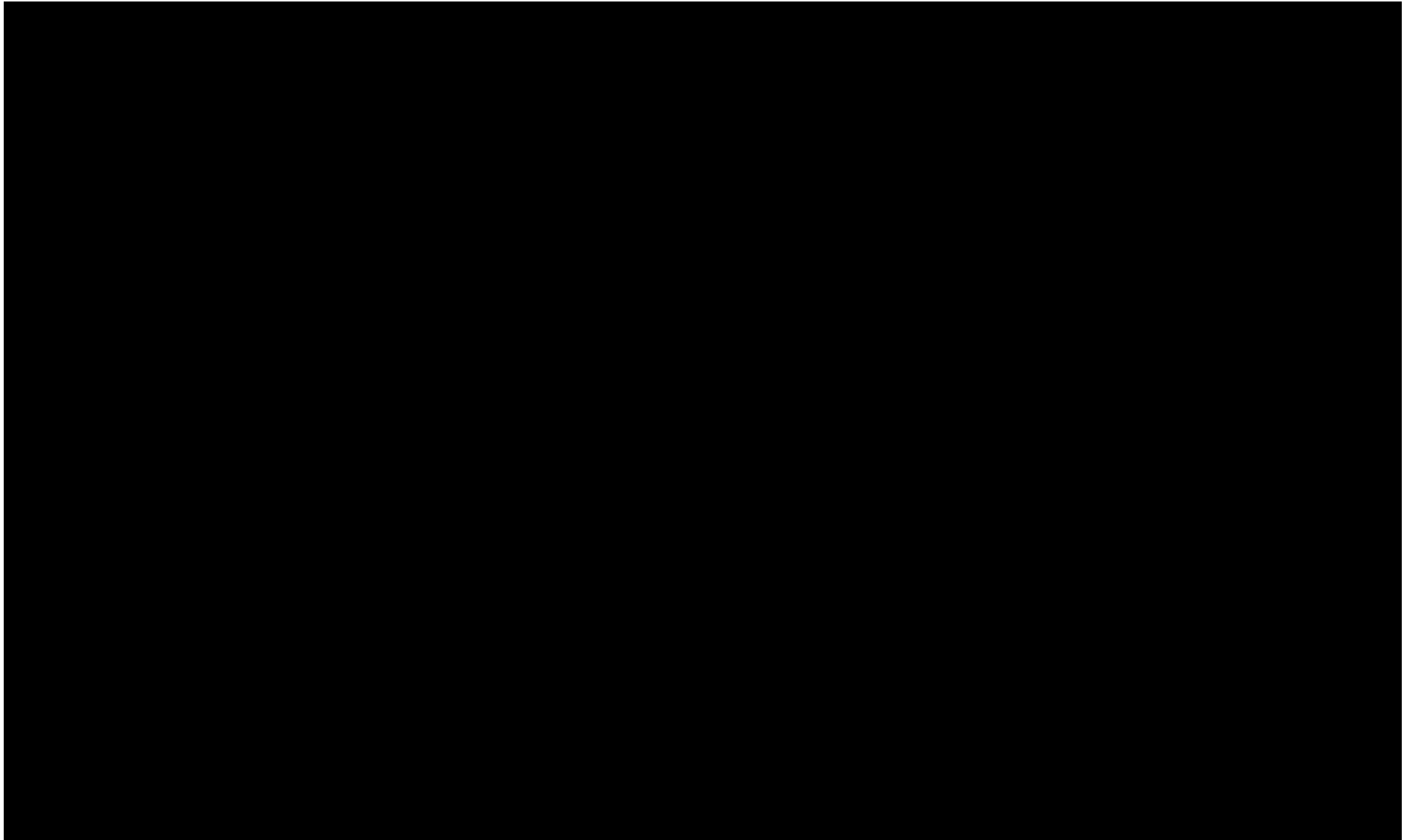


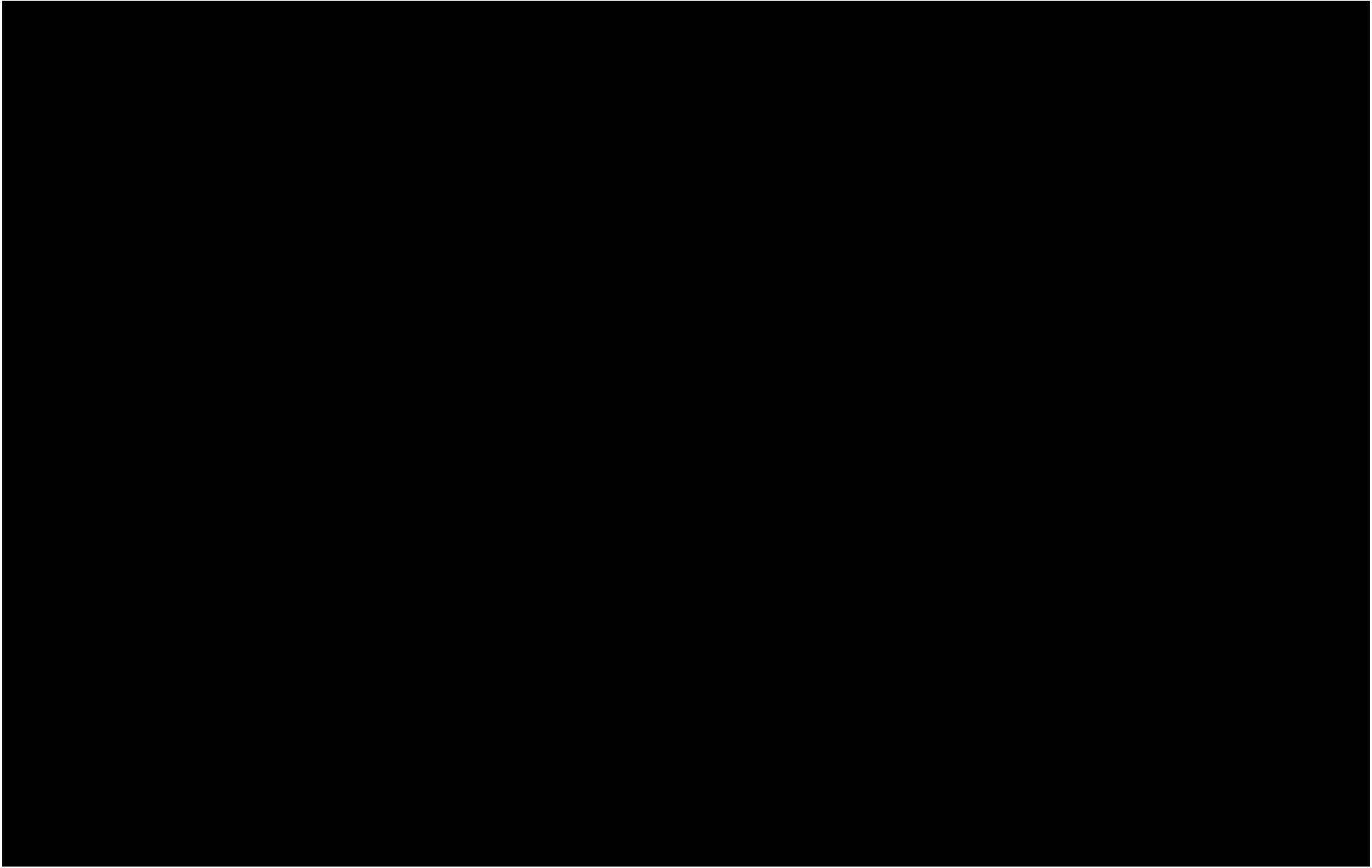


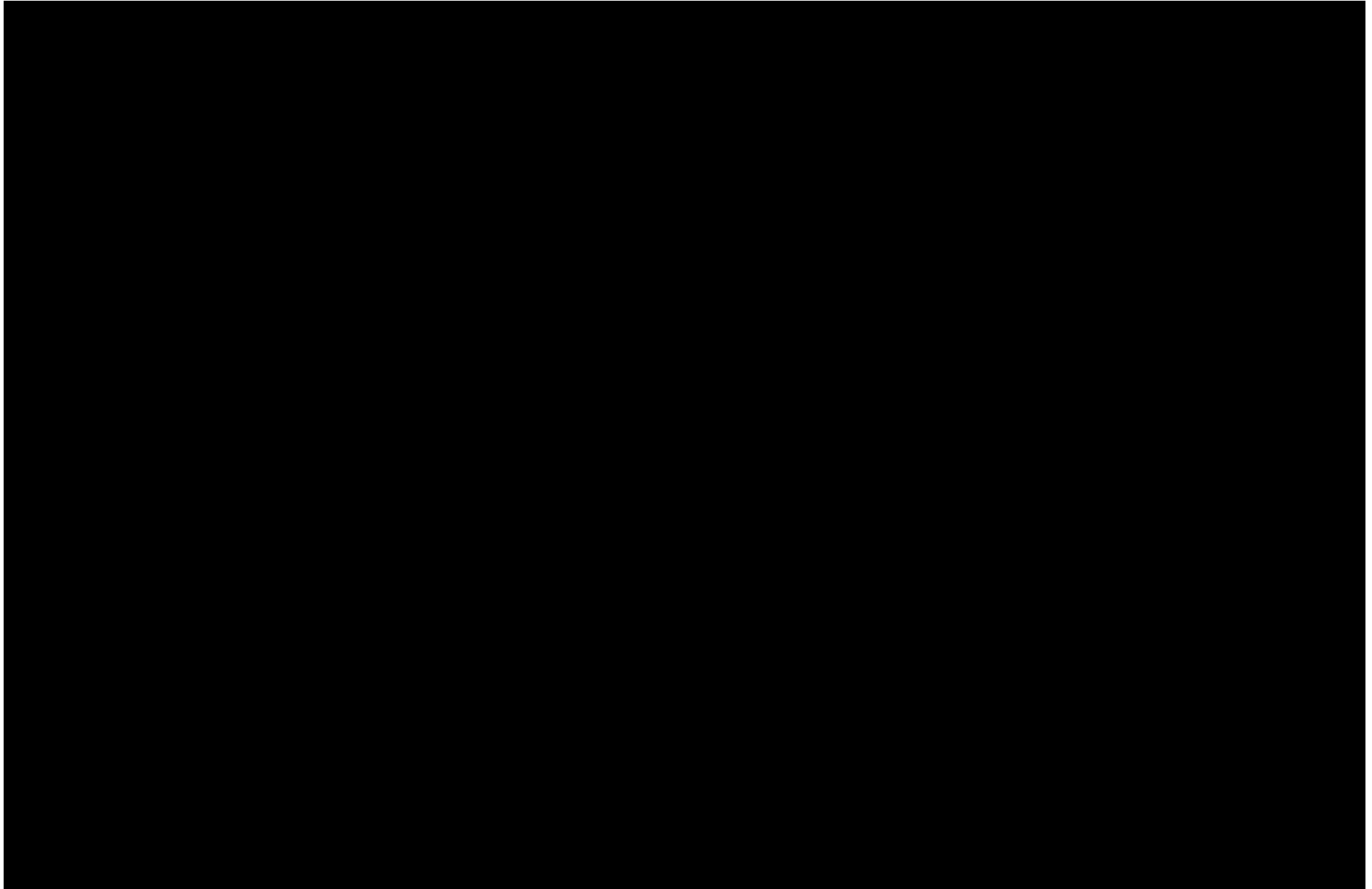


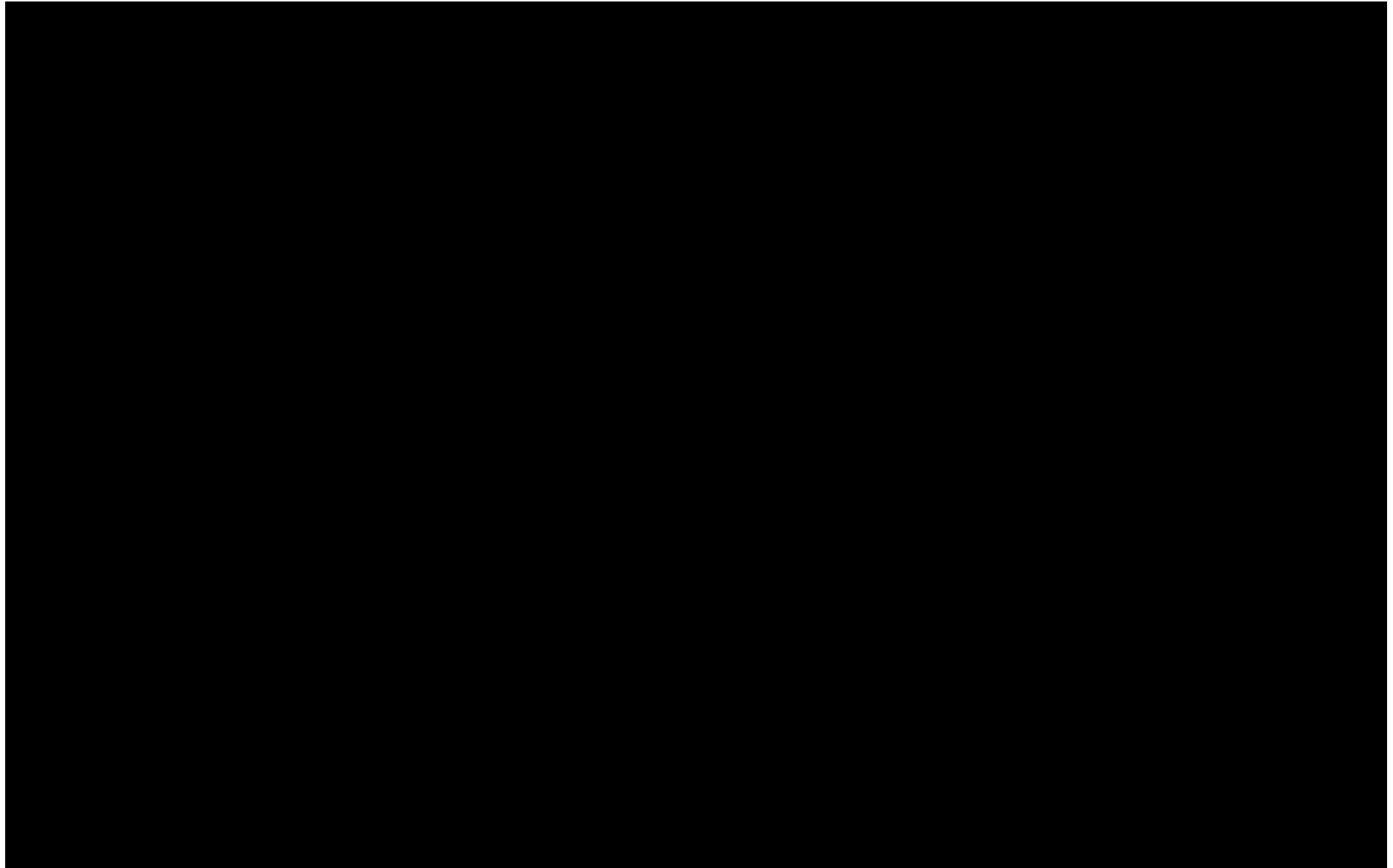


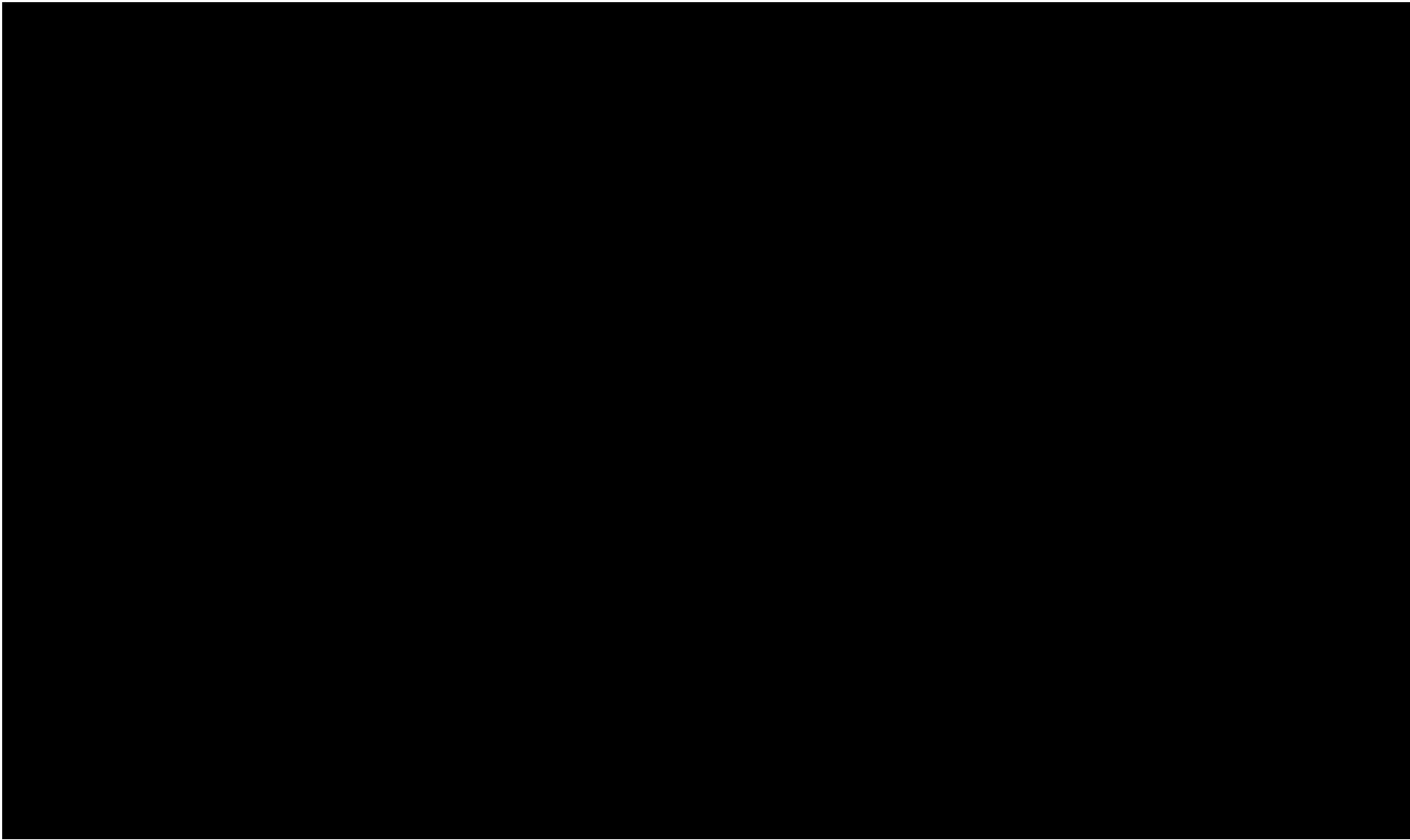


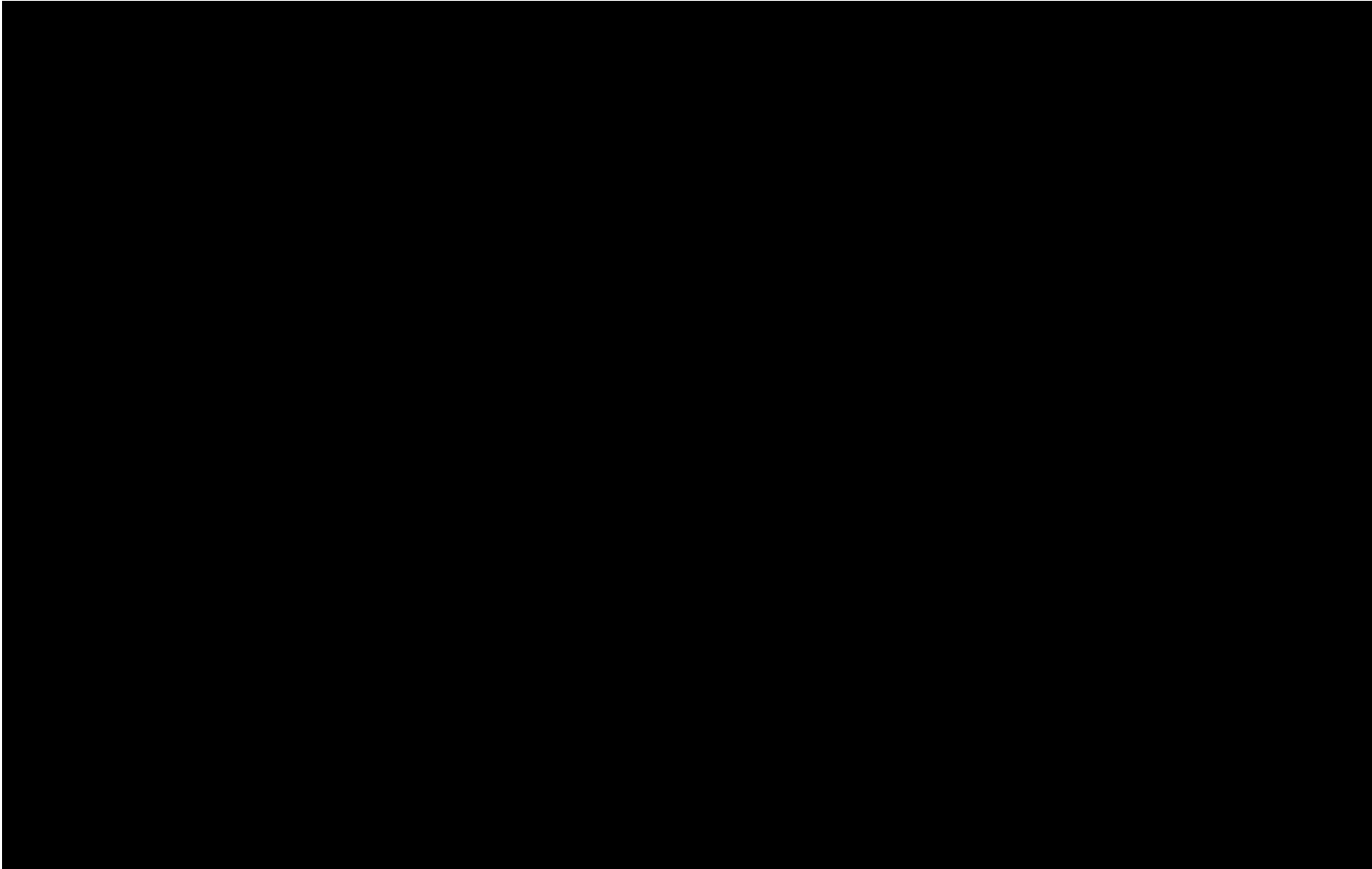


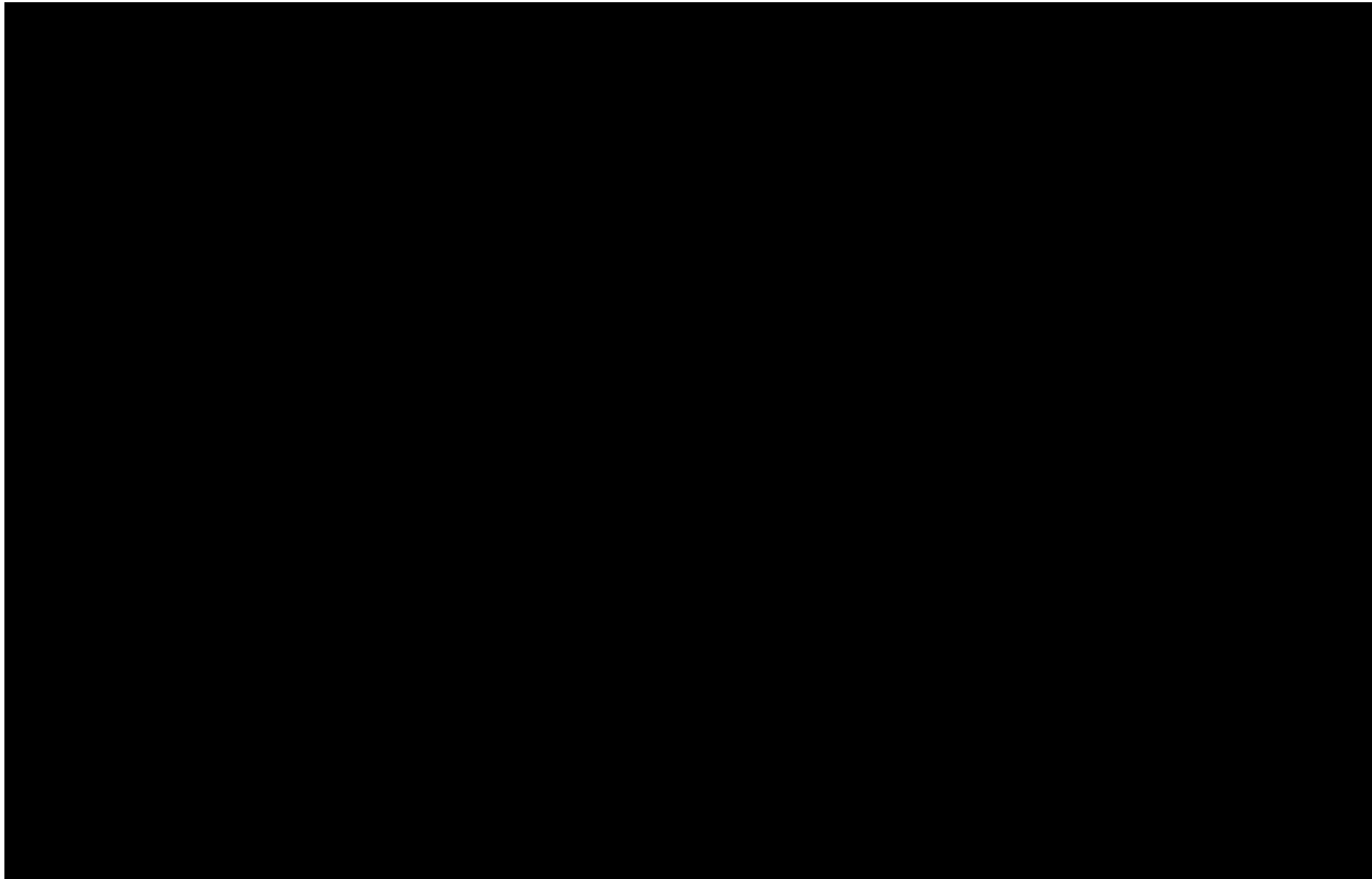




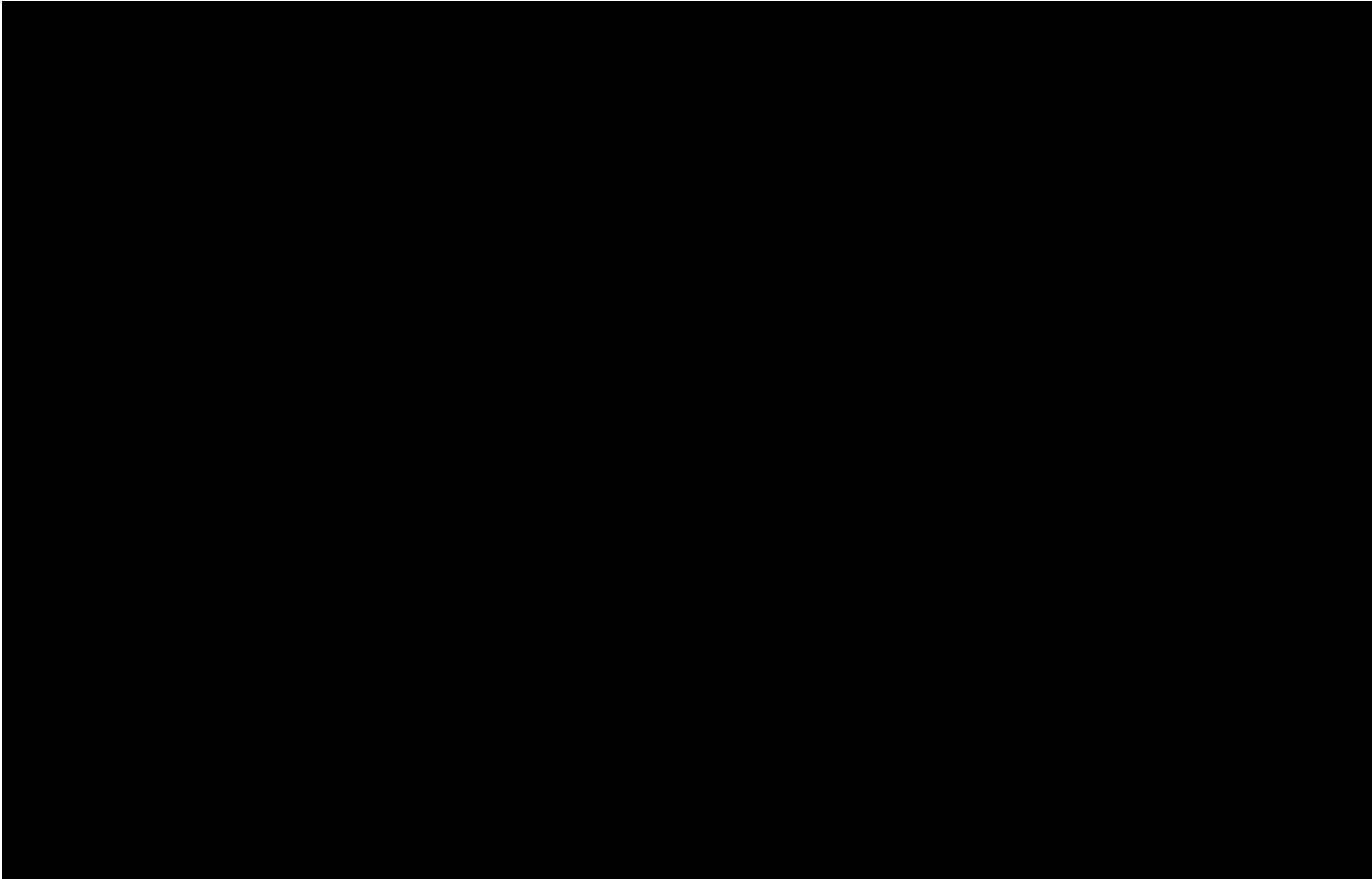


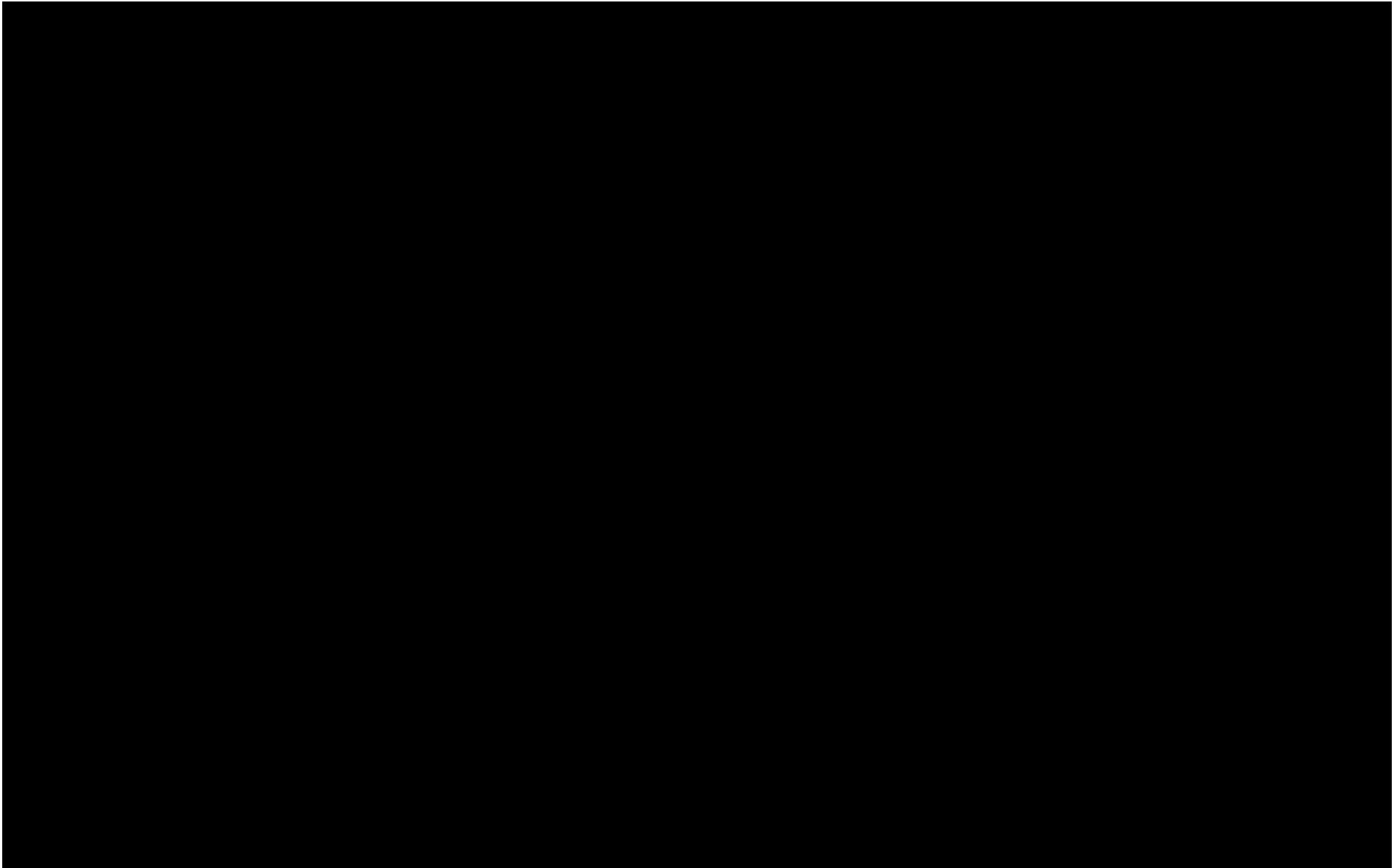


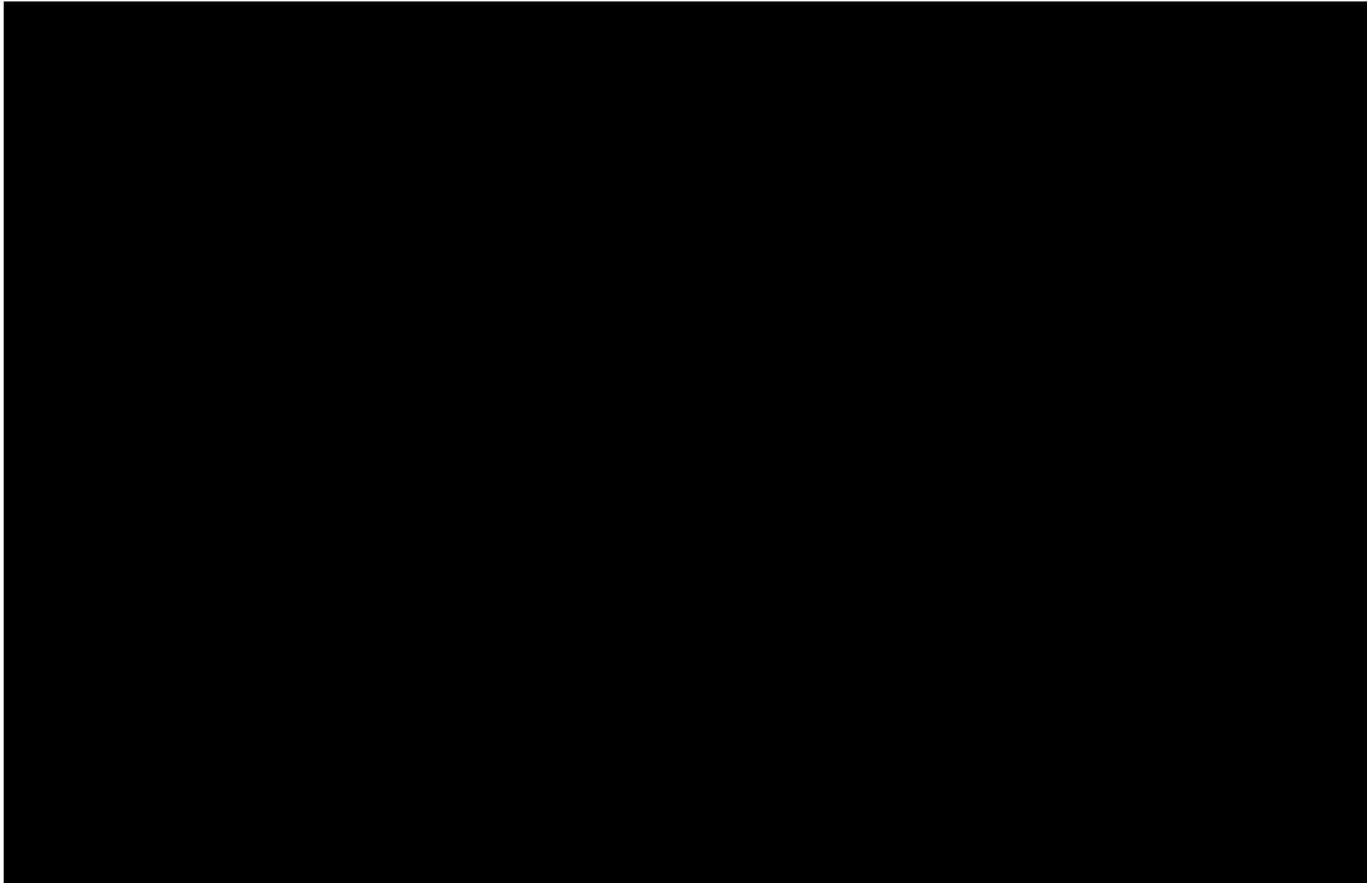


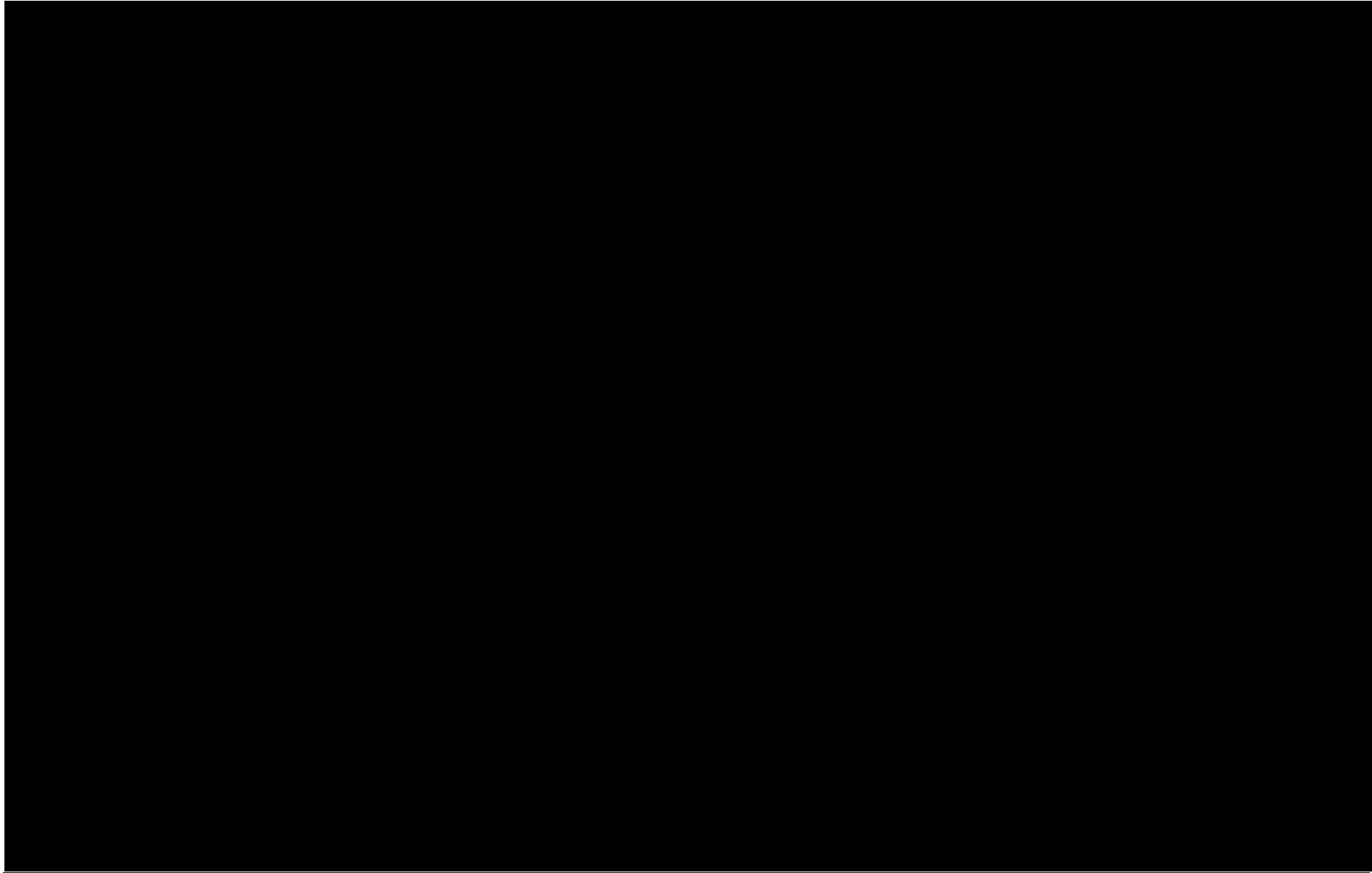


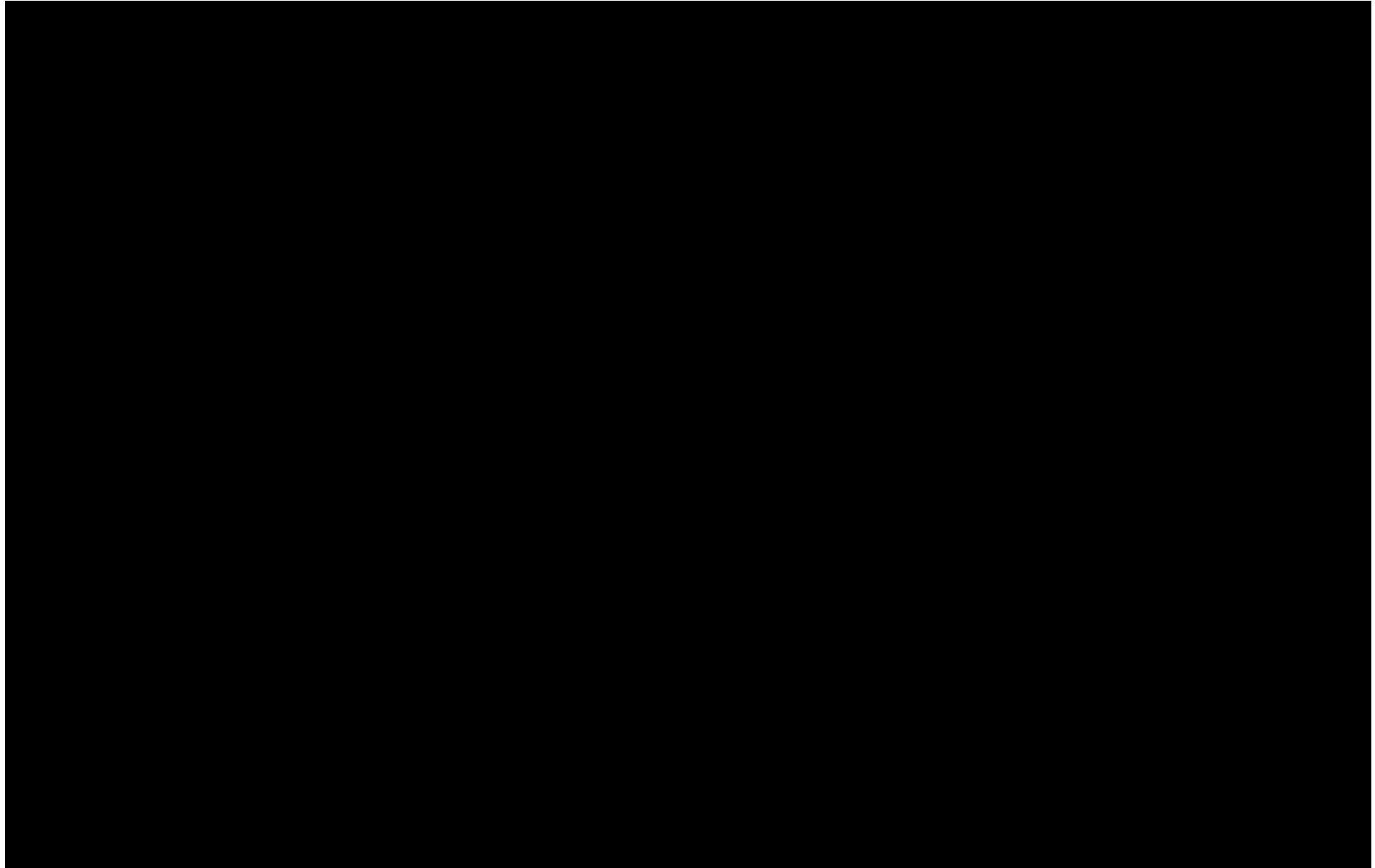




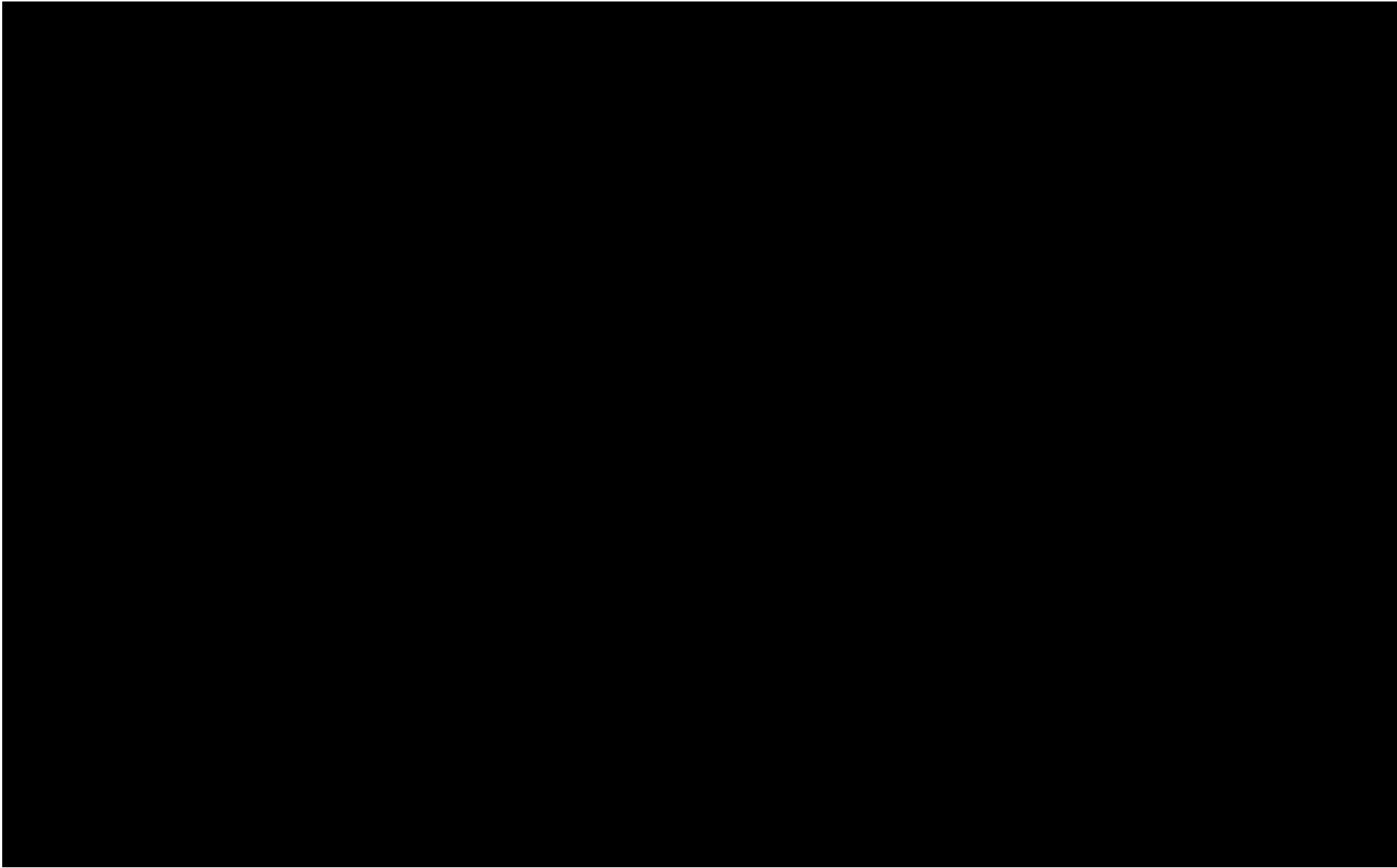


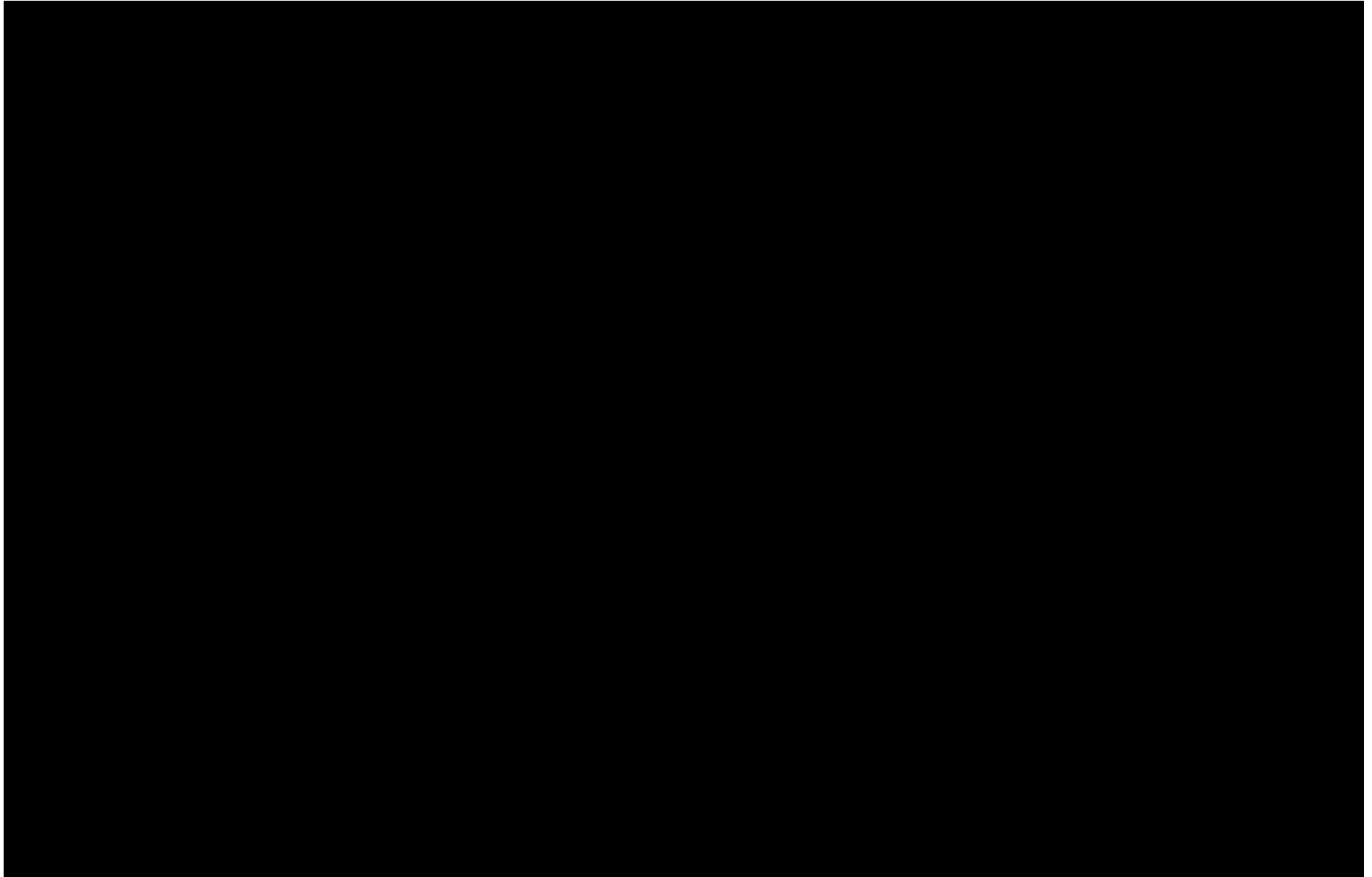




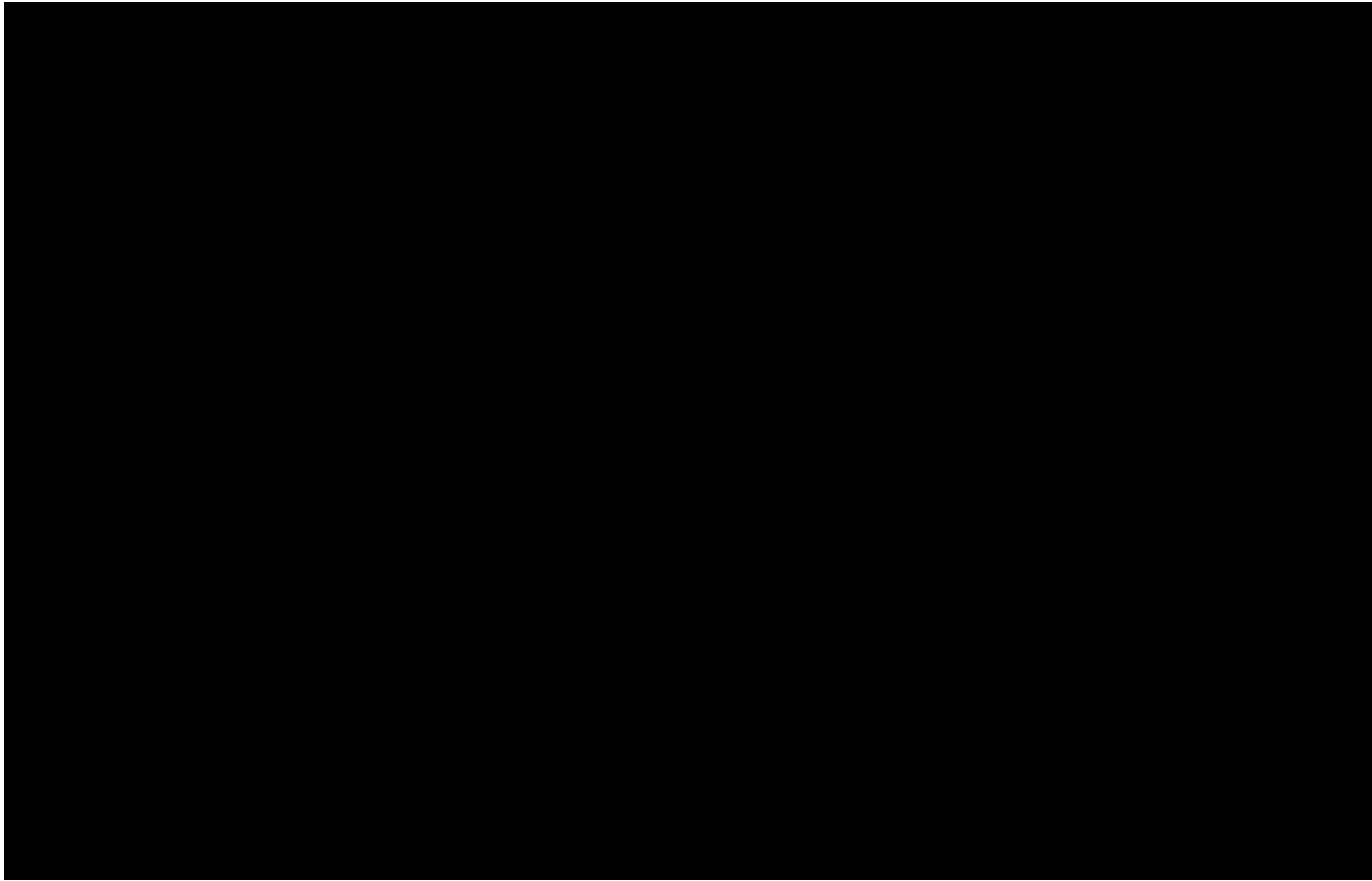


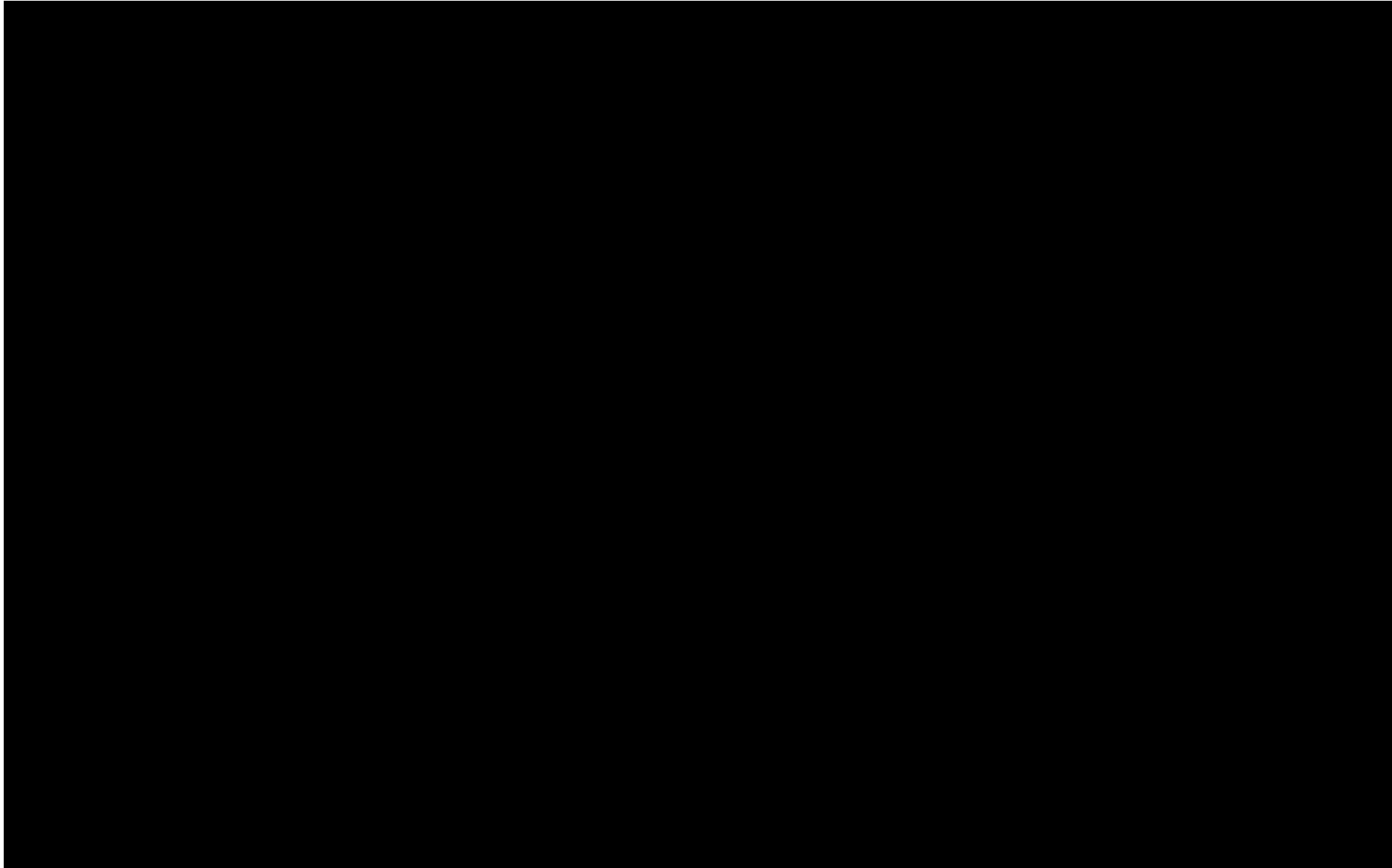


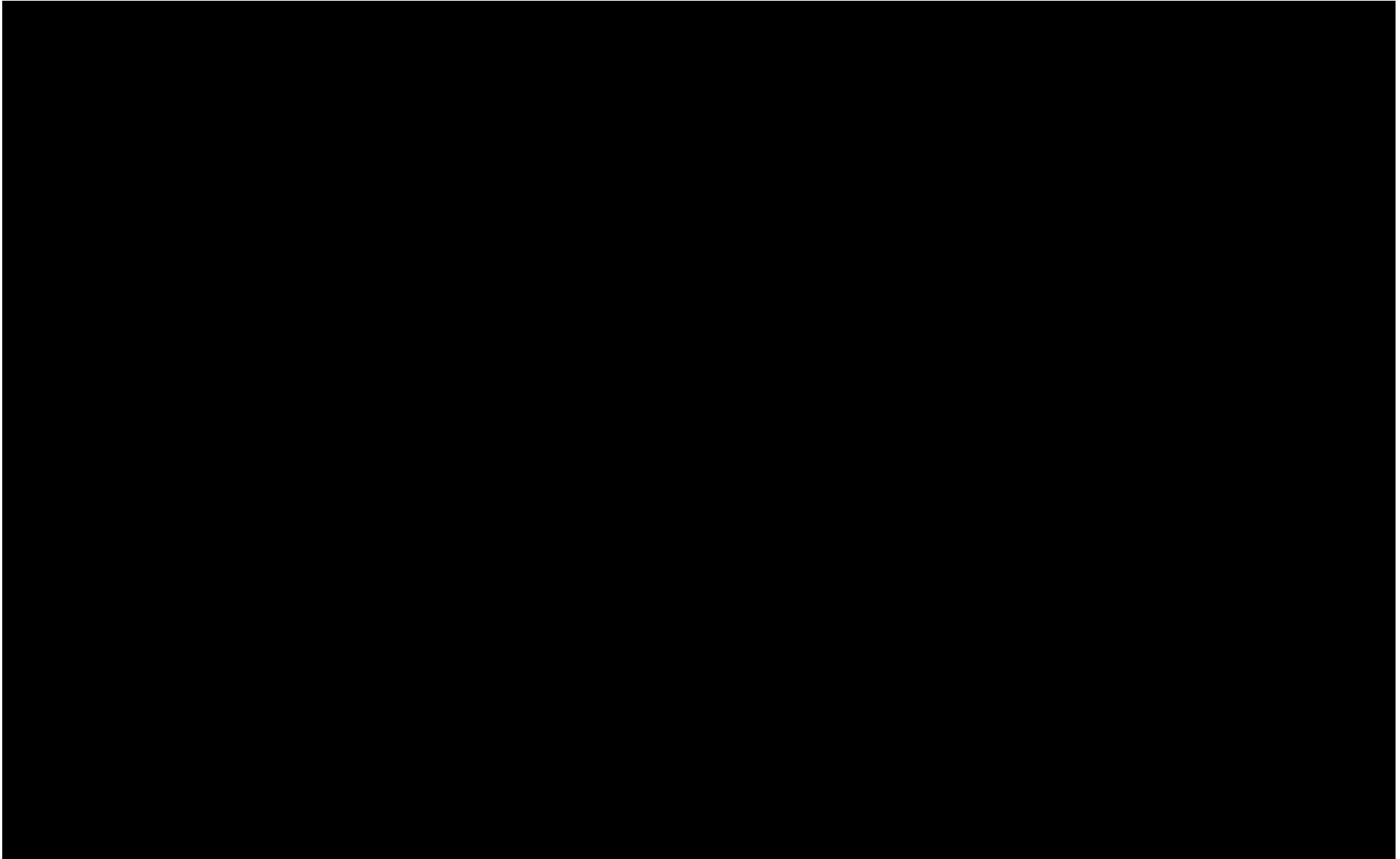


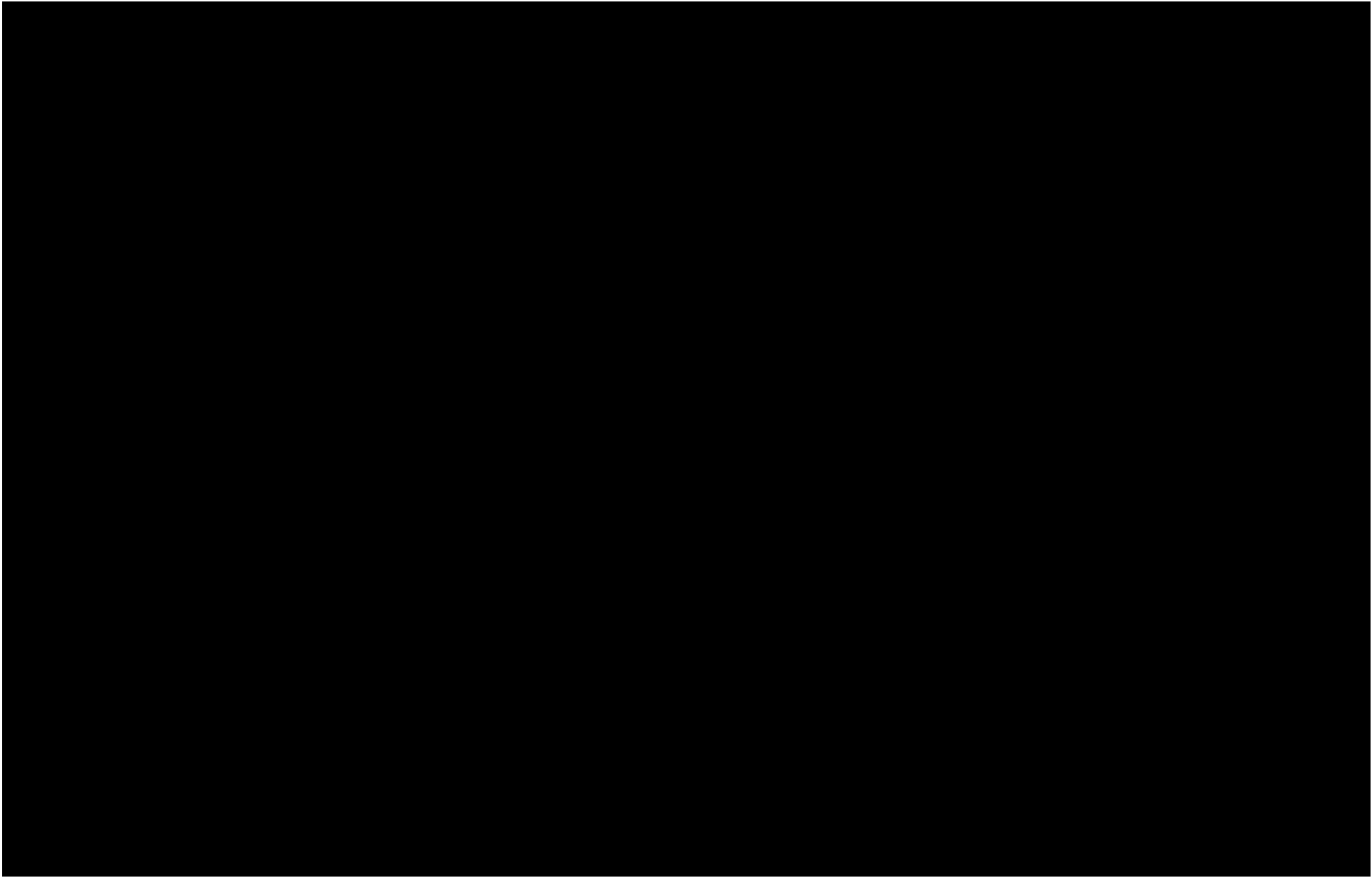


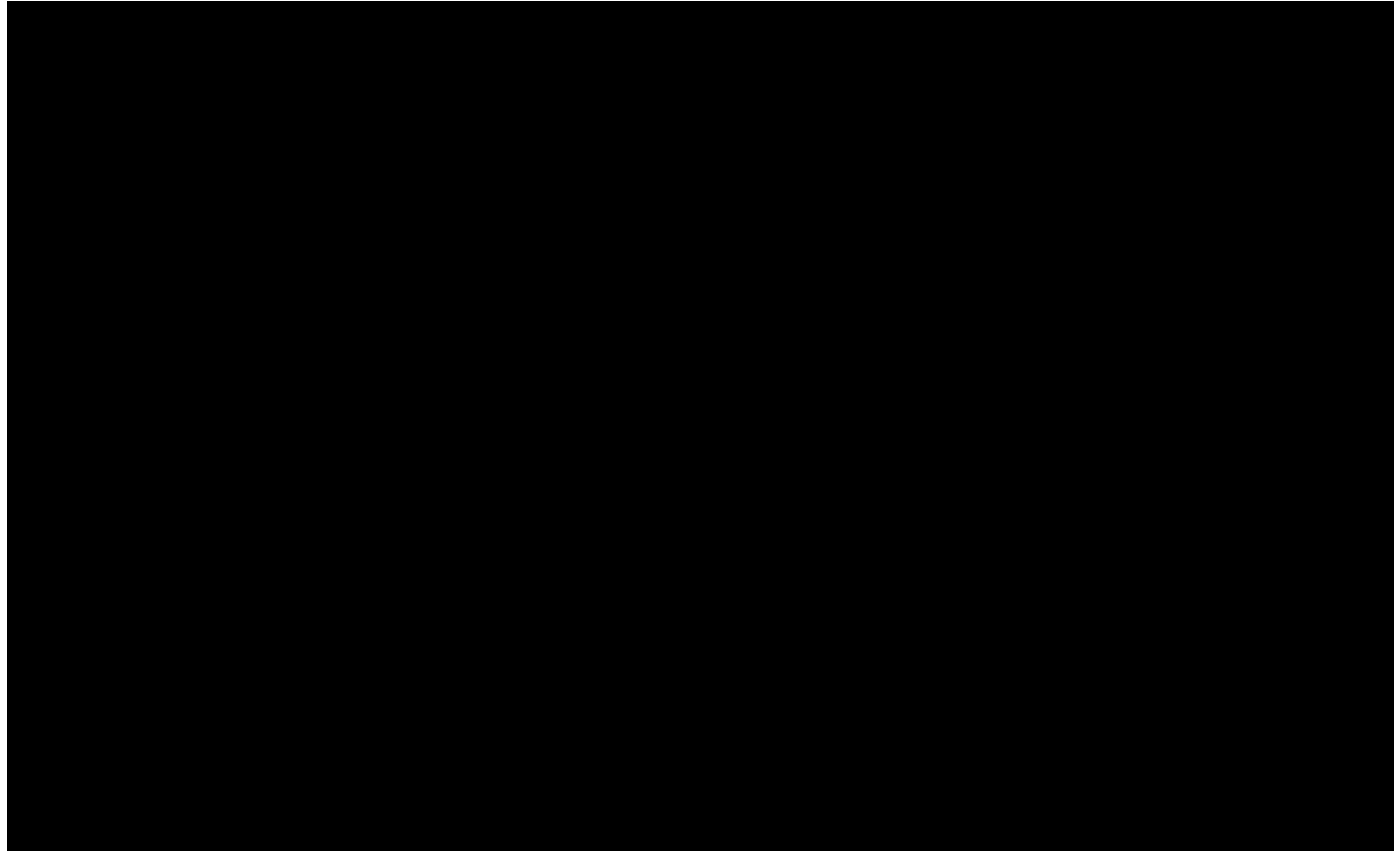


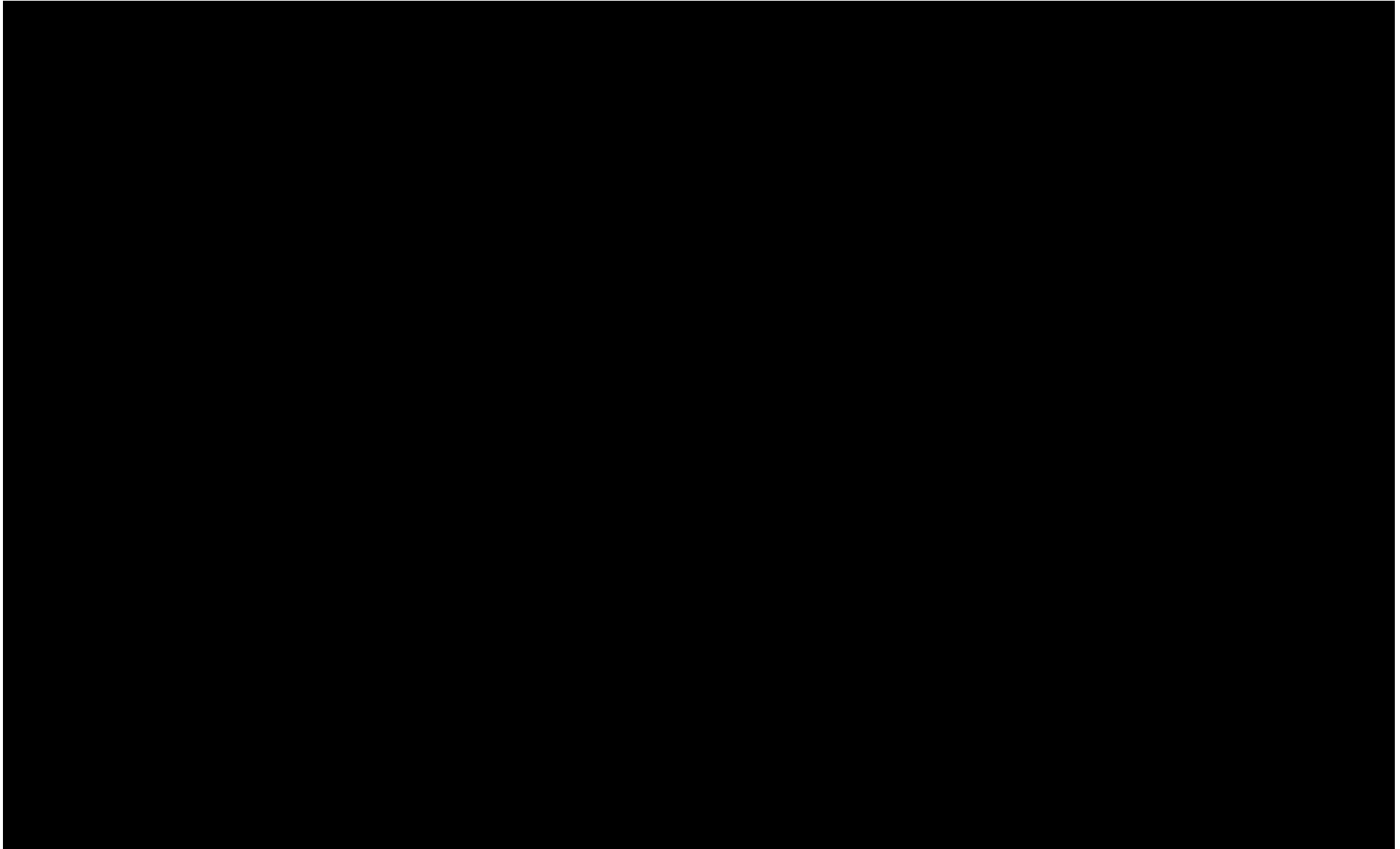


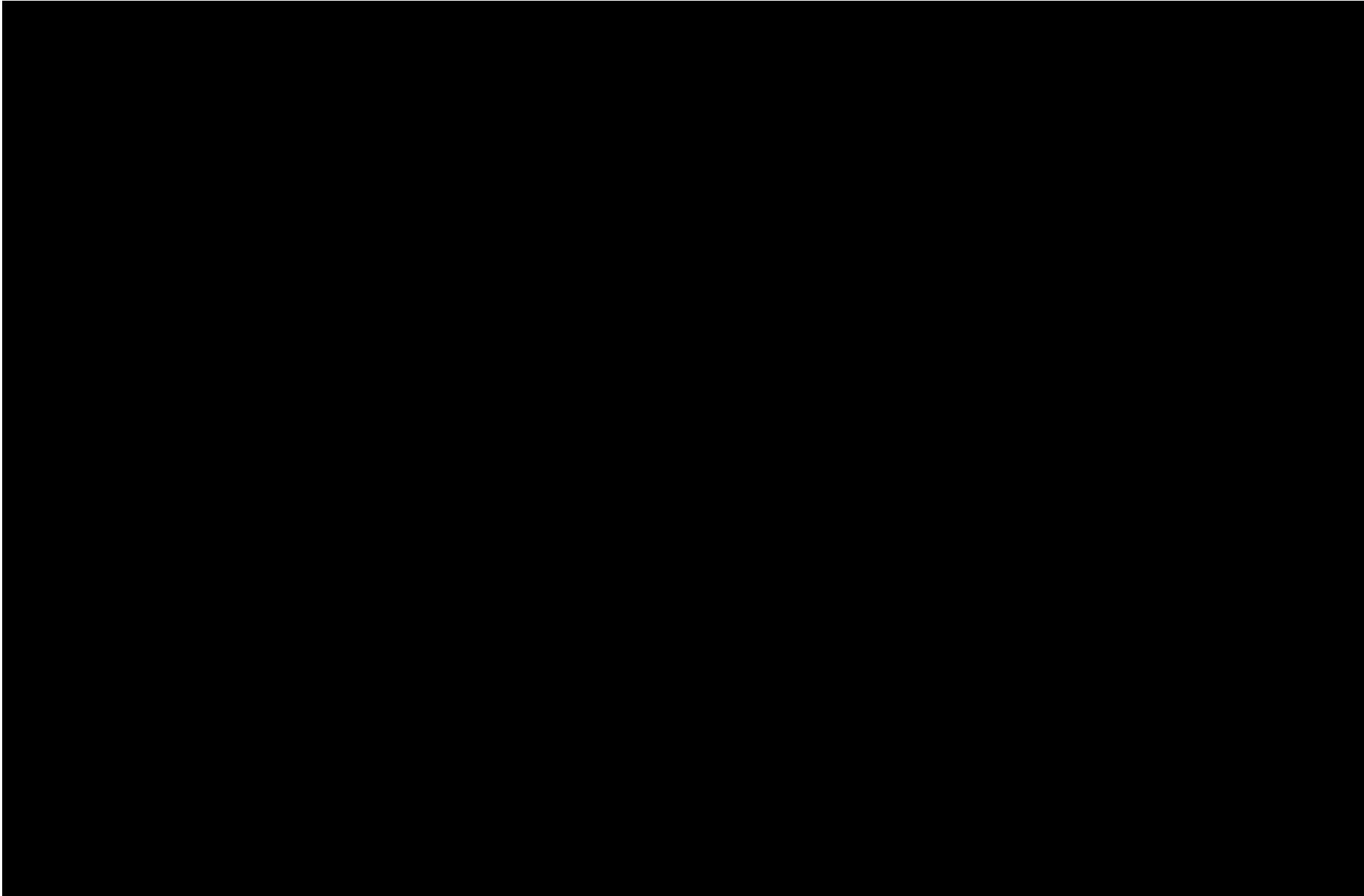


