



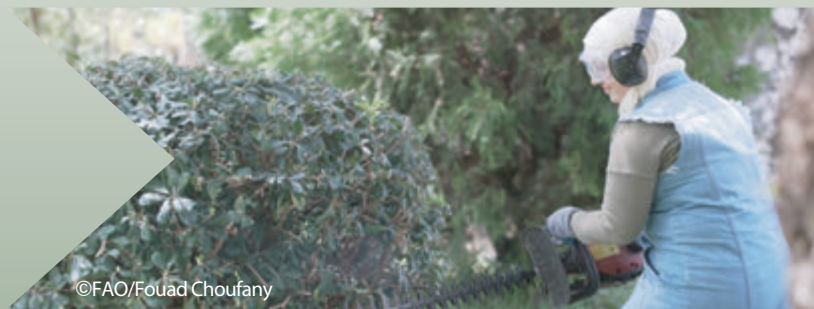
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Skills Development for **Inclusive Growth** in the **Lebanese Agriculture Sector** Policy Brief



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Beirut, 2020

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This policy brief was developed in the framework of the FAO project “Upgrading the technical agriculture education system in Lebanon” funded by the Kingdom of Netherlands. The project is implemented in partnership with the Ministry of Agriculture, UNICEF, ILO, and AVSI. It works on enhancing the employability of young Lebanese and displaced Syrians and other refugees in Lebanon. It offers them the opportunity of acquiring the necessary technical skills to access improved career opportunities in agriculture and agribusiness in Lebanon or in Syria upon their return. The project also works on the efficiency of the agriculture education system in Lebanon to support more youth. This is done by improving agricultural capacity development and creating entry points into green jobs.

This brief builds on research conducted by Dr. Aurore Assaker, “Trends in the demand and supply for skills in the agriculture sector:

the case of Lebanon”, within the joint programme between ILO and FAO “Upgrading the technical agriculture education system in Lebanon”, funded by the Kingdom of the Netherlands. This brief was prepared by Dr Karim Eid-Sabbagh (Think Triangle), and reviewed by Leon Gaskin, Chief Technical Advisor Skills at ILO-ROAS; Serajul Islam Skills Development Officer at ILO-ROAS; and Yasser Ali, former Skills Development officer at ILO-ROAS. Rania Hokayem, National TVET Programme Coordinator at ILO-ROAS; Patrick Daru, Senior Skills and Employability Specialist at ILO ROAS; Simon Hills, former Chief Technical Advisor and Socio-Economic Recovery Expert at ILO-ROAS; Sylwia Golawska, Junior Technical Officer at ILO; PhD Maurice Saade, FAO representative in Lebanon; Etienne Careme, FAO Liaison and Resilience Officer; Elie Choueiry, FAO Programme Associate; and Abir Abou El Khoudoud, FAO project manager, provided inputs.

Skills Development for Inclusive Growth in the Lebanese Agriculture Sector

- ▶ **THE PRESENT POLICY BRIEF DRAWS ON RECENT ILO RESEARCH¹ AND OTHERS TO HIGHLIGHT THE IMPORTANCE OF ADDRESSING A PRONOUNCED SKILLS MISMATCH IN THE AGRICULTURAL LABOUR MARKET TO SPUR AGRICULTURE SECTOR DEVELOPMENT.**

This brief examines key factors that influence the labour market demand and supply of skills, while providing an assessment of specific skills in demand, based on the ILO's study of supply and demand in the agriculture sector in 2018. The brief also looks at key measures to be considered by the Ministry of Agriculture and other stakeholders to promote a market responsive technical and vocational education and training (TVET) system.

Background

- ▶ **THE AGRICULTURE SECTOR IN LEBANON HAS BEEN, AND CONTINUES TO BE, AN IMPORTANT SECTOR FOR THE LEBANESE ECONOMY. IT IS A PRIMARY SOURCE OF INCOME AND EMPLOYMENT, PROVIDING LIVELIHOODS TO A LARGE SECTION OF THE LEBANESE POPULATION.**

Up to 25 per cent of Lebanese and between 75,000 and 100,000 Syrian workers draw incomes from farming and related work.² Currently, the agricultural labour force accounts for 12.1 per cent of total labour force. The sector employs about 212,000 people, of which only 8 per cent are formally employed. The agro-food industry is among the most important industrial sectors in the country, and employs a workforce of approximately 21,000.³

- ▶ **HOWEVER, THE SECTOR'S ABILITY TO CONTRIBUTE TO AN IMPROVEMENT OF INDIVIDUAL LIVELIHOODS, COMMUNITY WELL-BEING, AND SOCIAL DEVELOPMENT IS SEVERELY HAMPERED BY A NUMBER OF STRUCTURAL IMPEDIMENTS.**

The budget of the Ministry of Agriculture has remained well below 1 per cent of total government expenditure for most years since 1994.⁴ As a result, technical and vocational education and training as well as extension services have not been able to upgrade their services to meet the needs of the market.

- ▶ **THE POTENTIAL OF EXTENSION SERVICES FOR COACHING ON NEW TECHNIQUES AND SKILLS DEVELOPMENT IS UNDER UTILISED.**

A lack of public sector guidance and insufficient operational budget are some of the issues affecting public extension services.⁵ An FAO assessment from 2011 suggests that some 240 jobs for extension agents should be created to meet the challenges of zero hunger and climate change adaptation.⁶ That implies a budget increase of 725 per cent compared to the 2011 budget.⁷ The shortcomings of the public extension services disproportionately affect poor farmers and contribute to sustain inequalities in the sector.

- ▶ **THE COOPERATIVE SYSTEM HAS A LIMITED OUTREACH AND SUFFERS FROM LOW TRUST FROM FARMERS.**

At present, there are some 1,250 cooperatives in Lebanon serving only 4.5 per cent⁸ of farmers, of which only one third are estimated to be active.⁹ Cooperatives are often seen

1 ILO 2018. Unpublished. "Trends in the Demand and Supply for Skills in the Agriculture Sector: The Case of Lebanon".

2 ESCWA. 2016. Strategic Review of Food and Nutrition Security in Lebanon; ILO. 2013. Assessment of the Impact of Syrian Refugees in Lebanon and their Employment profile.

3 Ministry of Industry. 2010. The Lebanese Industrial Sector Facts and Findings 2007. UNIDO - ALI.

4 MoA. 2014. Ministry of Agriculture Strategy 2015 – 2019.

5 Ghadban, E. Y. 2013. Cooperative enterprises and agricultural development: the case of Lebanon. PhD Thesis. SOAS, University of London; MoA. 2014. Ministry of Agriculture Strategy 2015 – 2019.

6 FAO. 2012. Investment requirement in Agricultural Research and Extension (2010-2025) to achieve Zero-Hunger and adapt to climate change. Available at: http://www.fao.org/fileadmin/user_upload/nr/research-extension/img/Lebanon.pdf.

