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SUPPORTING LIVELIHOODS IN SYRIA:

FARMERS AND HERDERS SKILLS GAP ANALYSIS


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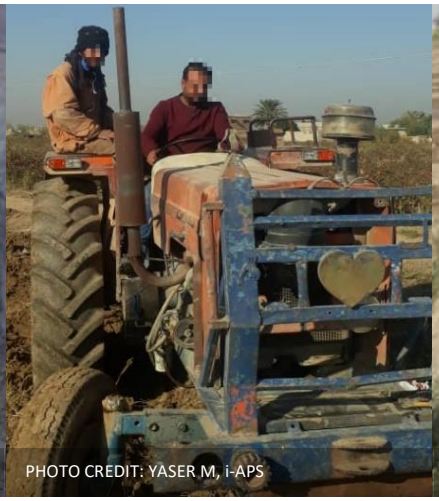
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ACRONYMS

CHF	Cooperative Housing Foundation
COP	Chief of Party
FAO	United Nations Food and Agriculture Organization
FFP	Office of Food for Peace
FGD	Focus Group Discussion
FSL	Food Security and Livelihoods
GC	Global Communities
GOS	Government of Syria
HAO	Humanitarian Affairs Office
HH	Household(s)
i-APS	International Advisory, Products and Systems Ltd.
IDP	Internally Displaced Person
ICARDA	International Centre for Agricultural Research in the Dry Areas
INGO	International Non-Governmental Organization
IR	Intermediate Result
KII	Key Informant Interview
LA	Local Authorities
LQ	Learning Question
M&E	Monitoring and Evaluation
MT	Metric Tons
MoU	Memorandum of Understanding
NES	North East Syria
NGO	Non-Governmental Organization
RFP	Request for Proposals
SA	Self-Administration
SDF	Syrian Defense Force
SLS	Supporting Livelihoods in Syria
SYP	Syrian Pound/Lira
SWOT	Strengths, Weaknesses, Opportunities, Threats
TAG	Technical Advisory Group
TORs	Terms of Reference
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USAID	United States Agency for International Development
USD	US Dollars
VCA	Value Chain Assessment
VC	Value Chain
WFP	United Nations World Food Program

EXECUTIVE SUMMARY

Northeast Syria (NES) has a diverse agricultural economy, dominated in part by cereal grain and livestock production. Cereals are primarily wheat as a food crop and barley as both a food crop and livestock feed grain. The livestock value chain is led by small ruminant production, especially sheep, for both meat and dairy products. Milk and dairy products from cows are important in sub-districts but, for the most part, sheep dominate the livestock value chain. Three value chain assessments have been conducted for the wheat, livestock and fodder value chains. In the process of preparing these studies many skills and production gaps have been identified. This skills gap analysis draws upon the findings of the value chain studies to identify the key gaps in the wheat and livestock (including fodder) value chains.

The skills gap analysis uses the surveys, interviews and analyses that were conducted to prepare value chain studies. With surveys, key informant interviews (KIIs), focus group discussions (FGD) and strengths, weaknesses, opportunities and threat (SWOT) analyses the study team has identified a range of skills gaps and opportunities for strengthening these value chains.

Input suppliers. Pre-conflict, most inputs were provided to farmers through highly subsidized systems to ensure key staples were available for consumption in the country. Most of those systems have broken down and there has been an expansion of input suppliers for both cereals and livestock production. The lack of improved or certified seed is a primary constraint that requires rebuilding the NES capacity to develop and manage seed multiplication schemes. For other inputs there is a growing number of fertilizers, agrochemicals, veterinary medicines and animal production supplies that are largely imported. Skills gaps for input suppliers range from technical skills requirements to deploy modern technologies at reasonable prices, maintaining input quality, outreach systems to farmers and supply chain and business management.

Cereals and livestock production. Challenges in production methods, access to inputs, proper use of inputs, lack of financial capacity and low margins for cereals and livestock products constrain improved productivity and quality of both wheat and livestock products. The limited quantity and poor quality of grain, meat and milk coming into these value chains constrain the development of a competitive agricultural industry. Skills gaps of farmers include their technical skills to properly and safely use fertilizers and agrochemicals. Seed production, soil management, water management, animal nutrition and animal health knowledge are all key skills gaps for NES farmers and herders.

Marketing and processing. The processing and marketing industry for bread, bulgur, meat and dairy products relies primarily on traditional products and recipes. Rehabilitation and modernization of food production facilities builds the importance of maintenance and repair of equipment. With poor fuel quality and aging equipment, there is a need to repair or manufacture some spare parts locally. As markets become more competitive, there will be increasing need for food manufacturers and entrepreneurs to manage supply chains, secure investment and do sound business and financial planning.

INTRODUCTION

Agriculture plays a key role in the lives of communities in the Northeast region of Syria (NES). The skills traditionally used for agricultural and livestock production and other value chain activities pre-conflict must evolve to increase production, quality, food safety and profitability of each value chain. In an environment with fewer subsidies, less access to government extension and support programs, increased impacts of climate change and the need to strengthen value chain actors, this Skills Gap Assessment identifies some of the key skills and requirements to support improvements in wheat and livestock production and foods and the fodder value chain.

CHF, under the USAID funded Supporting Livelihoods in Syria (SLS) program, commissioned value chain assessments of wheat, livestock and livestock fodder by International Advisory, Products and Systems Ltd. (i-APS). While researching these value chain assessments, a skills gap analysis was conducted to provide useful guidance for stakeholders and the donor community. This Skills Gap Assessment aims to identify the skills needed to formulate training, rehabilitation and other actions that will strengthen the capabilities for sustainable development of wheat, livestock and fodder value chains in NES. The assessment draws upon the data collection and analysis conducted to develop value chain assessments for wheat, livestock and fodder.

This report presents the skills gaps and development needs that were identified along these value chains, including: input suppliers; wheat and livestock production; and wheat and livestock processing and marketing.

METHODOLOGY

As part of a larger value chain assessment effort, i-APS carried out a study on the knowledge and skills gaps of wheat, livestock and fodder value chain stakeholders in NES. Three categories of respondents were interviewed under this study: input suppliers, production actors and marketing and processing actors. Interviews were conducted in a two-phase process using semi-structured questionnaires. The data collection process is shown in Figure 1 and described below.

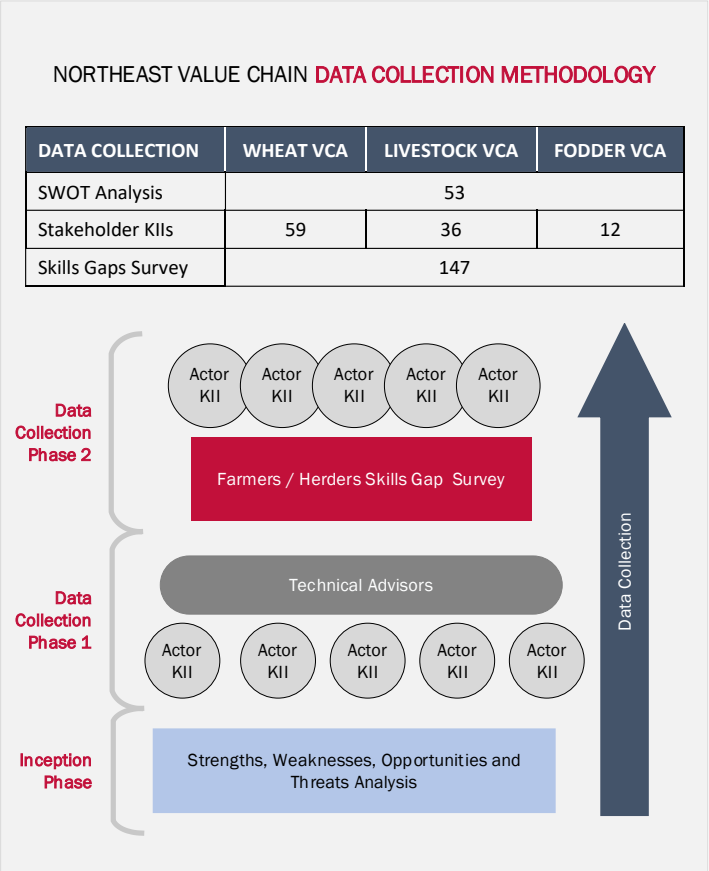


Figure 1: NES value chain data collection methodology

PHASE I: Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

In phase one, i-APS carried out an initial strengths, weaknesses, opportunities and threats (SWOT) analysis with 23 primary value chain stakeholders in Deir Ez-Zor Governorate. While the skills gaps assessment targeted both Deir Ez-Zor and Al-Hasakeh Governorates, the Turkish military incursion hindered access to Al-Hasakeh Governorate at the time of data collection, causing the assessment to narrow its focus to Deir Ez-Zor Governorate. After tensions lowered, i-APS team returned to Al-Hasakeh and carried out a SWOT analysis with an additional 30 primary value chain stakeholders. The assessment team disaggregated value chain actors into three segments: Inputs, Production and Processing, and Marketing. Figure 2 below provides the key informant interviews by value chain segment.