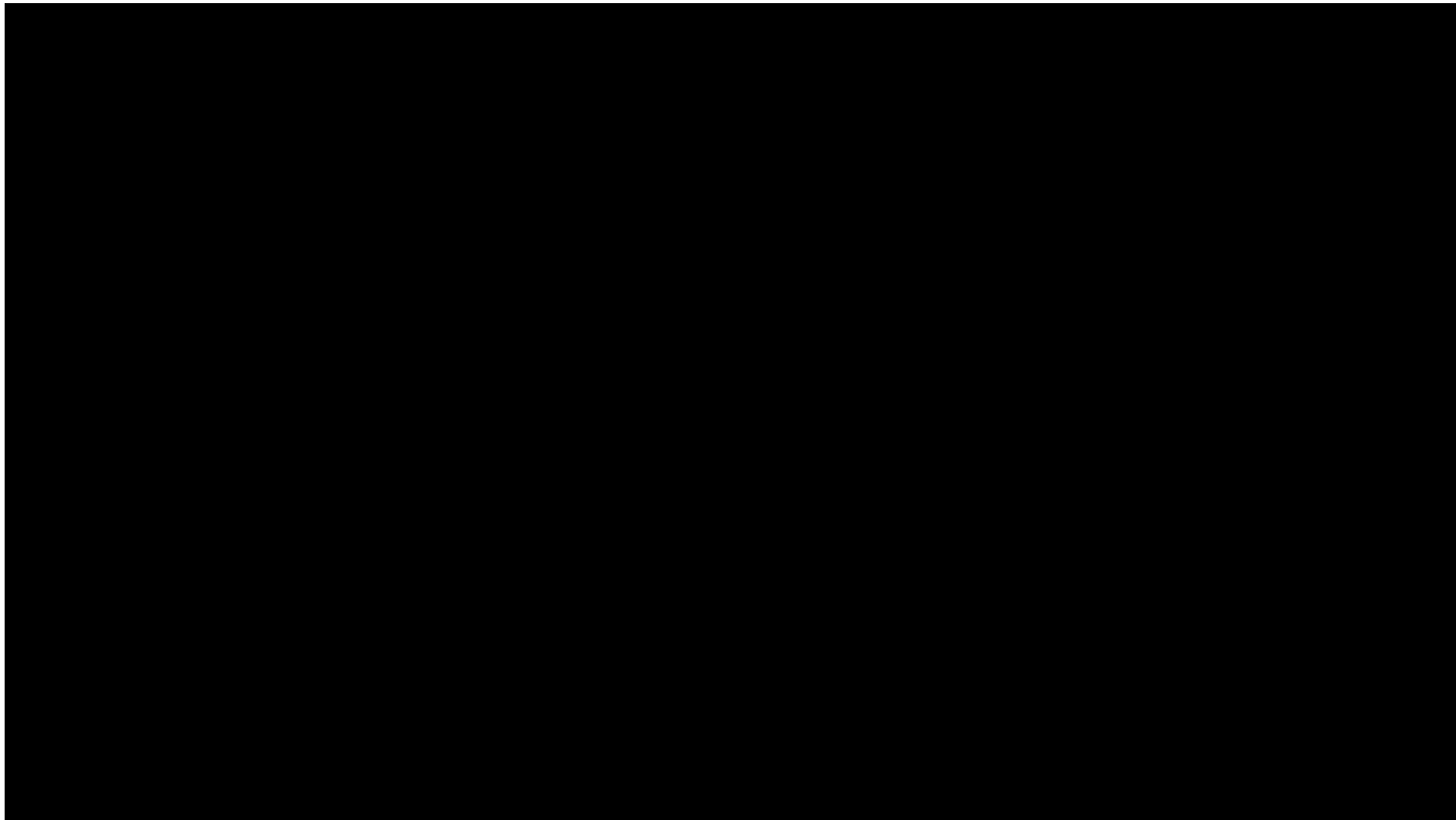












<b>TOTAL</b>	<b>\$ 10,151,986</b>	<b>\$ 9,069,729</b>	<b>\$ 19,221,716</b>	
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## **Annex B: LIVCD Results Framework and Performance Indicators**

LIVCD tracked results on the project level according to the LIVCD results framework and the associated set of performance indicators, which measured progress toward achieving the project's Intermediate Results (IR) and Goal:

### **LIVCD Goal: Develop competitive, functional<sup>20</sup> value chains to increase incomes of the rural population, including MSMEs**

*LIVCD Intermediate Result 1: Increased access to markets in targeted value chain*

*LIVCD Intermediate Result 2: Increased business linkages in target value chains*

*LIVCD Intermediate Result 3: Increased productivity in target value chains*

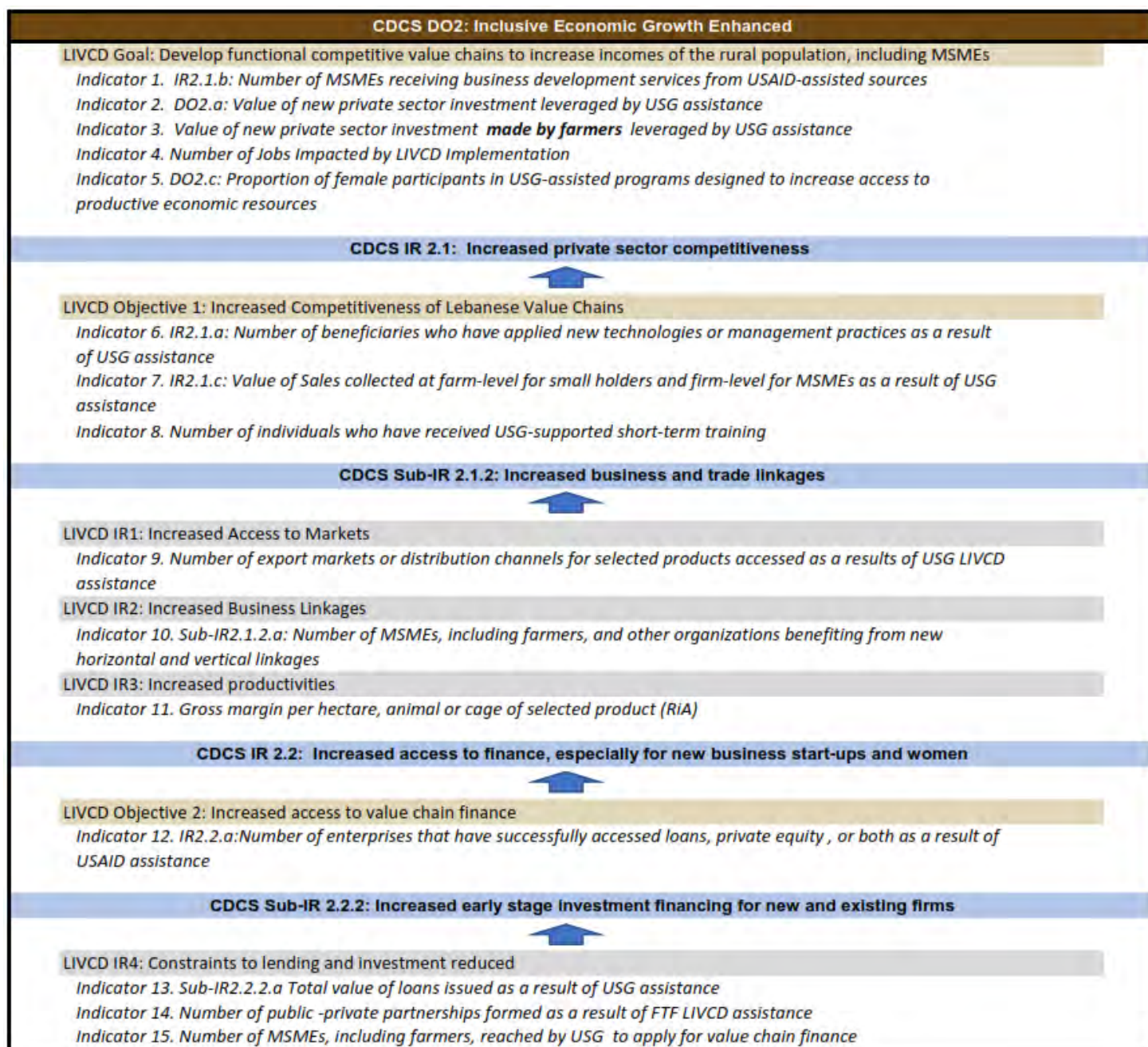
*LIVCD Intermediate Result 4: Constraints to lending reduced in target value chains*