7 Ibidem.

8 ILO. 2018. The Cooperative Sector in Lebanon: What Role? What Future?

9 Ibidem.

as acting as political tools in patronage systems.¹⁰ The cooperative system is further hampered by a weak regulatory framework and administrative structure. The Directorate General for Cooperatives is understaffed and unable to monitor and support cooperatives. The Lebanese Cooperative Federation's organizational and decision-making structure is in need of review to make it more democratic and increase outreach. A stronger and politically independent federation could become an important advocate and policy voice representing farmers. To provide an additional venue for cheap agricultural credit the National Union for Cooperative Credit needs to be overhauled to allow for new membership and account for the deflation of the LL to set appropriate action stock prices.

► **FEW YOUNG PEOPLE ARE TRAINED FOR THE AGRICULTURE SECTOR, AND THERE IS A NEED FOR MORE RESEARCH AND IMPROVED TRAINING.**

Only 6.4 per cent of Lebanese and less than 1 per cent of Syrians at upper secondary age (15-17) were attending TVET (regardless of level) in 2015.¹¹ Enrolment in Agricultural Technical Schools is particularly low, a primary reason for the lack of trained workforce. In 2016-2017, 259 students¹² were enrolled in Agricultural Technical Schools in full-time programmes compared to the 48,924 students enrolled in public TVET schools for the academic year 2016-2017.¹³ Currently, the number of students at technical schools is at 211 against 55,022 students¹⁴ at public schools (as per CRED latest statistics of 2018-2019). The absence of market relevant agriculture training and the lack of agriculture research to address challenges of the agriculture sector, also affect negatively the sector. There is also a need to include new specialization in occupations such as crop and

fruit growers, gardeners, and forestry workers, or among livestock, dairy, poultry, and honey producers and regularly update curricula, to match current practices.

► **IN THIS CONTEXT, THE MINISTRY OF AGRICULTURE'S (MOA) ADOPTED A SECTOR STRATEGY 2021 - 2025**

To create jobs, increase farmers' income, and stabilize rural demographics. With support of FAO MoA is currently elaborating a strategy of the agricultural sector together with an action plan covering the period 2021-2025. The MoA Course of Action V of the Strategy committed the Ministry to strengthening agricultural services to farmers, as well as revitalizing agricultural technical vocational education and training to better respond to market needs.

A Socio-Economic Overview of the Agricultural Sector in Lebanon

► **AGRICULTURE IS IMPORTANT TO LEBANON – IN SPITE OF ITS LOW CONTRIBUTION TO GDP – BECAUSE OF VALUE CHAIN LINKAGES, MANAGEMENT OF NATURAL RESOURCES, AND SOURCE OF INCOME FOR RURAL POPULATIONS.**

Agriculture contribution to Lebanese GDP has oscillated between a low three and five percent over the last decade. The total value of the sector was USD 2,394 billion (3,591 billion LL) in 2018 (see Table 1).¹⁵ That, according to the FAO, around 20–25 percent of Lebanon's active population is involved in the agriculture sector¹⁶ highlights the importance of the sector. Further, how value is realized up and downstream of the agricultural production process is not illustrated by GDP measures. An analysis of price mark ups in the agricultural value chains illustrates this. Costs of production¹⁷ vary per crop but range between 10 and 30 percent of final retail price. Whole

10 Ghadban, E. Y. 2013. Cooperative enterprises and agricultural development: the case of Lebanon. PhD Thesis. SOAS, University of London

11 UNICEF. July 2016. Household survey and preliminary findings.

12 MoA school registry.

13 National Strategic Framework for Technical Vocational Education and Training in Lebanon, 2018-2021. The latter includes short-term programmes of 3-9 month, data on which is not available with regards to the agricultural sector. An additional 34,244 students are enrolled in private TVET programmes.

14 Center for Education Research and Development. 2018-2019. Latest statistics available.

15 Major crops are fruits, most importantly citrus, grapes, apples and bananas; vegetables, notably potatoes and tomatoes; olives and tobacco. Livestock includes livestock itself such as cow, goats and sheep and poultry, and livestock products (fresh cow milk, eggs, dairy products, etc.).

16 FAO. LEBANON Plan of Action for Resilient Livelihoods: Food Security Response and Stabilization of Rural Livelihoods Addressing the Impacts of the Syria Crisis, 2014 -2018.

17 This analysis excludes the cost of land or rent therefore.

and retail sale capture roughly between 25 and 35 percent if not more of final retail price each.¹⁸ Accordingly, the agricultural sector share of GDP represents only about a third of the total value produced in the crop value chain. Finally, the cost of pollution and soil degradation from agriculture has not been quantified across Lebanon, nor in terms of

GDP. Yet environmental effects are undeniable, for example, the overutilization of land and the excessive application of pesticides and fertilizers and its effects on water resources as has been noted for potato production in the Akkar, among others.¹⁹

Table 1: Share of gross domestic product of agriculture and agro-food industry
(at constant prices, chain-linked billions LBP as referenced to the prices of 2010)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Agriculture and forestry	1 236	1 357	1 495	1 499	1 489	1 718	1 408	1 474	1 710	1 664
% change year on year	0.1%	0.2%	0.2%	0.0%	0.0%	0.4%	-0.4%	0.1%	0.3%	0%
Livestock & livestock products fishing	909	881	901	868	938	1 085	1 023	1 111	1 220	1 150
% change	0.1%	-0.1%	0.0%	0.0%	0.1%	0.2%	-0.1%	0.1%	0.1%	-0.1%
Manufacturing of food products	615	684	722	750	821	808	785	809	791	777
% change	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.1%	0%	0%

Source: CAS Lebanese National Accounts 2014-2018 Comments and Tables. Available at:

[http://www.cas.gov.lb/images/PDFs/National%20Accounts/CAS Lebanon National Accounts 2016 Comments and tables.pdf](http://www.cas.gov.lb/images/PDFs/National%20Accounts/CAS%20Lebanon%20National%20Accounts%202016%20Comments%20and%20tables.pdf)

18 Riachi R., Chaaban J. 2012. The Agricultural Sector in Lebanon: Economical Features and Challenges. Synthesis Report Ibsar, AUB, IDRC.

19 ILO. 2015. Potatoes and Leafy green vegetables: value chain analysis (Akkar/Lebanon). See also Kouzayha, A. et al. 2013. Occurrence of Pesticide Residues in Lebanon's Water Resources. Bulletin of environmental contamination and toxicology.