Figure 2. Value chain stakeholders participating in data collection

VALUE CHAIN	INPUTS	PRODUCTION	PROCESSING & MARKETING
Wheat Value Chain	Wheat seed traders	Wheat, barley farmers	Flour mills, silos
	Grain and seed processing facilities	Farmers' Cooperatives	Small-scale traders
	Agrochemical wholesale and retail suppliers	Seed multiplication	Wholesale traders
	Machinery and equipment sales, parts, rentals		Public and private bakeries
	Local Councils, Agricultural Directorate		
	GOSM, AANES[1] Seed Development Department		

[1] GOSM, AANES

VALUE CHAIN	INPUTS	PRODUCTION	PROCESSING & MARKETING
Livestock Value Chain	Veterinarian Products Importers / Local Suppliers	Small-scale Sheep and Goat herders	Local Animal Brokers
	Wheat/Barley farmers Fodder producers	Commercial herders	Livestock market
	Feed Mill Qamishli		Butchers/Slaughterhouses
	Extension and Governance Information: Local Council/HAO/Livestock Department		Dairy Workshops/In-house Dairy processors
Fodder Value Chain	Flour Mills	Private Fodder Mills	Fodder Dealers
	Livestock herder survey Wheat/Barley farmers	Public Fodder Mill	Wholesale Fodder Dealers
	Local Council/HAO/Livestock Department		

PHASE II: Interviews with Value Chain Actors

The assessment, being an empirical study, put a strategic focus on a horizontal approach to data collection by seeking a wide range of stakeholders to get a diverse view on the skills gaps and needs of value chain actors. Due to the limited time available, a quality approach to this assessment was the most suitable method to explore skills gaps of the various actors within the value chains. Altogether, i-APS carried out 107 key informant interviews (KIIs) with value chain actors and stakeholders from both Al-Hasakeh and Deir-ez-Zor governorates in the wheat, livestock and fodder sectors. Additionally, the research team conducted a skills gaps survey with 147 farmers and herders in Deir Ez-Zor Governorate.

FINDINGS AND RECOMMENDATIONS

The findings and recommendations of this assessment have been divided among three broad value chain segments: Inputs, Production, and Processing and Marketing. Each of these segments has been divided into findings for the wheat and livestock value chains and the categories of stakeholders within each segment. More details on the wheat, livestock and fodder value chains can be found in the three companion studies to this skills gap summary:

Wheat Value Chain Assessment: Northeast Syria
Livestock Value Chain Assessment: Northeast Syria
Fodder Value Chain Assessment: Northeast Syria

INPUTS

Wheat Value Chain

Seed System Skills Gaps

Poor quality seed and the lack of access to certified seed of varieties adapted to the NES are among the most critical constraints to wheat production. Pre-conflict there was a well-developed and highly subsidized system that produced certified wheat seed. Most farmers purchased new, certified seed at least every three years. Because of the expense and lack of access to high quality seed, most farmers now save their own seed or purchase it from traders that resell grain they purchased in the previous season. Much of this seed is not well-cleaned, sorted and sterilized to ensure the seed is a uniform variety, free of wheat seeds and treated against soil-borne pathogens. Poor quality seed is one of the key constraints limiting wheat yield in the region.

Key informant interviews focused on the need to replenish and refresh seed varieties. Prior to the conflict, there was an effective variety testing and seed multiplication. Much of this system has fallen into disrepair

and there is a shortage of trained personnel to carry out seed multiplication activities. Seed multiplication, certification, and quality control systems for production, storage, and handling to maintain certified seed quality are all limiting factors in building a reliable seed production system. There are multiple standards and processes to manage that produce quality seed that require systemic support. KIIs focused on two key features of the system: the need for skilled personnel for certified seed production and the need to expand seed multiplication and seed processing systems.

- **Wheat seed research and variety testing capacity**. In addition to production of high-quality seed of existing varieties, there have been new varieties developed worldwide. There is a need to revitalize the wheat seed and variety testing capacity in the NES to test and release new varieties adapted to the changing climate (for example, heat tolerance). It is necessary to identify new varieties, test them under NES conditions and collect data on variety performance and manage variety registration processes.
- **Seed stocks of approved varieties**. Systems and personnel are needed to import registered and certified seed to maintain variety purity, pest resistance traits and to multiply seed to commercially available quantities.
- **Rehabilitation and improved management of both public and private sector** seed storage, handling, logistics, and management.
- **Effective local authority management** of seed legislation, policies, and systems.
- **Private sector capacity** to manage distribution of improved seeds.
- **On-farm seed treatment**: Focus group discussions revealed that many farmers use unscreened and unsterilized wheat seeds to reduce costs, making their crops vulnerable to soil-borne fungal diseases. When saving seed for the following season, farmers often use poor quality seed over successive plantings. A key farmer and trader skills gap for the current seed market is the need for both farmers and traders to select uniform seed, clean it well and learn proper methods to treat seed with fungicides.

Seed Processors

There limited seed processing capacities in the NES. Nearly all seed processing facilities have been damaged or destroyed in the years of conflict. In Al-Hasakeh, there is a seed processing facility at Qamishli and a private sector facility in Al-Sa'wa in Deir-ez-Zor. These facilities do not have the capacity to meet market need and demand. Reported skills gaps for seed treatment include:

- As modern equipment is purchased and installed in the region, **training on installation, management and maintenance** of the new equipment will be required.
- **Ongoing training and support** in seed treatment, proper application procedures and appropriate agro-chemicals required.
- Current seed sterilization is conducted to control diseases. There is a need to **review potential seed and seedling insect damage** to determine if it is economically viable to apply a mixed fungicide/insecticide seed treatment

Fertilizer Use Skills Gaps

Key informant interviews with extension personnel indicated that farmers use less fertilizer than they did prior to the conflict when it was more readily available and subsidized. Fertilizer use now is variable and farmers do not balance nitrogen and superphosphate fertilizers and tend to under apply nitrogen. Urea and superphosphate fertilizers are in short supply because of import restrictions on urea and limited

fertilizer production by the plant in Homs. Imported fertilizers are expensive and many farmers choose not to apply them to save on production costs.

Key skills gaps related to fertilizer input supply relate to the rehabilitation of local fertilizer production capacity and building the import relationships of fertilizers either from other parts of Syria or international sources. Regarding fertilizer use challenges, there is a lack of soil labs to conduct appropriate soil nutrient analysis and limited extension services to advise on recommended fertilizer application rates and methods.

Especially given the uneven and often inappropriate use of fertilizers, a significant skills gap in Syrian agriculture is basic soil fertility management. For example, if nitrogen fertilizer is unavailable or not affordable, farmers should rotate wheat with legume crops. Farmers lack the knowledge and experience to use fertilizer appropriately, which erodes soil quality and reduces yields.[2] Soil management skills gaps include:

- **Integrated soil fertility management** and application of appropriate practices that sustainably manage wheat soil nutrients
- **Crop rotation systems**, especially ones that rotate wheat with nitrogen-fixing legume crops
- **Maintenance of soil organic matter** using crop residues and animal manure
- **Reduced tillage and conservation systems** to retain soil moisture and reduce erosion
- Proper use of **urea and superphosphate fertilizers** to ensure

Agrochemicals Skills Gap

Agrochemical suppliers that provide farmers with products to control insect, plan disease and weeds report that farmers tend to lack the knowledge and experience in the proper use of these agents. There is a growing lack of trust in agrochemical products. When pesticides underperform according to farmer expectations, there is an erosion of trust in agrochemical dealers and their products. Agricultural chemicals come into NES from many locations (Jordan, China, EU, Turkey among others) and the quality of products and label instructions are often not acceptable. However, agrochemical dealers and extension personnel indicate there is considerable user error when applying pesticides, using the wrong product, poor application methods, not using the correct rate and lack of safety in applications.