The overall goal of the LIVCD upgrading strategies was to facilitate assistance that developed functional, competitive value chains to increase incomes of the rural population, including MSMEs. LIVCD assistance (grants and technical assistance, including training) achieved this goal by helping beneficiaries in the target value chains become more competitive by leveraging investments and reducing constraints to lending, enabling increased productivity, facilitating new linkages between producers and buyers/input suppliers, and helping beneficiaries to access to new markets or increase sales to existing markets.

The LIVCD results framework provides a visual depiction of how LIVCD worked toward its Goal through the achievement of the four Intermediate Results, linked with the USAID/Lebanon Mission Country Development Cooperation Strategy (CDCS) results framework, Development Objective (DO), and Intermediate Results as follows:

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<sup>20</sup> *Per the revised LIVCD scope of work (SOW), a functional value chain is a competitive and inclusive value chain. Competitiveness can be measured by increase in sales, improvement in quality and productivity. Inclusiveness can be measured by the number of value chain participants including micro, small and medium enterprises, farmers and other organizations, receiving assistance. The assistance can include business development services, application of improved technologies or management practices and facilitation of business linkages.*



### **Performance Results:**

LIVCD achieved results exceeding the set targets – often significantly – for many of its indicators and achieved results within 5% of the target for most others. The table below summarizes the project performance indicators and results achieved against life of project (LOP) targets. The subsequent table includes more details of the performance indicators and results.