► **AGRICULTURE BENEFITS FROM A STRONG FOOD AND BEVERAGE SECTOR.**

The agri-food sector is a major contributor to the Lebanese economy. In 2018, it generated an estimated 38 per cent of the industrial sector output and around 2.9 per cent of the country's GDP. The sector currently employs an estimated workforce of around 21,000 employees accounting for 25 per cent of the total industrial sector workforce.²⁰ There are 1,245 registered industries manufacturing agri-food products employing around 28 persons (on average).²¹ The inter-linkages with the agro-food industry varies by agricultural sub-sector and crop. Grape production for wine and arak, for example, profits from strong linkages with the beverages industry while other agricultural sub-sectors have relatively weak linkages into the industrial sector.²² Agri-food exports have been growing at a CAGR of 2 per cent since 2010, highlighting the sector's potential and resilience.²³

► **THE AGRICULTURAL AND FOOD SECTOR IS CHARACTERIZED SIMULTANEOUSLY BY AN IMPORT AND EXPORT DEPENDENCY.**

Lebanon is a major food importer particularly of staples, such as wheat, which contribute to the country's import dependency: the agricultural import to export ratio stood at 9.1 in 2015. Even though trade agreements seem to have helped increase the value of agricultural exports, imports have also produced serious competitiveness challenges for Lebanese farmers.²⁴

► **IMPORT DEPENDENCY IS MATCHED BY EXPORT DEPENDENCY AS ILLUSTRATED BY THE EXPORT CRISIS RESULTING FROM THE CLOSURE OF THE SYRIAN JORDANIAN BORDER.**

Prior to the closure of the Syrian-Jordanian border in 2015 more citrus, banana, and

pome fruits (such as apples and pears) were exported than consumed locally. With the onset of the Syrian conflict and the closure of the land border, principal export routes were closed. As a result, agricultural GDP fell to pre-2010 levels.

► **RECENT YEARS HAVE SEEN CHANGES IN CROP PRODUCTION AND SHIFTS TO VALUE CHAINS WITH MORE PROFIT AND/OR HIGHER EXPORT POTENTIAL.**

The 2015-2018 export crisis has contributed to these transformations and to the rerouting of trade routes, as well as adaptation of cropping patterns and agricultural systems. In the northern Lebanese region Akkar, for example, a considerable number of farmers converted citrus orchards to greenhouse production, with great investment.²⁵ Producers have also identified local niche markets as opportunities; for example, higher priced organic production. Similarly, studies have shown a potential for high-end consumer niche markets for leafy greens.²⁶

The Concentration of Land Holdings: Lebanon's Large and Small Producers

THE AGRICULTURAL SECTOR IS CHARACTERIZED BY LAND CONCENTRATION.

According to the 2012 agricultural census, the top 1.8 per cent of 169,512 land-holders own 33 per cent of all arable land (Figure 1). Concentration of irrigated land is even higher, with 42.6 per cent of irrigated land held by the top 0.2 per cent of landholders (Figure 2). At the same time, almost 94 per cent of farmers work on less than four hectares (48.8 per cent of arable land and only 39.4 per cent of irrigated land), and 70 per cent on less than 1 hectare. Larger land holdings are concentrated in the Bekaa where the average size of a holding is 2.9 hectare, versus the 1.3-hectare average of the country.

20 Lebanese National Accounts. 2018.

21 Ministry of Industry. 2020.

22 ILO. 2018. Overview of the Agriculture and Agro-food sectors in Lebanon.

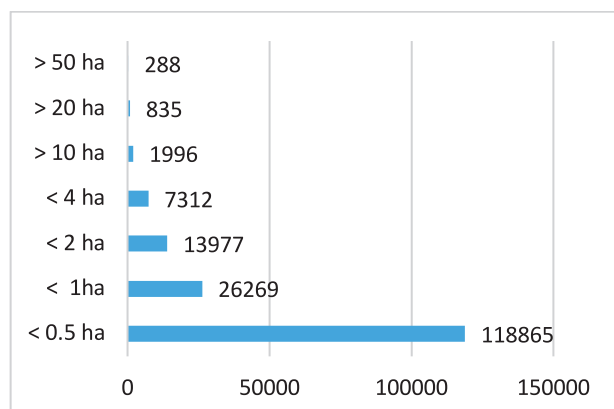
23 Investment Authority of Lebanon. 2020. Agri-Food sector in Lebanon. 202 Factbook.

24 ILO. 2015. Potatoes and Leafy green vegetables: value chain analysis (Akkar/Lebanon).

25 ILO. 2016. Leafy Greens Feasibility Study Final Report. ILO. 2018. Overview of the Agriculture and Agro-food sectors in Lebanon.

26 Ibidem.

Figure 1 Number of farmers per size of holding



Source: Ministry of Agriculture, Agriculture Census 2010, Lebanon

► **LAND-HOLDING CONCENTRATION EXPLAINS ALSO HIGH LEVELS OF POVERTY IN AGRICULTURE.**

According to the most recent household expenditure survey, the poverty rate among those active in agriculture in 2015 was 30 percent,²⁷ and is likely higher since the onset of the political and economic crisis in Lebanon post October 2019. Other data shows that poverty rates for agricultural households are approximately 67 per cent.²⁸ These figures are also reflected in average poverty rates in the governorates where agriculture is an important sector, such as the South where poverty is at 42 per cent.²⁹ Current rates are likely to be similar, if not higher, given the ongoing economic crisis in Lebanon. Furthermore, poverty is also a result of the lack of opportunities and market imbalances, such as the concentration in the input market and the powerful market position of wholesalers.

27 Centrals Administration of Statistics and World Bank .2012. Snapshot of Poverty and Labour Market outcomes.

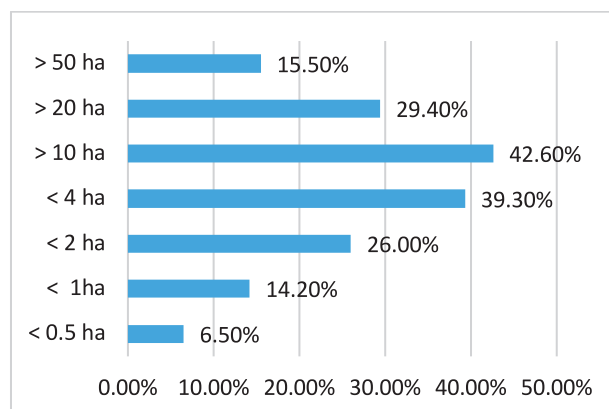
28 Riachi, R. 2013. Institutions et régulation d'une ressource naturelle dans une société fragmentée: Théorie et applications à une gestion durable de l'eau au Liban. Gestion et management. Université de Grenoble.

29 Extreme poverty rates were measured at 11.64%, and an astounding 17.75%. UNDP. 2008. Poverty Growth and Income Distribution in Lebanon. Available at:

<http://www.lb.undp.org/content/dam/lebanon/docs/Poverty/Publications/Poverty,%20Growth%20and%20Income%20Distribution%20in%20Lebanon.pdf>.

A 2016 UNDP report confirms the average rate but seems to indicate a more even distribution of poverty.