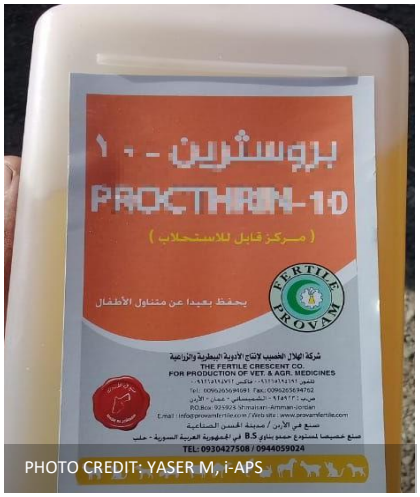


PHOTO CREDIT: YASER M, i-APS

Figure 3: Example veterinary medicine

Agrochemical dealers have challenges to supplying farmers with the right products in line with farmer capacity to use products effectively. In addition, there are other challenges to the use of agro-chemicals and managing agrochemical sales:

- **Risk assessment and hazard forecasting due to climate risk and complex export–import cross-border transactions.**

2 Wheat and barley farmers, Technical Advisory Group FGD.

- **Knowledge of the latest agricultural developments and new products available for integrated pest management**—biological control pesticides and the linkages between agricultural chemicals and other pest management tools.
- **Training in giving farmers extension advice, as they are the primary information source for product information, application and safety instructions.** This includes the understanding that excessive use of pesticides and potential impacts on both the crop and environment.
- **Business, accounting, project management, and demand and supply management skills.** Establish Agrochemical Supplier interest groups so that their members receive structured training that enables them to better link up with other value chain actors, including on methods for community engagement through improved outreach by agrochemical suppliers.
- **Provide training to agrochemical suppliers, service providers and farmers** on safe practices for calibrating equipment, pesticide mixing and application practices and use of personal protection equipment.

Machinery and Mechanization Skills Gaps

Farm machinery is expensive, and few farmers purchase or own their equipment. Farm mechanization service providers provide fee-for-service land preparation and planting, pest control and some harvest processes. Machinery is becoming older and requires repair and maintenance. Skills gaps for farm machinery and mechanization services include:

- **Mechanical maintenance**, including engine repair and use of spare parts.
- Using **turning and lathe machines** to repair engine parts, especially those damaged by poor quality fuel.
- **Local manufacture of some spare parts** (to reduce dependence on imports). There is a need to train local technicians to strengthen technical expertise and manage the cost and time constraints of maintenance and repairs.
- **Equipment calibration** to ensure proper seed, fertilizer and pesticide application rates.

Irrigation Rehabilitation and Management Skills Gaps

Irrigation systems in NES are significantly broken and in need of repair. Reduced water flow through the Euphrates River and increasingly erratic weather attributed to climate change increases the need for irrigation. But the inefficient basin irrigation method most farmers use is one of the least efficient ways to irrigate crops. Running high-pressure sprinkler systems on diesel pumps takes high levels of energy that is also inefficient and costly.

Rehabilitation of existing infrastructure, repairing pumping stations and cleaning and repairing canals and other irrigation infrastructure is a key to improving access to reliable irrigation. As infrastructure is repaired, it will be risky to return exclusively to inefficient basin irrigation methods. Using water resources more efficiently and productively will improve access and effectiveness of irrigated systems.

Irrigation managers and farmers need additional skills to adapt to more efficient methods for managing irrigation. These include:

- **Managing supplemental sprinkler and drip irrigation systems** to augment rains and reduce water use.
- **Use of solar pump systems** that have a high initial cost but lower operating and maintenance costs.

- Use of both **high- and low-pressure irrigation systems.**
- **Managing systems** for maintenance, repairs, spare parts and supplies to avoid gaps in water application.
- Efficient irrigation practices linked to climate smart and soil conservation practices.
- **Understanding water quality** and its impacts on soil salinity and crop production.
- Developing and managing **water user associations and cooperatives** that provide overall management of irrigation water use and creating a fee structure that can sustain management of irrigation supply systems.

Livestock Value Chain

Veterinary Medicine and Additives Suppliers Skills Gaps

Strengthen technical capacity of veterinary service providers. With the collapse of livestock support programs and government subsidy of the livestock value chain during pre-conflict times, input supplies and services have become expensive and there has been little post-graduate training and education for veterinarians and vet assistants. All key informants identified training and updating the skills of veterinary and livestock support personnel with the latest veterinary techniques as needed to effectively deliver their services.[3] Some of the issues identified for training support included:

- **Artificial insemination** techniques and diagnosing pregnancy problems.
- Developing **improved feed rations** adapted to seasons and animal nutrition needs.
- Diagnosing nutritional and infectious **diseases.**
- Better **training of border personnel** to prevent entry of sick animals.
- New **trends in animal disease** treatment and control.

A second major skills gap is the need to improve the quality of veterinary medicines and supplies. Large quantities of veterinary medicines are imported into NES through both formal customs and informal channels. Vaccines and some medicines lose their effectiveness when the cold chain is broken during transit or storage. There are significant challenges in shipping medicines to NES and maintaining cold chain, but veterinary suppliers, traders and transporters need to strengthen skills and quality control processes to maintain the cold chain to ensure that veterinary supplies remain safe and effective. Veterinary suppliers indicate a growing lack of trust, and consequently investment, in vaccinations and veterinary medicines.

Veterinary Suppliers

Interviews conducted with Veterinarian Suppliers indicate that they rely on either their own experience or local traders as an informal source to acquire knowledge on varieties of chemical mixtures and supplies. This may be resulting in an inappropriate mixture of veterinary medicines and pesticides. Especially for external/internal parasite control, these types of pesticides are carelessly used and distributed. A primary objective for managing pesticides is to ensure that the product is effective for the control of the target pest while causing little or no deleterious effect to humans, non-target organisms and the environment. Agrochemical and Veterinarian Suppliers state that they would benefit from the following training and technical assistance:

[33] Veterinary center KIIs – Deir-ez-Zor and Al-Hasakeh.

- **Latest technologies** in livestock medicines and animal disease control mechanisms for dealing with emergencies.
- Take part in and apply **training courses** on the latest agricultural methods and new products beyond label descriptions.
- Expand the **current informal credit systems** and improve supplier budgeting, planning, storage and distribution networks.
- **Training** on pesticide safety, proper personal protection equipment and pesticide mixing and application practices.
- **Operationalize the Livestock Sub-Directorate/ Management Center** to become the main source of guidance and information for farmers and input traders alike.
- Training is needed on **severe case management** and on managing critical situations, such as avoiding pathogen spread, how to deal with emergencies and how to apply hazard prediction.

Fodder Dealers and Suppliers Skills Gap

Fodder availability and complex feed costs vary throughout the year and livestock producers constantly adjust with the season, cost of feed and livestock prices to maximize income and maintain a healthy herd. For the most part, livestock producers are price sensitive and are unwilling to invest in quality feed that costs more but has better results in animal health or productivity. There is little clear evidence of how to manage herd nutrition through the year. Skills gaps identified through KIIs and surveys include:

- **Need for evidence that the use of higher priced composite feed is profitable**. Livestock herdowners understand the need for better quality feed for their animals. However, there appears to be a lack of real evidence that the use of composite feed is profitable. There is a need to support the linkage of improved livestock nutrition with improved feed: gain ratios, milk and meat production and herdowner revenue.
- **There is a lack of consistent supply of composite feeds**. Beyond the mill at Qamishli that is operating at about 50 percent capacity and small private feed mills, there is an issue with consistent supply and quality of livestock pellets. Capital investment in commercial feed mills is not readily available, so smaller, mobile feed mills that operate as small businesses can support improved quality feed in multiple sub-districts.
- **Farmer knowledge of feed formulation** using local ingredients and animal nutrition.
- **Strengthening the capacity of mobile and small-scale feed mills** to produce pellets and feeds of high quality. Fodder mill owners identify their need to learn more about animal nutrition and feed formulas, additives and concentrates to be able to produce higher quality feed rations.

Local Council Support Skills Gaps

Skills gaps identified through KIIs include:

- **Lack of personnel and resources**. While not a skills gap, the lack of personnel and operating funds limits local authority capacity to provide monitoring, advisory or regulatory services to the livestock value chain.
- **Need to strengthen the capacity of local council livestock staff**. In order to offer expanded services to local herdowners and the livestock value chain, there is a need to strengthen the capacity of local technical staff to assess herd health, offer animal husbandry and feed ration advisory services and support accurate livestock estimates.

- **Development of standards consistent with evolving international standards** as described by the World Organization for Animal Health and harmonizing existing regulations with international standards.
- **Laboratory capacity for conducting basic tests** for livestock diseases and health.