LIVCD Goal: Develop competitive, functional value chains to increase incomes of the rural population, including MSMEs			
Performance indicator	Life of project targets and results		
	Target	Result	Variation
1. Number of MSMEs receiving business development services from USAID-assisted sources	17,835	19,628	Exceeded the target by 1,793 MSMEs or 10%
2. Value of private sector investment leveraged by USG assistance	\$12,828,000	\$15,894,088	Exceeded the target by \$3,066,088 or 24%
3. Value of investment made by farmers and other value chain actors leveraged by LIVCD implementation	\$20,830,000	\$25,473,149	Exceeded the target by \$4,643,149 or 22%
4. Number of jobs impacted LIVCD implementation	9,195	8,864	Below the target by 331 jobs or 3.6%
5. Proportion of female participants in USG-assisted programs designed to increase access to productive economic resources	23%	20%	Below the target by 3 percentage points
6. Number of beneficiaries who have applied improved technologies or management practices as a result of USG assistance	12,960	12,918	Below the target by 42 beneficiaries or 0.3%
7. Value of sales (collected at farm level for smallholders and firm level for MSMEs) as a result of USG assistance	\$160,000,000	\$138,665,782	Below the target by \$21,334,218 or 13%
8. Number of individuals who have received USG-supported short-term training	16,420	16,200	Below the target by 220 individuals or 1.3%
LIVCD Intermediate Result 1: Increased access to markets			
Performance indicator	Life of project targets and results		
	Target	Result	Variation
9. Number of export markets, or distribution channels for selected products accessed as a result of USG assistance	199	188	Below the target by 11 markets or 5.5%
LIVCD Intermediate Result 2: Increased business linkages			
Performance indicator	Life of project targets and results		
	Target	Result	Variation
10. Number of MSMEs, including farmers, benefiting from new horizontal & vertical linkages	5,745	5,554	Below the target by 191 MSMEs or 3.3%
LIVCD Intermediate Result 3: Increased productivity			
Performance indicator	Life of project targets and results		
	Target	Result	Variation
11. Gross margin per hectare, animal or cage of selected product	10% over baseline	Results by value chain below	
Apples (US Dollar/hectare)	\$5,412	\$3,455	Below the target by \$1,957 or 36%
Avocados (US Dollar/hectare)	\$11,169	\$18,822	Exceeded the target by \$7,654 or 69%
Cherries (US Dollar/hectare)	\$5,326	\$5,153	Below the target by \$173 or 3.3%
Olive oil (US Dollar/hectare)	\$1,465	\$2,600	Exceeded the target by \$1,135 or 77%
Grapes (US Dollar/hectare)	\$8,461	\$9,124	Exceeded the target by \$663 or 8%