Figure 2 Percentage of all irrigated arable land by size of holding



Source: Ministry of Agriculture, Agriculture Census 2010, Lebanon

► **SMALL-SCALE FARMERS ARE FURTHER DISADVANTAGED BY THE MARKET.**

Large farming operations are often vertically integrated, generate higher profit margins because they can shape and react to market price fluctuations. These operations have easier access to export markets, and can mobilize technical expertise to their advantage. Whereas small-scale farmers who represent the majority of farmers are more exposed to the vagaries of market prices and depend on wholesalers.³⁰ Small profit margins and lack of access to capital such as bank loans (despite recent efforts by the MoA to improve small-scale farmer financial options) leave smaller farmers with little possibility to deploy capital intensive technologies, employ specialized labour or invest time and money into acquiring new skills and techniques. Input traders also provide credit at high interest sometimes pushing farmers in chronic indebtedness.³¹ The financial crisis changed the dynamics of doing business in agriculture for all farmers who need to cover farming expenses cash in advance. Insecure and short-term land rights further disincentive tenant farmers from capital-intensive transformations and sustainable long-term production systems, such as land rehabilitation, advanced irrigation systems, plantation of trees, or conversion to agro-ecological farming as a promising climate change adaptation strategy.

30 Riachi R., Chaaban J. 2012. The Agricultural Sector in Lebanon: Economical Features and Challenges. Synthesis Report. Ibsar, AUB, IDRC.

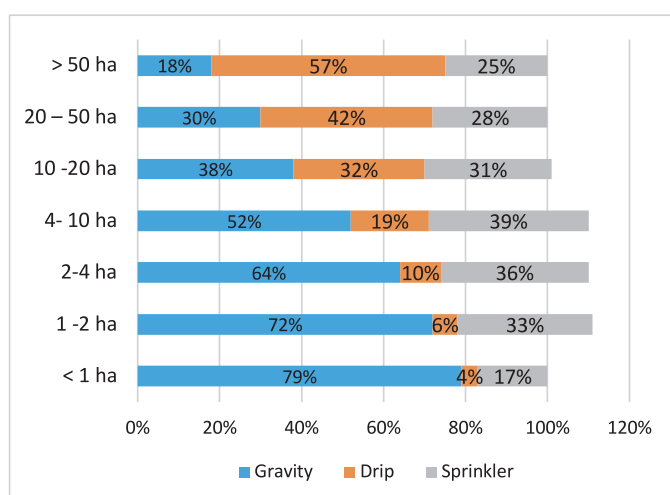
31 ILO .2018. Overview of the Agriculture and Agro-food sectors in Lebanon.

Current and Emerging Trends in Agricultural Practices and Techniques

- ▶ **ADVANCED IRRIGATION TECHNOLOGIES ARE USED RELATIVELY MORE BY LARGE FARMING OPERATIONS, WHEREAS SMALLER FARMING OPERATIONS TEND TO RELY MORE ON GRAVITY IRRIGATION AS WELL AS RAIN-FED AGRICULTURE.**

Modes of irrigation by farm holding size are a good proxy for an understanding of farming methods (see Figure 3). The larger the farm holding, the more mechanized and input intensive the operation; the smaller the farm holding, the more likely it is to rely on less sophisticated technology.

Figure 3 Primary Mode of Irrigation by size of holding



Source: Ministry of Agriculture, Agriculture Census 2010, Lebanon

- ▶ **QUALITY OF PRODUCT AND YIELDS AS WELL AS THE LOCAL ECOSYSTEMS ARE NEGATIVELY INFLUENCED BY PREVALENT AGRICULTURAL PRACTICES.**

The over-application of pesticides and fertilizers negatively affects the quality of ground water, human health and product quality and safety – which in turn is affected by the application of highly polluted waters for irrigation. A study of value chains across sub-sectors identifies numerous factors negatively affecting yields and quality, including lack of knowledge of sustainable practices and limited extension services available to farmers.

- ▶ **LARGER ESTABLISHMENTS IN THE LIVESTOCK SUB-SECTOR HAVE INTRODUCED NEW PRODUCTION METHODS AND INTERNATIONAL BEST PRACTICES.**

For example, large dairy farms have successfully introduced livestock management techniques using cow ID for milking parlours, automated techniques for feeding, and for cleaning and detecting diseases. Similarly, a large section of agro-food industries are currently using new methods of production and adopting higher standards (e.g. Good Manufacturing Practices (GMP) or Good Handling Practices (GHP) etc.).³²

- ▶ **LARGE FARM HOLDINGS AS WELL AS SMALL AND MEDIUM SIZED FARMS WITH ACCESS TO CAPITAL ARE IN FACT MORE LIKELY TO EMPLOY NEW TECHNIQUES SUCH AS THE ONES MENTIONED BELOW.**

Permaculture	Agro-ecological techniques improve farming systems by mimicking natural processes and encouraging synergies of plants, soils, insects, bacteria etc. to increase yields per farmed area over the whole year without industrial inputs. It includes practices such as building soil structure; improving soil health; recycling nutrients and ensuring local sourcing; conserving and using water efficiently; and sustaining and improving functional diversity.
Aquaponics	A combination of aquaculture and hydroponics, which produces a system of raising fish and growing non-soiled plants together. The aquaponics cycle uses microbes to convert fish waste to plant fertilizer, which then grows the plants. In turn, the plants that are grown, naturally filter the water that the fish are raised in.
Conservation Agriculture	A system of soil management practices that aim to minimize soil disturbance, maintain permanent soil cover, and crop rotation to improve soils.
Climate-Smart Agriculture (CSA)	Agricultural practices that aim to sustainably increase productivity, and adapt and build resilience towards climate change, and reduce greenhouse gas emissions.
Grafting	A technique where plants are joined together to continue growth.

³² ILO 2018. Unpublished. "Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon".

Hydroponics	Plants that are grown in a water-based nutrient solution, rather than in soil.
Integrated Pest Management	An ecosystem approach to crop production and protection, which combines different management strategies and practices to grow healthy crops and minimize the use of pesticides.
Nutrient Film Technique (NFT)	A hydroponic technique wherein a very shallow stream of water containing all the dissolved nutrients required for plant growth is recirculated past the bare roots of plants in a watertight gully, also known as channels.
Organic Farming	Farming that avoids, or largely excludes the use of synthetic inputs (fertilizers, pesticides, hormones, feed additives etc.) and relies on crop rotations, crop residues, animal manure, biological nutrients and plant protection.
Agroecology	A socio-political and technical program that is drawing on permaculture and other input less agricultural techniques combined with a set of ethics focused on social justice and principles to integrate people, food, shelter, and medicine in a holistic approach to agricultural production. ³³
Precision Agriculture	A modern farming concept, which observes, measures, and responds to crop or livestock behaviour using a combination of information technologies such as GPS, sensors, robotics, and control systems.
Trellis	A structure that is used to support plants.
Vetch	Vine plants that are used as cover crops to protect soil from the effects of weather, as well as improve soil structure and fertility.