Fodder Value Chain

Wheat/Barley Corn Farmers Skills Gaps

Skills gaps identified through KIIs include:

- **Managing seed quality**. As with wheat, barley farmers have challenges with seed quality due to repetitive use of the same varieties. Farmers can select relatively higher quality seed from traders or save their own.
- **Cereal grain and green fodder production practices**. There is a need for overall extension support to refresh farmer knowledge regarding good agricultural practices.
- **Knowledge of cropping systems** and crop intensification measures to maximize fodder and feed grain production on farm.

Local Council/Livestock Department Skills Gaps

Skills gaps identified through KIIs include:

- **Capacity limitations.** The Livestock Department lacks the staff, budget and logistics to conduct extensive outreach operations with herdowners and fodder producers.
- **Regulatory requirements.** Under the GoS, there were multiple regulations governing livestock production feed and food safety. Rebuilding these core livestock industry regulatory principles will enable the re-establishment of core standards.

Local Authorities

Current personnel in the Agricultural Directorate are general agricultural practitioners, commonly known as agronomists. They provide support to farmers focusing on the production leg of the value chain. However, they recognize the need for a new class of agricultural specialists with proper training in agricultural extension methods and skills. This was expressed by the head of the General Agricultural Administration in Deir Ez-Zor. He reported that the lack of agricultural education, training and research is a persistent issue facing the Agricultural Directorate as they are forced to rely on unskilled staff who cannot train farmers on better agricultural policies without first receiving training themselves, under a Training of Trainers Model.

There is an agreement among local authorities that farmer profiles are needed to give targeted support to farmers. A SWOT analysis conducted with local authorities indicated that farmer licenses are based upon often inaccurate estimates of land holdings by a household. Remote sensing could provide more precise planning tools for local authorities. In addition, better planning and better services could create incentives for more farmers to register with the Agricultural Directorate. Information from Local Authority SWOT/KII analyses indicates the following needs and skills gaps:

- **Rebuild human resource capacities of targeted Local Council Agricultural Directorates** to manage extension services, based on an Institutional Strategic Plan to guide the capability-building process, including provision of trainings to existing staff on the above topics.

- **Reincorporate into each Agricultural Directorate expert staff** who have skills in agricultural technologies, investment funding, extension systems, and strengthening of Farmers Cooperatives.
- Introduce Agricultural Governorate staff to **remote sensing** detection systems.
- **Allocate a budget (financial support) to a Livestock Sub-Directorate/ Management Center** or similar entity, which would establish modern veterinary preventive and therapeutic health centers, mobile veterinary clinics and establish warehouses for feed/fodder to support breeders.
- Activate the role of **cooperative societies for Farmers and for Livestock Herders**.
- Increase the number of **veterinary experts**.
- Apply **training to increase farmer knowledge** and provide them with agricultural information.

Cooperatives

Farmers grouped in Cooperatives have fallen into disuse and would benefit from applying rebuilding methods to redevelop these institutions. Cooperatives serve many purposes, such as the group buying in volume of needed inputs, and the group sale of combined products, to pay less for incoming materials, and earn more from sales. Training is needed on these topics. Few surveyed farmers registered with local authorities appear to have accessed their services. These Cooperatives require rebuilding and associated training.

Farmer cooperatives have challenges in managing collective decision-making, governance and overall management of the cooperative. In NES, there appears to be a positive orientation towards cooperatives, especially as a mechanism to support poor people through allocation of land and coop membership. In that sense, cooperatives in NES have a stronger social inclusion than economic mandate. Adapting the model to build upon its social inclusion approach to building its economic benefits to members is an area for skills development for both managers and members. Weaknesses in financial management of cooperative assets have great potential to cause a collapse in trust. The gap identified is the limited administrative capacity of cooperative members who are responsible for administration. A proposed technical assistance package could establish a capacity-building program for ten targeted farmer cooperatives. The training related aspects of this program would include:

- **Rebuilding networks of qualified farmers and agricultural cooperative leaders** to enable field-level extension and learning
- Provide **training** in methods for effective seed multiplication, post-harvesting handling, storage, and financial management and marketing skills to better manage negotiation of better prices for seeds, agrochemicals, and equipment

PRODUCTION

Wheat Value Chain

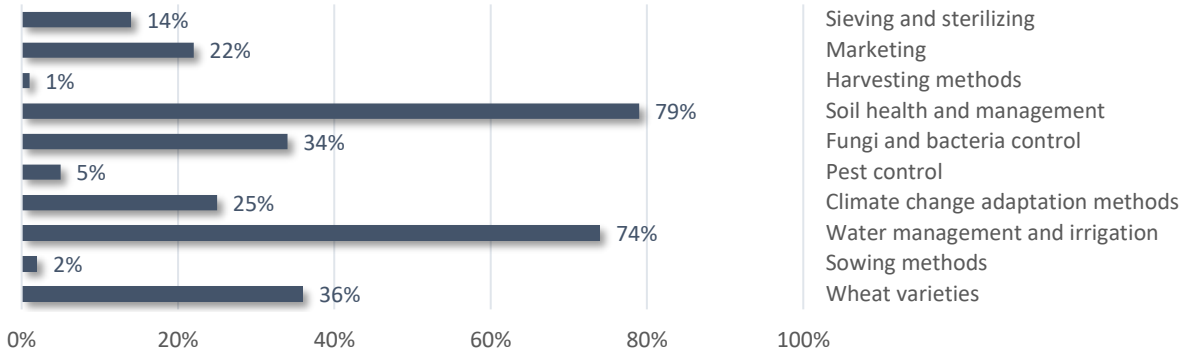
Wheat production constraints and skills gaps influence the productivity of wheat in NES. This is a critical challenge to all value chain actors since it limits both the supply and quality of wheat that is used for milling flour and bulgur and the quality of bread in both public and private bakeries. It is a primary challenge to the entire value chain that production systems and skills gaps be resolved to achieve the productivity and quality of wheat grain that is a food security staple in the region.

Farmers Skills Assessment

Farmers surveyed in Deir-ez-Zor indicated water and irrigation management, soil health and improved wheat varieties were the key areas in need of skills development and training. Similarly, the farmer and

herder surveys indicated similar trends in skills gaps and needs. Except in dryland areas of Al-Hasakeh, irrigation and water management were not the major concern. Climate change and supplemental irrigation were important in these areas.

Figure 4: Needs of Agricultural Extension Information of Farmers in Deir-ez-Zor



Skills and Technical Practices in Agriculture

Soil Health Management Practices Skills Gaps

For wheat cultivation, the majority of farmers tend to use mechanized disc harrow plowing, followed by manual sowing, fertilization, and additional disc harrowing to cover the seeds.[4] However, farmers in the region tend to cultivate the same crops on the same land for numerous seasons.[5] This practice has not only led to the degradation of seed quality over time, but also to a significant decline in soil fertility in the region, due to progressive micro-nutrient depletion. Although fertilizer is used to manage macro-nutrient soil fertility issues, farmers may choose not to use it, to reduce costs, or they lack the knowledge and experience to use fertilizer appropriately, further eroding soil quality and reducing yields.[6]

Water Management and Irrigation Practices Skills Gaps

Data from the Deir-ez-Zor survey reveals that 97% of farmers irrigate their farmland, with the vast majority (99%) using traditional flood basin or immersion irrigation methods.[7] From an environmental conservation standpoint, however, the widespread use of traditional flood basin irrigation tends to be 50% less water efficient than other methods, such as sprinkler irrigation. In Al-Hasakeh, about 70 percent of land is farmed under dryland conditions, although more farmers are digging both legal and illegal tube wells to supplement rainfall with irrigation in rainfed areas and to compensate for damaged irrigation systems.

Figure 5: Traditional flood basin irrigation method used in Deir Ez-Zor

Seed Application Rates Gaps

To improve yields, farmers tend to increase the application seeding rate per unit area, hoping to ensure plants sufficiently germinate. Survey

[4] Farmer survey; Technical Advisory Group meeting, 15 November 2019.
[5] Ibid.
[6] Wheat and barley farmers, Technical Advisory Group Focus Group Discussion.
[7] One farmer uses improved flood irrigation methods.

data indicates that 96% of the farmers use an excessive application rate of at least 30 kg/dunum, including 81% who use over 40 kg/dunum. This usually results in the wheat plants growing too close to one another, competing for water and nutrients, and yielding poorly. Only 1% of farmers were found using a seed rate of between 20 to 30 kg/dunum, near the GOSM recommended seed rate of 25kg/dunum for a popular seed variety (Sham 3) used throughout the country.[8] Again, this represents a training need, associated with the physical problem of poor-quality seed.