Honey (US Dollar/hive)	\$184	\$175	Below the target by \$9 or 5%
<b>LIVCD Intermediate Result 4: Constraints to lending reduced (support access to finance)</b>			
<i>Performance indicator</i>	<i>Life of project targets and results</i>		
	<i>Target</i>	<i>Result</i>	<i>Variation</i>
12. Number of enterprises/farmers that successfully accessed loans, private equity, or both as a result of USAID assistance	102	103	Exceeded the target by 1 enterprise/farm or 1%
13. Total value of loans issued as a result of USG assistance	\$19,870,000	\$18,984,535	Below the target by \$885,465 or 4.5%
14. Number of public-private partnerships formed as a result of FtF assistance	205	211	Exceeded the target by 6 PPPs or 2.9%
15. Number of MSMEs, including farmers, assisted by USG to apply for value chain finance	1,337	1,255	Below the target by 82 MSMEs or 6.1%

No.	Results Framework reference	Indicator Title - Disaggregation	Unit of measurement	Reporting frequency	Life of Project Results through December 2018	Life of Project Targets
USAID/Lebanon Development Objective 2: Enhance Economic opportunity for the poorest segments of Lebanese society, particularly in areas outside Beirut						
CDCS DO2: Inclusive Economic Growth Enhanced						
LIVCD Goal: Develop functioning, competitive value chains to increase incomes of the rural population including MSMEs						
1	IR 2.1.b:	Number of MSMEs, including farmers, and other organizations receiving business development services from USG assisted sources	MSMEs, including farmers/producers	Quarterly	19,628	17,835
	Size	Micro (1-10)				
	Size	Small (11-50)				
	Size	Medium (51-100)				
2	DO 2.a:	Value of new private sector investment leveraged by USG assistance	Value of new private sector investment	Annual	\$ 15,894,087.66	\$ 12,828,000.00
3		Value of investment <u>made by farmers</u> and other value chain actors leveraged by LIVCD implementation.	Value of new private sector investment made by Farmers	Annual	\$ 25,473,148.91	\$ 20,830,000.00
4		Number of Jobs Impacted by LIVCD Implementation	Jobs - FTEs	Quarterly	8,864	9,195
5	DO 2c:	Proportion of female participants in USG-assisted programs designed to increase access to productive economic resources (assets, credit, income or employment)	Women proportion	Quarterly	20%	23%
	Denominator	Number of male and female MSMEs			19,628	17,835
		Number of male and female IFs			4,275	-
	Numerator	Number of females			4,807	4,129
CDCS IR2.1: Increased Private Sector Competitiveness						
LIVCD Objective 1: Increased Competitiveness of Lebanese Value Chains						
6	IR 2.1.a:	Number of beneficiaries who have applied improved technologies or management practices as a result of USG assistance	Farmers/MSMEs	Quarterly	12,918	12,960
		Number of farmers and others who have applied improved technologies or management practices as a result of USG assistance	Farmers & others		12,496	12,300
		Producers			12,220	
		Sex			12,220	
		Technology type			10,772	
		Other			276	

No.	Results Framework reference	Indicator Title - Disaggregation	Unit of measurement	Reporting frequency	Life of Project Results through December 2018	Life of Project Targets
		Sex			276	
		Technology type			276	
		Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations and community-based organizations (CBOs) that applied improved technologies or management practices as a result of USG assistance	Private enterprises Producers organizations Water users associations Women's groups Trade & business association CBOs		422	660
	Type of Organization	Private enterprises			258	
		Producers organization			86	
		Water users associations			-	
		Women's groups			-	
		Trade & Business association			1	
		CBOs			77	
7	IR 2.1c	IR 2.1c: Value of sales (collected at farm-level for small holders and firm-level for MSMEs) as a result of USG assistance	Volume	Annual	179,425	58,691
		# of beneficiaries with attributed value of sales	Value		\$ 138,665,781.84	\$ 160,000,000.00
		Value of Export sales - MSME	Volume		11,299	
		# of beneficiaries with attributed value of sales	Value		\$ 24,988,281.05	\$ 24,878,807.35
		Pome Fruits-Apple	Volume			
			Value		\$ 3,889,545.16	
		Stone Fruits-Avocado	Volume			
			Value		\$ 53,813.33	
		Stone Fruits-Cherry	Volume			
			Value		\$ -	
		Olive Oil	Volume			
			Value		\$ 558,653.09	
		Grapes	Volume			
			Value		\$ 5,255,729.99	
		Honey	Volume			
			Value		\$ 2,497,948.40	
		Processed Food	Volume			
			Value		\$ 12,667,900.24	
		Rural Basket	Volume			
			Value		\$ 64,690.84	

No.	Results Framework reference	Indicator Title - Disaggregation	Unit of measurement	Reporting frequency	Life of Project Results through December 2018	Life of Project Targets
		Value of Domestic sales - MSME	Volume		113,643	
			Value		\$ 34,363,337.52	\$ 64,968,396.14
		# of beneficiaries with attributed value of sales				
		Pome Fruits-Apple	Volume			
			Value		\$ 1,079,026.73	
		Stone Fruits-Avocado	Volume			
			Value		\$ -	
		Stone Fruits-Cherry	Volume			
			Value		\$ 20,020.00	
		Olive Oil	Volume			
			Value		\$ 609,333.00	
		Grapes	Volume			
			Value		\$ 1,481,580.00	
		Honey	Volume			
			Value		\$ 3,926,046.09	
		Processed Food	Volume			
			Value		\$ 10,105,575.54	
		Rural Basket	Volume			
			Value		\$ 3,981,756.17	
		Rural Tourism	Volume			
			Value		\$ 13,160,000.00	
		Value of Domestic sales - Farmers	Volume		54,482	
			Value		\$ 79,314,163.26	\$ 70,152,796.51
		# of beneficiaries with attributed value of sales				
		Pome Fruits-Apple	Volume			
			Value		\$ 6,223,763.71	
		Stone Fruits-Avocado	Volume			
			Value		\$ 11,473,487.77	
		Stone Fruits-Cherry	Volume			
			Value		\$ 3,401,041.59	
		Olive Oil	Volume			
			Value		\$ 20,802,025.27	
		Grapes	Volume			
			Value		\$ 16,732,791.56	
		Honey	Volume			
			Value		\$ 20,681,053.35	
8		Number of individuals who have received USG-supported short-term training.	Individuals	Quarterly	16,200	16,420
	Type of Individual	Producers				
		People in government				
		People in private sector firms				
		People in civil society				
CDCDS Sub-IR2.1.2: Increased Business and Trade Linkages						

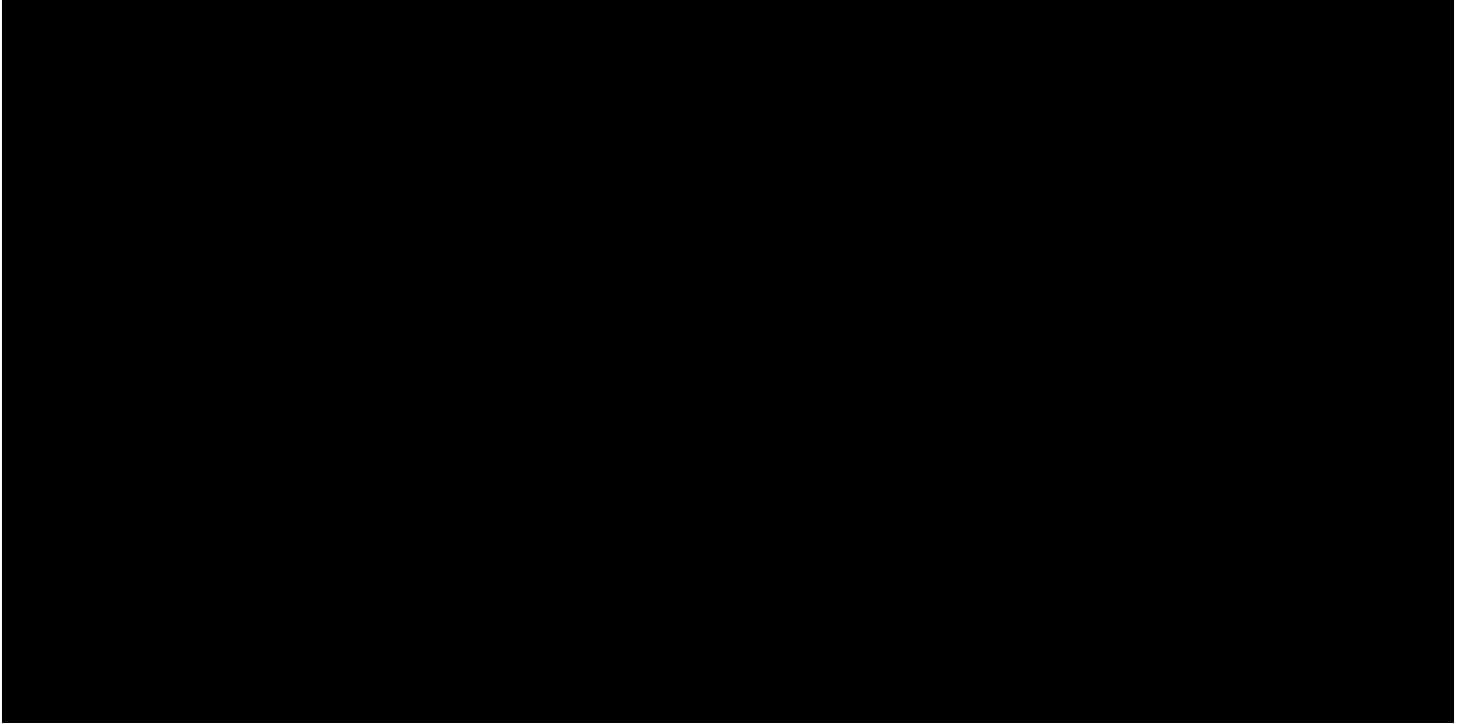
No.	Results Framework reference	Indicator Title - Disaggregation	Unit of measurement	Reporting frequency	Life of Project Results through December 2018	Life of Project Targets
LIVCD IR1: Increased Access to Markets						
9		Number of export markets, or distribution channels for selected products accessed as a result of USG assistance	New export markets New distribution channels	Annual	188	199
	Value Chain	Pome Fruit				
	Value Chain	Stone Fruit-Avocados				
	Value Chain	Stone Fruit-Cherry				
	Value Chain	Olive Oil				
	Value Chain	Honey				
	Value Chain	Grapes				
	Value Chain	Processed Foods				
	Value Chain	Rural Basket				
LIVCD IR2: Increased Business Linkages						
10	Sub-IR 2.1.2.a	Number of MSMEs, including farmers, and other organizations, benefiting from new horizontal & vertical linkages	MSMEs, including farmers/producers	Quarterly	5,554	5,745
	Size	Micro (1-10)			5,493	
	Size	Small (11-50)			50	
	Size	Medium (51-100)			11	
LIVCD IR3: Increased Productivities						
11		Gross margin per hectár, animal or cage of selected product		Annual		
		4.5- 16 Farmer's gross margin per unit of land	US Dollar / hectár			
		Pome Fruit			\$ 3,454.79	\$ 5,411.81
		Stone Fruit-Avocados			\$ 18,822.08	\$ 11,168.52
		Stone Fruit-Cherry			\$ 5,153.21	\$ 5,326.38
		Olive Oil			\$ 2,599.96	\$ 1,465.37
		Grapes			\$ 9,123.73	\$ 8,460.50
		4.5- 17 Farmer's gross margin per crate (hive)	US Dollar / hive			
		Honey			\$ 174.92	\$ 184.03
CDCS IR2.2: Increased access to finance, especially for new business start-ups and woman						
LIVCD Objective 2: Increased Access to Value Chain Finance						
12	IR 2.2.a:	Number of enterprise/farmers that successfully accessed loans, private equity, or both as a result of USAID assistance	MSMEs, including farmers	Quarterly	103	102
CDCS Sub-IR2.2.2: Increased early stage investment financing for new and existing firms						
LIVCD IR4: Constraints to Lending and Investment Reduced						



No.	Results Framework reference	Indicator Title - Disaggregation	Unit of measurement	Reporting frequency	Life of Project Results through December 2018	Life of Project Targets
13	Sub-IR 2.2.2.a	Sub-IR 2.2.2a Total value of loans issued as a result of USG assistance	Value of loans	Quarterly	\$ 18,984,535.01	\$ 19,870,000.00
14		Number of public-private partnerships formed as a result of FtF assistance	Public-private partnerships	Quarterly	211	205
	Partnership Focus	Agricultural production				
		Agricultural post-harvest transformation				
		Nutrition				
		Other				
		Multi-focus				
15		Number of MSMEs, including farmers, reached by USG to apply for value chain finance	MSMEs, including farmers	Quarterly	1,255	1,337
	Size	Micro (1-10)				
		Small (11-50)				
		Medium (51-100)				

## **Annex C: Final Financial and Level of Effort (LOE) Report**

### ***Total LIVCD Contract Expenditure (USD):***



*includes estimated expenses for January 2019*

### ***Total LIVCD Contract LOE Expenditure (Days):***