Source: ILO 2018. Unpublished. "Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon"

The Agricultural Labour Market in Lebanon

► THE AGRICULTURAL LABOUR MARKET IN LEBANON IS LARGELY INFORMAL AND LOW-SKILLED. 5

kills development is hampered by the lack of labour market information; data on labour demand in the agricultural/agro-food industry, productivity levels, available skills, as well as market demand for skills is largely missing. Indeed, the most comprehensive data concerning labour in agriculture is more than a decade old, dating to the 2010 Agricultural Census. A large number of agencies produces labour market analysis focused on limited areas / products / value chains.

► THE AGRICULTURAL SECTOR PRESENTS A SEGMENTED WORKFORCE.

The workforce in the agriculture sector can be estimated at between 287,000 and 312,000, including Syrian agricultural workers (see Table 2). The workforce is comprised of permanent and seasonal agricultural workers and farm holders (111,457) who work on owned or rented land. Wages for Lebanese in permanent employment are reportedly higher than for Syrians (USD 500-550 per month for Lebanese male worker vs USD 450-470 for Syrian male worker). The discriminatory patterns are more pronounced for semi-skilled/limited skilled seasonal workers: while a Lebanese male unskilled labourer daily rate is USD 20-\$25, Syrian male unskilled labourers earn an average \$10-\$15/day, while Syrian women and children earn as little as USD 7\$ and 4\$ respectively.³⁴

³³ Rosset, P. M., Altieri, M. A. 2017. Agroecology: science and politics. Practical Action Publishing.

³⁴ ILO .2013. Assessment of the Impact of Syrian Refugees in Lebanon and their Employment profile.

Table 2 Agricultural labourers in Lebanon

	Family worker		Wage worker		Range of estimates of Syrian agricultural labour.
	Permanent (including farmholders and family members)	Seasonal	Permanent	Seasonal in workdays	
Number of individuals	165 594	239 007 ³⁵	51 015	6 686 877 ⁴¹	75 000 - 85 000 (FAO) 100 000 (ILO) ⁴²

Source: MoA, Agriculture Census 2010, Lebanon, Except Syrian agricultural labour from FAO 2016

► **AGRICULTURAL WORKERS ARE SUBJECT TO DIFFICULT AND HAZARDOUS WORKING CONDITIONS.**

Long hours, low wages and negative agricultural practices such as uncontrolled pesticide use and lack of protective equipment for workers is widespread. Studies suggests that exposure to toxic chemicals and pesticides have serious health effects in the long term.³⁶ Syrian refugees are often more vulnerable because of their precarious legal situation, with women and children being the most vulnerable. Women have increased risk factors for a range of diseases, and typical multi-stress disorders from, among others, stooped work, repetitive motion, awkward body postures and prolonged kneeling.³⁷ Child labour in agriculture is prevalent.³⁸ In some cases, families are kept in bonded labour to pay for makeshift dwellings provided by landowners.³⁹

► **THE DEMAND FOR SKILLS DEVELOPMENT DEPENDS ON THE TRAINEE'S STATUS.**

Farmers have different incentives and needs than wagedworkers when acquiring knowledge and skills. Small-scale farmers balance their priorities between accessing competencies and procuring equipment, depending on access to land, mode of land tenure, family size, upstream and downstream value chains.⁴⁰

35 Seasonal family workers are enumerated as 239 007 individuals whereby the number of workdays is not specified and can vary widely.

36 Habib, R. R., F.A. Fathallah. 2012. Migrant Women Farm Workers in the Occupational Health Literature. Work 2012;41 Suppl 1:4356-4362. Available at: <https://content.iospress.com/articles/work/wor0101>

37 Ibidem.

38 ILO. 2012. Action against child labour in Lebanon: a mapping of policy and normative initiatives. ILO and FAO. 2017. Child labour in agriculture in Lebanon. A guide for practitioners.

39 ILAB. 2018 Findings on the Worst Forms of Child Labor. <https://www.dol.gov/agencies/ilab/resources/reports/child-labor/lebanon>

40 Douwe Van der Ploeg, J. 2013. Peasants and the Art of Farming. (Rugby, UK: Practical Action Publishing).

In the case of wagedworkers, their training and educational choices are primarily linked to labour market opportunities and wage levels.

► **THE AGRICULTURE SECTOR IS FACING THE BURDEN OF COMPOUNDED CRISIS AS THE NATIONAL ECONOMY IS EXPERIENCING FINANCIAL STRESSES, SOCIAL UNREST AND COVID-19 PANDEMIC.**

These crises add another layer to the existing structural problems the economy and the agricultural sector are facing. It has been estimated that nearly one out of every three Lebanese was pushed into unemployment,⁴³ while over 50 per cent of the population in Lebanon might be at risk of food insecurity by the end of 2020.⁴⁴ Input supply companies have been facing 50 percent reduction in their business turnover.⁴⁵ Following the restriction on transfers of hard currency and limited availability of US dollar-denominated cash, importing companies in all sectors, including agriculture, lacked the hard currency needed to fulfil their import requirements. Some have closed down and other resorted to salaries cut down to their employees or decreasing working hours. With the depreciation of the Lebanese Pound (LBP) by 83 per cent (July 2020)⁴⁶ and cash flow problems, importers even stopped importing certain products. For producers, the cost of production increased by more than 50 per cent for various agricultural

41 The MoA considers 150 workdays equivalent to a permanent position for a total equivalent of 44 666 permanent worker equivalent for the 6.686 million seasonal workdays.

42 Based on the ILO employment profile of Syrian refugees (2013), some 100 000 are estimated to work in agriculture.

43 WFP. 2020. Web Assessment Survey.

44 ESCWA. 2020. Mitigating the impact of the Economic and COVID-19 crises on Food Security in Lebanon.

45 FAO, 2020. Special report. FAP mission to assess the impact of financial crisis on agriculture in Lebanon, April 2020.

46 ESCWA. 2020. Mitigating the impact of the Economic and COVID-19 crises on Food Security in Lebanon

systems, while the cost of basic agriculture inputs rose by 400 per cent.⁴⁷ The financial crisis changed the dynamics of doing business in agriculture for all farmers who need to cover farming expenses cash in advance. This is expected to reduce the land under production by 30 per cent in the coming winter season (2020).⁴⁸ The rise in cost of production and the sharply inflated food prices caused by the currency depreciation have further deepened the current socioeconomic and food crises.

Skills mismatch as a defining feature of this sector

► EMPLOYERS HAVE DIFFICULTIES RECRUITING WORKERS.