Sieving and Sterilizing Practices Skills Gaps

Focus group discussions conducted with the Technical Advisory Group reveal that many farmers use unscreened or unsterilized wheat seeds to reduce costs. KIIs conducted with farmers confirm that most farmers do not sterilize wheat seed, making their crops vulnerable to fungal diseases and insects. Since many farmers save part of their crops as seeds for the next planting season, farmers are frequently using poor quality seeds over successive plantings. Seed sterilizing agrochemicals are of varying quality and price, and farmers who do sterilize their seeds tend to use the least expensive process, which may be inefficient. Some farmers purchase seed from traders who allocate some of the grain they have purchased for seed sales. Some traders do sieve and sterilize seeds themselves or through a seed treatment center, but this practice is not uniform.

Agrochemical Use

Key informant interviews with agrochemical suppliers, who provide farmers with agents to control against disease, pest, and weed outbreaks, also report that farmers tend to lack the knowledge and experience in the proper use of these agents. When agrochemicals products underperform according to farmer expectations, causing damage to crops from diseases and pests, farmers tend to blame suppliers. Integrated Pest Management methods have been researched by ICARDA and others and are available as sources. The methods used by farmers to dilute and apply pesticides is a major issue in farmer and laborer health. The inability of farmers to coordinate their pesticide applications, can leave untreated fields as focal points for new infestations. However, farmer judgements of the poor quality of agrochemicals are contested by agrochemical suppliers to a number of other causes, including inferior seed varieties used, adverse weather conditions, or poor agricultural practices.[9] Agrochemical suppliers say that farmer dissatisfaction with product quality is largely due to farmer limited knowledge and practices, including:

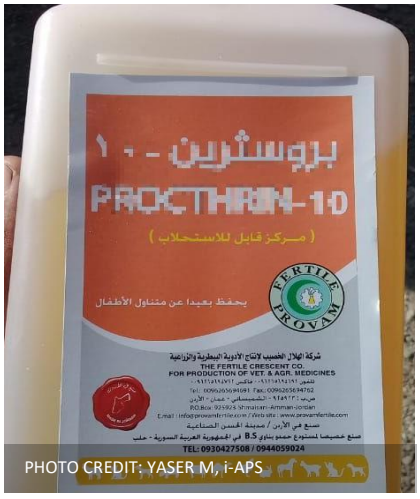


PHOTO CREDIT: YASER M, i-APS

Figure 6: Example veterinary medicine

- Farmer **lack of awareness** on the appropriate use (amount and timing) of the products.
- **Lack of practical experience** with newer types of agrochemicals on the market (by both farmer and supplier).
- Farmers **not buying the amount of product required** for their crop area because of cost.
- **Farmers buying cheaper, and thus poorer quality** inputs from an unreliable source that do not perform effectively, especially on intractable weeds that need specialized treatment.[10]

[8] 3% use less than 20 kg/dunum. FAO/WFP, Special Report, 8 October 2018, p. 13.
[9] FAO/WFP, Special Report, 9 October 2018, p. 14.
[10] Agrochemical suppliers, Technical Advisory Group Focus Group Discussion.

Across all of these areas, farmers require greater training to enable them to understand practices in safe agrochemical usage, and the methods required when applying by each specific type of agrochemical product.

Climate Change Adaptation

Farmers are generally aware of climate change but have little knowledge of how Syria's climate is now challenging all forms of agriculture, not just wheat. The impacts of climate change, droughts, excessive air temperatures and extended dry spells, are becoming significant for wheat and livestock farmers in Syria. Dry weather affects pollination and grain fill during reproductive stages. As the crop nears harvest, dry weather also builds vulnerability to fires. At other times, climate impacts include excessive rain, flooding of fields, soil waterlogging, and low temperatures which affect growth of winter wheat. Climate change brings more variability of seasonal changes and shifts between weather events that impact crop growth. The drought of 2017 to 2018 had severe impacts, while the hot spell of May and June 2019 was a contributing factor to widespread crop fires. Farmers need information on changes to their practices to maintain production. The entire topic of Climate Resilient Farming Practices is of growing urgency in NES.

Economic and Institutional Practices

Credit

The farmer survey found that although the majority, 65%, of farmers use cash to purchase inputs, a sizeable proportion, 57%, use credit. Nearly a quarter, 22%, use both forms of payment. Of those who use credit, 46% rely on it as their main form of financing. KIIs with agrochemical suppliers also corroborate that approximately half of their farmer clients depend on credit, in part or in full. There are no banks and microfinance agencies providing crop loans. Farmers typically access credit through neighbors and relatives or through their agricultural input suppliers. Supplier credits are typically interest-free up-front sales to known clients who repay their debt at the end of the season. Loans are informal, based upon character and ongoing supply relationships and are generally used by input suppliers to maintain market share.

Marketing

With few exceptions, farmers sell grain on the open market to traders, which can expose them to market risk. Data from the farmer survey reveals that a large majority of farmers, 92%, sell their wheat harvests to the private sector, predominantly to local traders who then sell the product onward to wholesalers. Only 8% of farmers do not sell to traders or to public sector entities, using their harvest for household consumption.[11]In Al-Hasakeh, there are more opportunities to sell grain either to Government of Syria or Local Authority reception centers and fixed prices. Once reception centers are full, then nearly all grain not for household use is sold to traders.


PHOTO CREDIT: YASER M, i-APS

Figure 7: Sieved and sterilized seed ready for sale or usage

Given farmer heavy reliance on private grain traders to market and distribute their wheat, farmers claim that they are manipulated by grain traders due to their need to sell crops.[12] In their view, the presence of trader monopolies resulting from a lack of sufficient

[11] Only one farmer surveyed reported selling directly to the public sector, in this case the Local Council.
[12] Farmer KII, Alharmousheyeh village.

competition. Local Authority grain reception centers have announced plans for procurement in volume and price, and then have not complied with those undertakings. This results in farmers selling to grain traders at lower than ideal prices.[13] Farmers require training in how to anticipate price fluctuations, how to make choices about seed sieving/sterilizing to increase potentials sales prices, and how to choose the most effective purchasers.

Bookkeeping and Small Business Management

Many farmers belong to an ageing cohort, with only basic numeracy skills, is a limitation. However, younger farmers have a far greater skill set to manage farms as business enterprises. In business planning terms, most farmers only operate at a subsistence level, and would benefit from exposure to tools for effective bookkeeping. These would in turn enable farmers to better utilize market information and adopt modern production methods. Farmers can then engage with other value chain actors, such as traders, in a stronger bargaining position, based on real knowledge about actual costs incurred and current prices in different markets, and this could help farmers reach a better price that ensures costs recovery and profit. Farmers who are members of cooperatives, have a pressing need to acquire bookkeeping skills, as this is required for many coop-based activities, such as joint grain sales, and joint input purchases. Farmers in cooperatives face the need to become much more effective as joint business operators.

Sources of Technical Support

Most farmers surveyed in Deir-ez-Zor and other KIIs report that in both governorates, there are very few agricultural extension visits. Farmers and herders mostly rely on their own experience tend to rely on their own experience to assess the condition of their crops. According to the farmer survey, farmers primarily rely on their own experience and knowledge to assess the health and condition of their crops. To a much lesser extent, some farmers hire outside experts, such as agricultural technicians, if they need more specialized experience in evaluating the crop and prescribing a course of treatment for pests and diseases.[14]

In the absence of strong public sector agricultural extensions services, private actors have become a key source of technical assistance and production inputs to farmers, especially agrochemical suppliers. According to the Deir-ez-Zor skills gap survey, 87% of farmers that apply pesticides use agrochemical suppliers as the main source of information and guidance. This relationship was also observed in early 2019, when heavy rainfall and warm winter temperatures led suppliers to forecast the spread of Yellow Rust fungal disease on wheat crops. Through close collaboration with farmers, which included field visits to inspect crops, agrochemical suppliers adjusted their import procurement strategy to import larger than normal quantities of fungicides, although the infection turned out to be mild.[15]

Agrochemical suppliers continue to require a training focus from humanitarian agencies, as their provision of advice vastly dominates all others that the farmers come in contact with.

[13] Wheat and barley farmers, Technical Advisory Group FGD; Farmer KIIs, Alharmousheyeh village.
[14] Farmer survey.
[15] Agrochemical supplier KII, Jezzret Albu Hmaid village.

Preferred Communication Methods

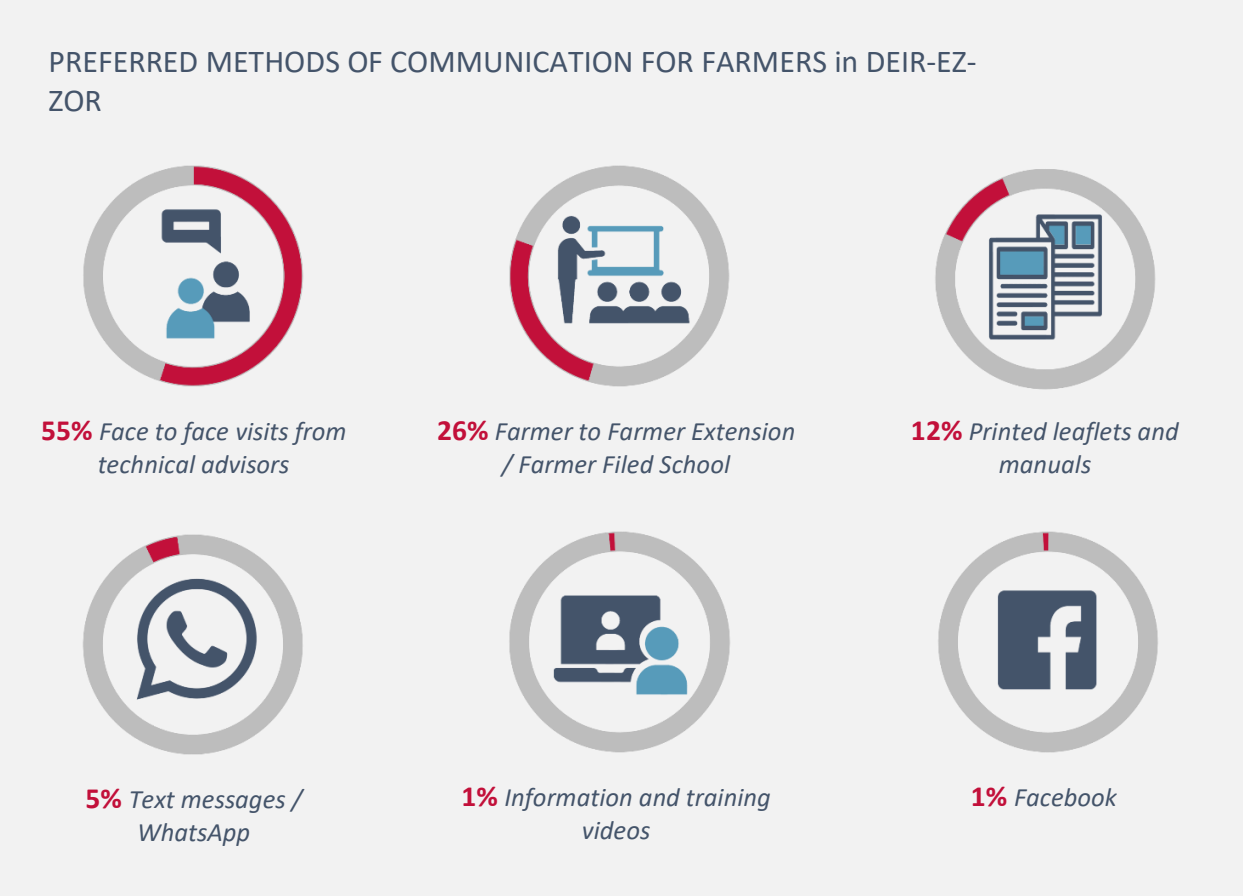


Figure 8: Reported preferred methods of communication for famers

According to the farmer skills gap survey in Deir-ez-Zor, farmers indicate strong preference to be supported by face-to-face visits from technical advisors to their farms. This method can be made more effective by organizing Farm Field Schools and using farmer-to-farmer extension models. This would enable farmers to receive updated information on a range of practices and farm opportunities in a cost-effective manner that does not depend upon constant field visits from understaffed public extension agents.

Internet connectivity is highly limited and unreliable. While over 98% of farmers have access to mobile phones, their access to internet browsing is much more limited, with only 32% stating that they engage with online webpages. This is a considerable impediment to programs that disseminate messages via websites. However, simple SMS type message can be used more effectively than programs requiring full web access.

Printed materials such as leaflets and manuals were found to be of interest to some farmers. These could serve as reference materials for specific information. Videos and social media were not perceived as desirable communication formats for most farmers.

Skills & Knowledge Gaps Recommendations for Farmers

As part of the farmer survey, i-APS assessed the key skills gaps identified in farmer households. Farmers stated that they would like to receive information on a range of topics and practices.

Integrated Pest and Disease Management Training

Training courses provided to Farmer Extension Providers on:

- Modern integrated pest management (IPM) methods
- Pest and disease recognition and treatment
- Climate resilient farming practices linked to IPM
- Soil health restoration methods
- Safe handling and disposal of agrochemicals practices

Farmer to Farmer information sharing

- Development of incentives system to support Farmer Extension Providers to conduct local farmer visits and share information from the capacity building program using farmer-first and farmer field school methodologies.

Climate resilient production technologies

Farming approaches including:

- Conservation agriculture
- Water & moisture conservation.
- Water efficiency
- Drought tolerant and cover crops
- Improved efficiency of irrigation systems
- Crop rotation cycles

Women Farmer Concerns

Results from further data collection instruments indicate that the following topics are of interest to farmers, particularly for female agricultural workers:

- Diversification of production to higher value crops, for example, vegetables, spices and the cultivation and marketing of mushrooms
- Technical and management support for female-headed households

Business Management Training:

- Training program for farmer leaders and farmer cooperatives on the use of market information, effective bookkeeping, business management, and agricultural finance .
- Training on systems for credit provision such as establishing ledgers, guarantee systems, and written contracts.

Livestock Value Chain

Herdowner Skills Gaps

Need for technical information and training. While most herdowners have been in business for 20 or more years, they have not had access to information and recent developments in animal husbandry and animal health. In surveys, herders indicated their most significant livestock information and advisory service needs are: animal breeding; animal nutrition (feed rations and optimum fodder inputs); animal health management, specifically for diseases and parasites; safe dairy processing methods; and rangeland management and grazing practices.[16]

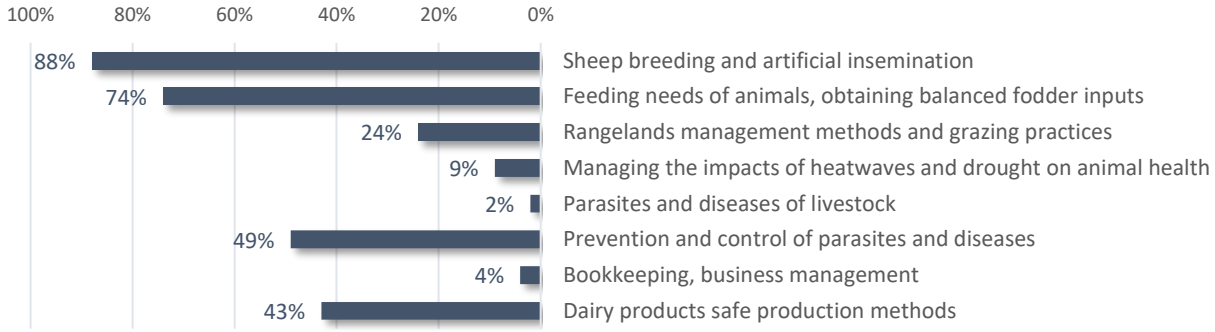
In terms of outreach, herders indicated a strong preference for face-to-face visits with technical experts (62 percent) followed by herder extension field schools that use peer learning opportunities (20 percent). This is how many farmers get information now, by relying on their own knowledge or talking to neighbors or traders. 12 percent of herders like to use published leaflets or manuals and only 5 percent indicated interest in information dissemination via social media such as WhatsApp. A combination of modalities is recommended, particularly since the printed leaflets could complement the face-to-face visits or peer learning as quick reference guides on key topics. 98 percent of herders have access to mobile phones, but only about half of them are connected to the internet. For this reason, WhatsApp and SMS messaging may be the most effective mobile outreach tool.

Herders Skills Assessment

Skills and Technical Practices in Herding

The Herder Survey generated an important data set, showing which areas for skills development where highest priority for respondents. This data is from Deir-ez-Zor although similar findings were found during KIIs and other herder surveys.