The research on trends in the demand and supply for skills in the agriculture sector conducted by ILO in 2018⁴⁹ revealed recruitment difficulties that employers face in finding workers with the skills required to perform their jobs at a price that they were willing and able to pay. These findings confirm previous studies on the labour market in various sectors of the food chain that emphasized the lack of a trained workforce, especially among technical baccalaureate (BT) graduates and workers with higher levels of training.⁵⁰

► SKILL MISMATCHES WERE REPORTED IN ALL SUB-SECTORS.

Employers also indicated several technical and life skills that BT graduates lacked, which include a number of crop and animal farming skills as well as some craft-related skills. A study assessing the educational levels of BT graduates found 40 out of 50 employers were willing to employ graduates but that only 30 per cent actually employed them.⁵¹ The same study found that employers expected job

ready graduates but instead had to train them on the job. Half of the employers stated that it took more than a year of work-based training for graduates to achieve a satisfactory level of efficiency and productivity, while 86 per cent stated that it took more than 6 months. Around 60 per cent of BT graduates remained without employment, and of those employed, almost 40 per cent do not work in agriculture. In addition, the fact that about 34 per cent of interviewed graduates work for the MoA further confirms that market demand for BT graduates at current skill levels is limited.⁵²

► THE REPORTED SKILL MISMATCHES SUGGEST THAT AGRICULTURAL TECHNICAL SCHOOLS (ATS) TRAINING DOES NOT MEET MARKET DEMAND AND THAT ON-THE JOB TRAINING PROVIDED AS PART OF ATS TRAINING PROGRAMMES IS INSUFFICIENT.⁵³

A comparison of employers' skills expectations and the BT curriculum for general agriculture shows a mismatch: the curriculum is laid out to provide broad-based instruction across sectors, rather than meeting employer increasingly specialised needs. A 2016 study showed that 59 per cent of BT graduates did not find employment and close to 60 per cent of graduates did not believe that their education equipped them with the proper skills for the job market. In addition, 90 per cent of graduates expressed the need to reinforce practical training within the BT program.⁵⁴ With support from FAO, ILO, AVSI, and WARD, the Ministry of Agriculture has instituted a work-based learning (WBL) programme as part of the curriculum for its BT and short-term courses in agriculture in order to provide students with adequate and hands-on experience. A group of 21 employers/companies has agreed to provide support to the trainees of the MoA. In June 2020, a memorandum of understanding (MoU) was signed between the Ministry and employers, establishing the basis for mutual understanding between the MoA and the companies in the implementation of WBL (including apprenticeships, internships,

47 Ibidem.

48 Ibidem.

49 ILO. Unpublished. "Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon".

50 Avsi. 2016. Labour market study, agriculture labour market study and educational level of the agricultural vocational schools in Lebanon. Ghneim, O. 2017. Skills Forecasting for the Agro-Food Sector in Lebanon. UNESCO – WARD. Hamade, K. et al. 2017. The Agro-Food Sector in Lebanon: Challenges and prospects A skill-need based analysis. ILO.

51 Avsi. 2016. Labour Market study, agriculture labour market study and educational level of the agricultural vocational schools in Lebanon.

52 ILO. Unpublished. "Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon".

53 Avsi 2016, Labour Market study, agriculture labour market study and educational level of the agricultural vocational schools in Lebanon.

54 Ibidem.

traineeships) for students enrolled in WBL programmes approved by the MoA.

► **VERY FEW STUDENTS ENGAGE IN AN AGRICULTURE TRAINING.**

There were 282 students enrolled in BT courses at seven Agricultural Technical Schools (ATS) in 2015-2016,⁵⁵ while in 2016-2017 there were 259 in addition to 643 students in agriculture short-term courses provided by FAO.⁵⁶ Meanwhile, according to the Lebanese Center for Research Education and Development (CRDP), the number of students enrolled at university in an “agriculture, fisheries and veterinary sciences” specialization for the year 2015–2016 reached 2,810 students in a Bachelor of Science programme, 309 students in a Master of Science programme and 9 students in a doctorate programme.⁵⁷ The negative social perceptions of ATS programmes in Lebanon were found to discourage enrolment. While a monthly stipend program encouraged some students to enrol in ATSs, more broadly, ATS education programmes are considered institutions of last resort for students who could not complete other forms of education.⁵⁸

► **STILL, THE AGRICULTURAL TECHNICAL EDUCATION OFFERED BY THE MINISTRY OF AGRICULTURE SUFFERS FROM INSUFFICIENT FUNDING.**

The budget of the MoA does not include sufficient allocations for agriculture technical education or other specialized short-term training courses. Consequently, schools and training programmes lack practical training facilities/plots,⁵⁹ while maintaining outdated curricula, and thus are unable to meet emerging demand for skills in agribusiness and farm management.⁶⁰ Earlier studies have

shown that youth harness negative perception towards agriculture as a way of life.⁶¹

► **THE SKILLS MISMATCH IDENTIFIED BY EMPLOYERS IS ALSO EMBEDDED WITHIN THE WIDER CONTEXT OF A COMPLEX LABOUR MARKET.**

The poor quality of BT training programme could not alone answer the question of the skills mismatch in the agriculture sector. Recruitment practices that are not always competency based, low wages and harsh work conditions also play a crucial role.⁶² Low wages are explained by the over-supply of the workforce. Employers in the crop production-sub sector for instance often prefer Syrian workers because they are considered serious, willing to accept lower wages, and difficult working conditions.⁶³ At the root of poor working conditions is also the weakness of agricultural unions, inadequate collective action targeting improvements in working conditions, as well as the limited incomes for the majority of farmers.

► **COVID-19 PANDEMIC PUTS GREATER PRESSURE TO INCREASE INVESTMENT IN TVET AND IMPROVE ITS QUALITY.**

In the TVET skills sector, the global pandemic has caused the closure of schools and training centres in Lebanon, disrupting teaching and learning and delaying examinations and assessments. In order to continue the provision of learning and skills development, the Ministry of Agriculture and FAO launched a distance online learning for all students enrolled in the baccalaureate programmes (BT) in the agricultural technical schools. However, TVET managers, teachers and trainers are facing various challenges in the provision of learning remotely, including in terms of

55 MoA. 2015–2016. Education and extension services, annual report 2015–2016.

56 Other organizations also provide short-term course but numbers are not available.

57 CRDP. 2015–2016. Statistical bulletin for the year 2015–2016.

58 ILO. Unpublished. “Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon”.

59 Support to furnish seven ATS with laboratory equipment and school materials is underway with support from FAO and funding from the Kingdom of Netherlands. This includes support for rehabilitation of the school buildings, through a partnership agreement between FAO and UNICEF.

60 MoA. 2014. Ministry of Agriculture Strategy 2015 – 2019; Avsi. 2016. Labour Market study, agriculture labour market study and educational

level of the agricultural vocational schools in Lebanon.