Figure 9: Requested Topics of Training by Herders



Sheep and Cattle Health and Nutrition Skills Gaps

Herders require considerable training to better understand how health issues for their stock are integrated. These include livestock health, sheltering, reproduction and feeding practices. Skill gaps and need for updating knowledge include:

- Lambing and reduction of newborn lamb loss

[16] Herder surveys – Al-Hasakeh and Deir-ez-Zor.

- Ewe nutrition during pregnancy and lactation
- Animal health management, especially for pests and infectious diseases
- Winterized shelter construction
- Care of newborn lambs

Strengthening these practices will lead to improved herd reproductive and health management, reduced ewe and lamb herd morbidity and reduced herd management costs.

Figure 10: Sheep sheds showing any lack of winterization features

Feed Practices

Data from the herder survey indicates that grazing livestock on natural pastures is the most widely used source of food for surveyed herders (89%), which is commonly supplemented by pelleted feed. Barley is the preferred fodder crop for livestock but, although more drought-tolerant than wheat, its production varies year-on-year depending on weather conditions. Despite the widespread use of crop residues, purchased hay remains the main source of feed/fodder for most herders (90%), compared to only 10% who rely on crop residues.

During droughts and dry periods, the loss of natural pastures increases herder reliance on purchased hay, feed and fodder.[17] This increases production costs as greater demand for hay, grain and fodder, combined with reduced grain and hay production raises fodder prices. In response, livestock herders use different coping strategies to manage the financial impact from drought. Some farmers cut out any concentrates, pellets and additives, switching to less expensive (and less nutritious) hay. [18] Other herders may need to sell part of their herd at low prices to buy fodder for the remaining animals.[19] Indeed, 87% of the herders surveyed have had to reduce their herd size/sell animals in order to cope with the impact of climate change on their livelihoods.

Economic and Institutional Practices

Credit

The vast majority of the herders surveyed, 96% pay for their inputs in cash, with 28% using credit on top of cash. Herders do not appear to rely primarily on one method of payment over the other, as the use of cash or credit depends on their situation at the time. Cattle owners may buy inputs by exchanging barren sheep to pay for fodder. Only 2% of herders surveyed use only credit, while 5% reported they sometimes had to sell part of their herd to finance their costs**.** Veterinary suppliers will advance inputs, medicines and other supplies to their customers in good standing. This is an oral contract; no interest is charged, and farmers pay when they sell animals.

Marketing

Data from the herder survey indicates that herders do not sell their livestock to the public sector, such as to local administration or local council authorities. A majority, 79%, sell livestock to private traders, while nearly a quarter, 23% sell animals in local livestock markets. Only 2% use both private traders and the local market. Most dairy products produced by herders in the region are traded locally. Ninety-five percent of surveyed herders do home-based dairy processing. Sales are made to three primary outlets:

[17] Fodder dealer KIIs.
[18] Herder survey; Sheep herder KII, Alsaghir village.
[19] Sheep herder KIIs, Alsa'wa village.

private traders, village shops and neighboring villagers. Thirty-five percent of households produced milk and dairy products for home consumption only.

Role of women

In terms of labor, the herder survey and KIIs highlighted the significant contribution of women's work in livestock production. According to nearly two thirds of the herders, women do 75% or more of livestock rearing and dairy processing. Focus group discussions with female herders similarly highlighted their important role in livestock production. As one participant noted, women have an important role in decision-making related to the management and care of the herd, as well as input on the sale of animals and the marketing of livestock products.

Figure 11: Women's Focus Group Discussion to inquire on their training needs

In addition, women are heavily involved in home-based dairy processing. Focus group discussion participants mentioned that the production and processing of cheese and dairy products are the prerogative of women, and as such reported that receiving training on modern methods of dairy production are of interest to them.

Sources of Technical Support

The skill gap survey in Deir-ez-Zor and KIIs in Al-Hasakeh indicated that very few herders register their herd with the Veterinary Unit or Livestock Department of the Local Council. Because herders are not registered with the local authorities, they also report that they do not receive support or information from local authorities. Consequently, the vast majority (95%) say that local authority support is either not available or rarely available (5%). This highlights that the public sector does not play a key role of support or technical guidance for herders.

As a result, herders rely on private actors for production inputs and technical advice or rely on their own experience and knowledge to assess their livestock. All herders surveyed rely on private veterinarian suppliers for their veterinarian inputs, and often receive technical assistance from these providers as well.

Figure 12: Livestock herders applying vaccinations

Skill Development Needs

As part of the herder survey, i-APS assessed the key skills gaps identified in herder households.

Herders report that their greatest livestock extension information needs are in animal breeding, animal nutrition (including optimum fodder inputs), animal health management (against diseases and parasites), and safe dairy processing methods. To a lesser extent, rangelands management and grazing practices is an area of interest to some herders. Focus group discussions with female herders also indicate high levels of interest in the following topics:

- Animal health and hygiene, including veterinary nursing (such as needle injection)
- Animal breeding techniques (IVF, etc.)
- Animal nutrition, including the ideal fodder compositions to use for various purposes (pregnancy, fattening, illness, etc.)
- Modern methods on the processing, preservation, storage, marketing, and safety of dairy products
- Home economics, capital management, marketing, and business planning

Herder Training

A training program would be based upon a set of training materials and manuals in 2016 that present a wide range of key information for Awasi breed sheep owners and are already in Arabic covering 10 topics. These products could be repurposed, with ICARDA permission, to the NES context. Provision of a comprehensive fodder sourcing, nutrition, livestock health, reproduction and feeding practices training program for better management of Awasi sheep and herd health. Training programs could include:

- Nutrition of herds; Fodder types, qualities and uses
- Lambing and reduction of newborn lamb loss/Lambing Kits
- Ewes' nutrition during pregnancy period
- Artificial insemination and breed improvement / Health Procedures
- Barn Preparation/Winterization of animal shelters
- How to deal with market, supply and demand
- Training courses for women educators on the latest methods of dairy processing, cheese and mechanisms of preservation, storage, marketing and product safety

Fodder Value Chain

Small Private Fodder Mills Skills Gaps

The availability of high-quality livestock feed at a reasonable price is crucial for improved livestock management. KIIs with feed mills in both governorates of this sturdy identified several skills gaps that they are aware of and want to better manage.

- **Mixing feed rations.** The key skills gap to address is to build the capacity of small feed mill operators to calculate feed rations based upon locally available ingredients. This will optimize the benefits of feed mills and support their business growth.

- **Business management skills.** The small feed mill business is challenging and relies on his marketing and business management capabilities as much as their technical skill mixing feed. There is a need to develop the business, financial and marketing management to efficiently run this business. With many small operators, there is a lack of efficiency in the feed mill business. Some of these entrepreneurs must develop the business and financial skills to attract and manage enterprises to grow into larger economies of scale that may be able to reduce costs to herdowners.

- **Herdowner management systems.** Many herdowners are not interested in improved feed because of the price without significant analysis of costs and benefits to improved feed practices coupled with improved animal husbandry. Herdowner awareness is a gap limiting uptake of improved feed rations.

Public Fodder Mills Skills Gaps

The primary skills gap for the public fodder mill is the quality control laboratory. Its current equipment is old and dated.[20] If the mill can source new laboratory equipment, then there will need to be a training on calibrating, operating and maintaining the new equipment to ensure feed quality control processes.