61 Bennell, P. 2010. Investing in the future, creating opportunities for young rural people. IFAD (http://www.youtheconomicopportunities.org/sites/default/files/uploads/resource/invest_future_IFAD.pdf) ; FAO, CTA and IFAD (2014) Youth and Agriculture: Key Challenges and Concrete Solutions. (Rome: FAO www.fao.org/3/a-i3947e.pdf; Leavy, J. and Smith, S. (2010) Future Farmers? Exploring Youth Aspirations for African Agriculture, Future Agricultures Consortium Policy Brief 037. www.future-agricultures.org/publications/research-and-analysis/945-future-farmers-exploring-youthaspirations-for-african-agriculture/file .

62 ILO. Unpublished. “Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon”.

63 Ibidem.

capacity to develop and deliver new teaching materials and insufficient financial and human resources to shift programmes online. The shift to distance learning also revealed unequal access to digital equipment and infrastructure (stable internet connection), potentially leading to exacerbating inequalities for those who already face disadvantages in access to learning (e.g. Syrian and Palestinian refugees). Furthermore, while the transition from face-to-face to online learning enabled the provision of theoretical knowledge, the closure of training institutions and workshops severely limited the provision of work-based learning and practical skills training.

Recommendations

- ▶ **I. The next Agriculture Strategy should focus on innovative practices for small-scale farmers, and budget allocation should be commensurable with the tasks ahead.**

Inter-sectoral linkages through various value chains⁶⁴ as well as the sector's centrality to natural resource management and the many livelihoods contingent on agriculture should cement the sector as a key government priority for human development. The focus on market-led export oriented growth has yet to prove that it is able to improve smallholder livelihoods. The contradictions arising from this focus on market-led export oriented growth and its failure to produce broad based social development in rural areas need to be addressed in the Strategy.⁶⁵ A costed Action Plan should ensure resourcing requirements are laid out that are commensurate to these tasks, including sufficient staffing with clear job descriptions and performance measures.

- ▶ **II. Extension services should be strengthened to become a tool for the introduction of new techniques and skills among farmers.**

The overhaul of the legal and regulatory framework for the cooperative sector and related efforts will allow cooperatives to contribute to the dissemination of new agricultural techniques. Extension work has the potential to benefit small farm holders and should be an important tool to take practical steps towards climate change adaptation. It should also be an important tool for lifelong learning, helping farmers access advice and training throughout their working lives.

- ▶ **III. Labour market information and analysis will provide the evidence to all stakeholders to make sound decisions.**

There is a need for enhancing the Labour Market Information System in Lebanon at national level. In the short term, the MoA should conduct market studies using mixed methodologies, as well as tracer studies and value chain specific analysis. Skills anticipation should identify both technical and non-technical skills to ensure market needs for labour and products are met; aside from the necessary technical skills, marketing, entrepreneurial and business management skills have become more and more crucial elements for a successful agriculture project. Collaboration with the private sector under a dedicated skills council should also serve to generate additional analysis. Improving demand-side information will also improve employment services and career guidance, reducing the heavy reliance on personal networks for recruitment. The increased understanding of the sector demands will therefore improve policies, training programmes and career orientation.

- ▶ **IV. The restructuring of value chains will open opportunities for socially balanced growth.**

The tremendous imbalance of imports over exports suggest that production aimed at import substitution is an interesting alternative

64 Ranging from inputs and material on the upstream side to whole and retail sales as well as agro-food industry on the downstream side.

65 Bush, R. 2016. "Family farming in the Near East and North Africa". International Policy Centre for Inclusive Growth (IPC-IG) Working Paper No. 151. Available at: <http://www.fao.org/3/a-i6537e.pdf>; Patnaik, U. 1996. "Export-Oriented Agriculture and Food Security in Developing Countries and India". *Economic and Political Weekly*, 31(35/37), 2429-2449. Available at: <http://www.jstor.org/stable/4404563>.

to valorise agricultural work and agro-food industries, for sub-sectors with comparative market advantage such as leafy greens in the Akkar region for example.⁶⁶ Additionally, more stringent regulation of wholesale markets to limit value capture and shortening of the market supply chain are possibilities to optimize value chains and increase producer profit margins.

► **V. A strengthened food supply system with upskilling of all stakeholders in the value chain will contribute to prevent food security crisis, but also create jobs for marginal farmers.**

Establishing a legal framework and standards for e-commerce of perishable products and encouraging direct sales from local producers to local consumers through digital platforms will lead to reduced food prices and job creation. The legal framework for wholesale market licensing should also be revised to enforce conditioning standards (cooling, controlled atmosphere) as a core measure for reducing food waste.⁶⁷ Replacement production could also be encouraged for imports of agricultural products that stopped, by facilitating access to seeds and arable land. Targeted interventions and training programmes for upskilling and reskilling of actors across the supply chain will be needed for a successful implementation of these measures.

► **VI. A competency-based approach to teaching, learning, testing and certification is the basis for improved quality within the agricultural TVET system.**

Strengthening of ATSs to provide broad based training required by the market and specialised know-how is possible through increased collaboration between the ATS and farmers federated in the sector skills councils, and through regular updates of curricula with new specializations, training of instructors, structured apprenticeship, and through short courses for life-long learning. Competency standards determined in partnership with the private sector enable instruction and

testing which measure trainees' ability to perform occupation-specific duties and tasks to an acceptable standard. The importance of instructors in this process is critical; investment in a professional development program ensures instructors' technical knowledge and pedagogical practices are up-to-date. In parallel, the job descriptions of agricultural TVET teachers should be reviewed and updated, to facilitate merit-based recruitment and the implementation of improved performance management practices.

► **VII. Improved quality of ATS programmes needs to be matched by enhanced skills use in the sector**

Exposure to work-based learning and on the job training has been shown to increase students' immediate employment prospects, and employer satisfaction with graduate skill levels.⁶⁸ Employers can complement the training at ATSs with specialised on the job modules that are validated through certificates, and to value the competencies of workers through decent wages and working conditions.

► **VIII. An apprenticeship framework for MoA should be developed.**

The recently updated agricultural curricula, which includes on-the-job training as part of competency-based teaching and learning, could be expanded to meet the standards of quality apprenticeship in agriculture seen in other countries. The MoA should stimulate the interest of the private sector and government in agricultural apprenticeship by highlighting its benefits and the return on investment it presents for national economies, labour markets and private sector development.⁶⁹ The signature of the MoU between the Ministry and employers on the implementation of work-based learning is a step in the right direction and the initiative should be scaled up.

⁶⁶ ILO. 2015. Potatoes and Leafy green vegetables: value chain analysis. (Akkar/Lebanon)

⁶⁷ ESCWA. 2020. Mitigating the impact of the Economic and COVID-19 crises on Food Security in Lebanon.

⁶⁸ ILO. Forthcoming. Brief of the Dual System Tracer Study.

⁶⁹ ILO. Unpublished. Quality Apprenticeship for Lebanon, a proposal for the agriculture sector.