Communication Methods

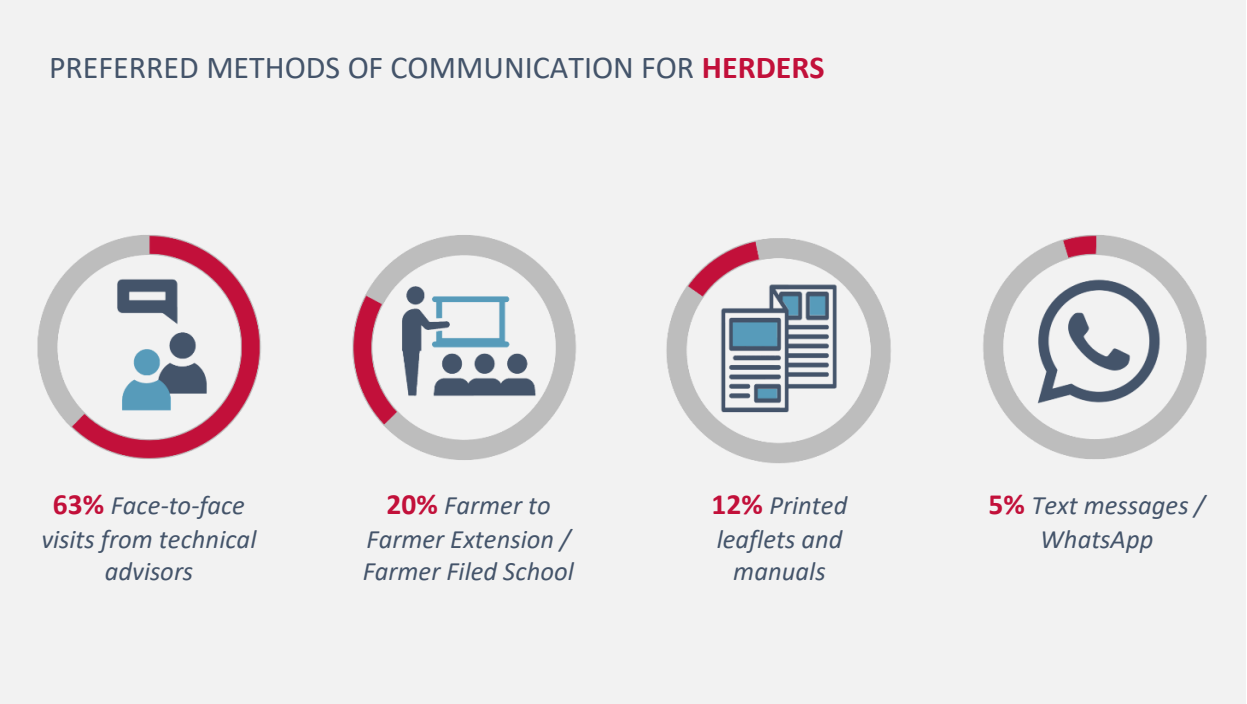


Figure 13: Reported preferred methods of communication for herders

Herders indicated a strong preference to receive advice and support through face-to-face visits (63%) from technical experts, followed by herder to herder extension or field schools that utilize peer learning opportunities (20%). Twelve percent preferred printed leaflets/manuals, while a small minority (5%) opt for information dissemination through WhatsApp. A combination of modalities is recommended, particularly since the printed leaflets could complement the face to face trainings by serving as quick reference guides on key topics.

As was observed with farmers, internet connectivity is highly limited and unreliable. Nearly all herders (98%) have access to mobile phones and just over half (51%) are connected to the internet. Over 30% of herders stated that any information available was not of a useful or expected quality. This is a considerable impediment to programs for disseminating agricultural extension information by phone, message and webpage access.

[20] Ibid.

MARKETING & PROCESSING

Wheat Value Chain

Grain Procurement, Storage, and Distribution Skills Gaps

The primary skills gap for farmers, traders, and storage facilities is the lack of available price information and the capacity to make market-based decisions on that information. Knowing prices at all sales points can build additional transparency and trust in the grain trade system.

In interviews, traders said they do not require training to manage or support their businesses but emphasized the need for farmer training to improve agricultural production and post-harvest handling to increase grain quantity and improve quality.

Flour Mills Skills Gaps

From KIIs with flour mills in Deir-ez-Zor and Al-Hasakeh, as similar set of skills gaps emerge. In general, milling operations have good technical knowledge of the products they produce and their business operations. For most milling operations there are a few key constraints revolving around aging equipment and an unstable energy supply:

- Adapting to modern machines that are more reliable and efficient.
- Flour mill maintenance, including fabrication of basic spare parts, manual mill machinery, which includes access to spare parts for new equipment, replacement stones for grinding, diesel generators and generator spare parts.
- Increased and improved storage facilities for grain and flour.

Bakeries Skills Gaps

For bakeries, the biggest challenge is to learn how to operate and maintain new equipment as bakeries are rehabilitated or built.

- Flour quality remains a challenge for bakeries to maintain a consistent quality of bread for public consumption. Flour quality drives the quality of bread produced and is largely dependent upon wheat quality and the operations of flour mills.
- Proper operation of rehabilitated equipment.
- Lack of trained and specialized engineers to maintain the equipment and operations of bakeries.
- Small business management skills in financial operations, business planning and marketing.
- Limited quantity of flour provided through public systems; bakeries have higher capacities than their daily flour allocation
- For private mills, development of new products and services that expand their capacity to profitably produce bread and bread products.

Livestock Value Chain

Marketing and Processing Skills Gaps

There are skills gaps that have been identified through surveys and KIIs at several levels of the meat processing value chain.

- **Livestock rations and feeding practices.** Both small and wholesale traders identified the need to improve their feeding practices to help them more efficiently fatten the animals they purchase

for resale. Livestock feeding practices and rations have been identified as an intervention in this analysis and inclusion of traders in animal nutrition, creating livestock rations and feeding practices may support both large and small traders.

- **Business management processes**. Traders and butchers identified the improvement of business and financial planning to effectively manage supply and demand trends in the market to facilitate more efficient transactions that maximize profits. Business management practices have been identified as a constraint throughout this assessment. Participation by traders, slaughterhouse managers and butchers will strengthen business management capacity throughout the value chain.

Slaughterhouses

Meat processors were consulted on their training needs (KII Slaughterhouse Operators) and identified the following areas:

- Practical guidance courses in-situ within the workplace from veterinary technicians providing specialized training for slaughterhouse workers on hygiene and how to examine carcasses.
- Training courses to provide the latest information in veterinary medicine.
- Establishment and training for veterinary laboratories to analyze meat samples to determine their disease-free status.
- Sanitation and hygiene at slaughterhouses are a critical skill gap. There are clear food safety, hygiene and environmental safety issues with the slaughtering process and the disposal of offal, hides and skins.
- Course on product safety to ensure meat quality

Small Dairy Unit" Guidelines & Training

Harnessing the organizing capacity of the farming cooperatives home based dairy producers who sell their products at the local market can be supported by adopting improved production practices. Home production guidelines and training packages, plus training of trainers, can be provided at focal points within farming cooperatives. Topics will include hygienic milking practices, improved production techniques, marketing strategies. This could lead to reduced losses of production; safer, higher quality dairy products, and strengthening of "co-operative culture". As a result, improved dairy production would strengthen livelihood opportunities and value chains critical to food security.

Figure 14: Sale of dairy products in Jezzret village

Dairy Processing Skills Gaps

KIIs identified the following skills gaps:

- **Food safety and hygiene.** There is a significant risk in the sanitation and hygiene of milk and milk products produced by numerous outlets under unregulated conditions. KIIs indicated that some processors do cut corners to reduce costs and this poses risk to the food system. Households request information and training on food safety and hygiene to ensure their products are safe and perhaps as a differentiator in the market. Dairy processor employees that surge from 3-30 during the year need training and guidelines to ensure safe production and handling methods.

- **New products and recipes.** Household producers know how to produce and process traditional products for their home and village consumption. Since all production facilities are producing the same products, there is sometimes over supply and high price competition. Some households, especially interviews with women, have indicated interest in diversification of product to create new market outlets and possibly higher margins for their business. [21]

- **Equipment maintenance.** Dairy processors have identified aging equipment and the challenges of doing maintenance and repairs on a timely basis. Spare parts and trained technicians are in short supply to repair equipment and generators that are frequently damaged by poor fuel quality.

- **Improved and consistent supply of raw milk.** The deficiencies in productivity and quality of raw milk by producers and traders has an impact on the production of quality dairy products. This skills gap relates back to skills gaps of producers but the maintenance of proper nutrition, veterinary care, hygiene during the milking process and handling of milk prior to processing have significant impacts on the quality and safety of processed milk.

Fodder Value Chain

Fodder Dealers Skills Gaps

Fodder dealers did not self-identify clear skills gaps. In general, they understand the trading business and have the warehouse space capacity to manage their business. A common refrain through each KII was their challenges with foreign exchange and with the supply and demand issues based upon the seasonality and marked shifts they experience from years with good rains and drought years. From the KIIs the assessment found that planning and financial management skills, especially when planning around business cycles is a skills gap in this profession.

CONCLUSION

The value chain studies have supported identification of a range of skills gaps and needs to strengthen the cereal grain and livestock industries. There are many specific skills and gaps to review in the context of developing and expanding new systems and private sector approaches to developing these key agricultural value chains in NES. Of primary importance is rebuilding the productive capacity of NES farms, improving the quality of grain and livestock products to build more competitive processing and marketing systems.

[21] Focus group discussion – women herders.