► **IX. Improved access to and support for distance learning will enable continuation of learning and skills development in times of crisis.**

The Covid-19 pandemic has been driving the demand for digital skills to learn and to work remotely. Investing in digital technologies and related skills across TVET is critical for the resilience of the TVET system. In addition, universal access to digital infrastructure (basic digital equipment and sufficiently strong internet connection), tools and modern

learning technologies are key factors that needs to be addressed to enable continued provision of learning and skills building. TVET managers, teachers and trainers should be provided with training and support to plan and deliver online learning activities, including the revision of teaching and learning models to make the best use of digital resources and tools, while learners also need to be provided with support to engage in distance courses, ensuring the participation and learning of disadvantaged students.

BOX 1 List of occupations and skills in demand⁷⁰

Occupation Group	Occupations in demand	Examples on the skills in demand
Labourer & Skilled workers (crops, gardens, and forestry)	Crop and fruit tree growers (ISCO 6111, 6112, 6114)	<ul style="list-style-type: none"> ■ installing irrigation systems ■ cultivating soil, ■ transplanting, pruning, thinning and mulching; ■ weed and pest control; ■ producing bulbs, seeds and saplings; ■ harvesting; ■ composting;
	Gardeners (ISCO 6113, 9211, 9214)	<ul style="list-style-type: none"> ■ preparing garden sites and plots; ■ assisting with planting and transplanting flowers, shrub, and trees; ■ maintaining gardens by watering, weeding, cleaning
	Forestry worker (ISCO 6210)	<ul style="list-style-type: none"> ■ assessing sites for reforestation, ■ selecting, seeding and planting trees; ■ assessing forest growth conditions (forest regeneration); ■ assessing forest health; ■ thinning and clearing undergrowth; ■ trimming and removing major branches and trees; ■ fire protection, detection I equipment maintenance.
	Packers (ISCO 9321)	<ul style="list-style-type: none"> ■ operate packaging of the final product, by hand or machine ■ ensuring optimum quality, hygiene and technical standards
Skilled worker (animal product)	Livestock & Dairy producer (ISCO 6121)	<ul style="list-style-type: none"> ■ monitoring and reporting on livestock conditions; ■ herding, milking; ■ growing and purchasing feed and other supplies, ■ ensure proper storage, maintain appropriate nutritional levels; ■ detect diseases and disorders, ■ treatment of dairy cattle, breeding and artificial insemination; ■ monitoring and assisting calving; ■ processing, storing animal products; ■ pest control (parasites and insects); ■ practice routine biosecurity measures; ■ reporting to engineer/veterinarian when an incident occurs (odour, sick animal, etc.);

⁷⁰ Ibidem.

		<ul style="list-style-type: none"> ■ monitoring the ammonia level in the farm to improve ventilation;
	Poultry Producer (ISCO 6122)	<ul style="list-style-type: none"> ■ growing and purchasing feed; ■ identifying and reporting on sick birds; ■ controlling humidity, temperature and ventilation;
	Apiarist and Sericulturists (ISCO 6123)	<ul style="list-style-type: none"> ■ preparing necessary equipment; ■ monitoring hives, adding frames and checking honey, pollen in hives; ■ honey harvesting, extraction and filtration; ■ checking queen's activity and replacing when needed; ■ queen breeding; ■ monitoring bee health, diagnose diseases, identify treatments; ■ bee feeding during off-season periods;
Skilled worker (fishery)	Aquaculture worker (ISCO 6221)	<ul style="list-style-type: none"> ■ monitoring and maintaining optimum conditions for aquatic life (oxygen level and other water quality parameters (ammonia, pH and nitrite); ■ disease and pest control; ■ good sanitation practices; ■ environmental, production and growth data collection and recording;
	Fisher worker (ISCO 6222)	<ul style="list-style-type: none"> ■ fishing activities from shores and shallow water; ■ using traditional methods such as (a) bottom stationary gear (trammel nets and longlines), (b) purse seine nets (lampara), and (c) beach seines while assuring the use of legal size of mesh nets; ■ prepare and repair nets and other fishing gear and equipment; ■ sorting and storing catch in holds with salt and ice.
Craft related workers (food processing)	Bakers, Pastry and confectionery makers (ISCO 7512)	<ul style="list-style-type: none"> ■ preparing flour products, ■ confectionary using hand tools and machinery;
	Butchers, fishmongers, and related food preparer (ISCO 7511)	<ul style="list-style-type: none"> ■ slaughtering animals; ■ cutting, dressing meat and fish; ■ preparing ingredients and making processed food; ■ cooking, preparing related food products.
Other craft workers	Flower arranger (ISCO 7549)	<ul style="list-style-type: none"> ■ arranging flowers for display ■ maintaining continuous care of flowers; ■ arranging special occasions; ■ preparing bouquet.
Technician (health)	Veterinary assistant (ISCO 3240 ⁷¹)	<ul style="list-style-type: none"> ■ Producing radiographs, collecting samples and performing other laboratory tests to assist in diagnosis of animal health problems;

⁷¹ The title of this occupation was listed as 'agriculture pharmacy assistant' in 2018 study, 'Trends in the demand and supply for skills in the agriculture sector: the case of Lebanon'. The title was updated to 'agricultural technician' in this brief to match the ISCO title, which covers the same skills as those mentioned for agriculture pharmacy assistant' in the 2018 study.

		<ul style="list-style-type: none"> ■ assisting vaccination and surgery; ■ basic treatments (ex. Deworming) ■ Preparing the feed mixture; animal grooming,
	Agricultural Technician (ISCO 3142)	<ul style="list-style-type: none"> ■ nutritional advice and help selecting fertilizers; ■ diagnosing and treating crop pests and diseases; ■ advising on crop selections; ■ calculating pesticide dilution and dosages;
	Food Inspectors (ISCO 3257)	<ul style="list-style-type: none"> ■ testing of quality of raw materials according to standards; ■ performing food microbiology and chemical tests; ■ controlling wastewater management;
Technician (physical science)	Chemical & Physical Science Technician (ISCO 3111)	<ul style="list-style-type: none"> ■ collecting water and soil samples; ■ performing soil and water tests to determine nutrient levels and pH; ■ preparing material for experiments.
Professional (teaching)	Vocational education teacher (ISCO 2320)	<ul style="list-style-type: none"> ■ developing curricula and planning course content, ■ evaluating training effectiveness and assess competency; ■ establishing relations between students and the private sector.
Professional (manager)	Cooperative Manager (1311, 1312)	<ul style="list-style-type: none"> ■ leading the cooperative; ■ giving guidance to farmers; ■ Ensuring membership rights and responsibilities; ■ Evaluating financial budget of the cooperative

For more information:

**International Labour Organization
Regional Office for Arab States**

Tel: +961 1 752400

Fax: +961 1 752405

beirut@ilo.org

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