



Modernising smallholder farming: Achievements, challenges and prospects WIDE Bridge Discussion Brief No. 2 of 7¹

Key messages from the WIDE Evidence

- In the course of the past three decades, there was both increased focus on modernisation of smallholder farming and key changes in the rural context in Ethiopia. These include changes in the natural resource-base, provision of extension services, expansion of roads, transport and communications, as well as various processes of urbanisation and modernisation. Land scarcity, the need to avoid relying on only one income source and the desire for additional income have encouraged many less-resourced and resourceful rural households to combine a host of nonfarm activities with farming. These changes are more evident in rural communities close to towns and cities and those along and near main roads. As they combine farming and nonfarming activities many households and individuals are thriving, others are doing fairly well; while there are many others who struggle to make ends meet.
 - Public perception that views rural places as separate from urban spaces no longer seems to fit the changing context of farming on the ground. It may therefore be useful to re-conceptualise this division so as to better identify the development needs of ‘transitioning’ rural economies.
 - Based on this re-consideration, policies and practices could be analysed and revised with a view to better balance attention to both the farming and nonfarming sectors, taking account of local contexts.
- As part of modernising the crop-sub sector, modern farm inputs namely improved seeds, inorganic fertilisers and to some extent pesticides and herbicides have been supplied by government, farmers’ cooperatives, farmers’ unions and the private sector. Over the last five to seven years, qualitative accounts by farmers, local experts and officials indicate that the use of these resources has continued to increase and so has production and productivity, except where this was hampered by drought. Nonetheless, accessibility, utilisation and coverage remain issues: the poor and less-resourced are less able to be part of the agricultural modernisation process, whilst the richer are the ones gaining most of the benefits.
 - A pro-poor distribution of these resources would enhance the currently limited participation of the less-resourced households and individuals;
 - This in turn, would require innovative thinking in relation to credit provision, expansion of crop insurance and vigorous pro-poor allocation of public subsidies;
 - Improving the provision of these inputs, especially seeds and pesticides that are in short supply, can further improve production and productivity for the richer farmers as well.
- Cattle and shoats production, especially cattle production through cross-bred dairy cows, fattening of cross-bred bulls and to some extent native shoats, has been increasing in importance despite growing shortage of grazing lands, traditional fodder and water as well as high costs of modern livestock feed. As cross-bred dairy cows/heifers and bulls are expensive, it is again mostly the rich and better-resourced who are involved.

- As with crop production, enhancing participation of the poor in this livestock production ‘boom’ would both spread the benefits and further enhance the level of production for national economic growth, which may require similar innovative thinking about ways of making the inputs accessible to them.
- Improving supply in terms of quality and quantity may reduce the high cost of cross-bred livestock, which would help both more financially able and less-resourced households.
- Chicken production for meat and eggs has become an important additional source of income. Cross-bred and native chickens and eggs have become increasingly important for households as well as young people organised in groups.
 - There would be benefits in deepening the focus of agricultural extension services on this sub-sector, going beyond encouraging households to engage in it. This could include support in terms of hybrid provision, sheds construction, feed supply and disease management.
- Vegetable production is becoming an important source of income and nutrition for many households, particularly with the expansion of irrigation. However, this was not as significant as might have been the case with greater irrigation-focused support. Such support could include:
 - Focused seeds supply and technical advice;
 - Assisting households, particularly the poor and the less-resourced, to construct private hand-dug wells to better exploit existing groundwater potential;
 - Developing more communal ponds where feasible, along with appropriate management and proper maintenance and repairs of older and new ones;
 - Introducing or revitalising new irrigation techniques such as sprinkle and drip irrigation for an optimal use of water resources;
 - Innovative approaches to management of water, including addressing watershed management, water use rules and regulations and upstream-downstream conflicts.
- The focus has rightly been put on science and technology which are essential to modernise farming. This has satisfied mostly the needs of farmers who could procure and use modern farm inputs. However, concerns are expressed about negative side-effects of some of these.
 - Research into these concerns and ways of integrating agricultural science and technology with traditional ecological knowledge and practices, and implementing positive outcomes from such research, can have both immediate economic and long-term ecological benefits.
 - Native seeds varieties which are preferred to modern improved varieties by some farmers merit scrutiny, selection and recognition based on research findings to enhance agricultural development.
 - To also reduce excessive dependence on chemical fertilisers, the use of inorganic fertilisers should be encouraged, including their local and commercial production.
- Overall, further strengthening agricultural modernisation policy and practices to better tune them to the new context of transitioning rural communities and to better address the challenges of the poor, while also building on the desire of richer farmers to grow further, would enhance the contribution of agricultural modernisation to poverty alleviation, economic growth and inequality reduction. Government-private sector collaboration can be of help in this regard.

Introduction

Ethiopia is a predominantly agrarian country even by African standards. However, rural Ethiopia has been rapidly transforming, changing the context of smallholder agriculture. Key trends framing the agricultural sector for many rural communities include rapid economic growth, rising educational outcomes and a much denser network of connections to towns, cities and the outside world as a result of improving roads, transport, communications and electricity, and growth in the farming sector as just noted. While this is a nation-wide transformation, rural communities with physical proximity to major towns and main roads and where connectivity increased comparatively to a greater extent have been transforming more rapidly (DBII:02 Urbanisation). In this context, the government has employed different strategies to develop the farming sector² (see e.g. Fantu *et al.* 2018b). Moreover, this has given many rural households the opportunity to diversify into the nonfarm sector as well, as shown in the case of the WIDE Bridge communities (see DBIII:03 Nonfarming livelihoods).

This discussion brief, based on empirical data from early 2018, offers a glimpse into the performance, challenges and opportunities of the agricultural sector in four different rural communities (see map at the end of the brief). Three of the sites did well over the past five-seven years: Ude/Sirba, in East Shewa, Oromia, is located on the old highway from Addis Ababa to Bishoftu and Mojo, with a rapidly expanding municipality surrounded by Ude rural kebele; both the farming and non-farming sectors have been flourishing, although pressure on land is high due to surrounding and internal urbanisation and industrialisation.³ Yetmen in East Gojjam, Amhara, with the area around the roadside town recently established as an emerging municipality, is historically strongly connected to the national *teff* market, the production of which continued to drive local economic growth, although farming is also diversifying. In Aze Debo in Kambata, SNNP, the farming sector is gradually shifting from coffee to diversified production for local markets (eucalyptus, irrigated tomatoes, dairy, and poultry), a trend incentivised by the steady expansion of the nearby zonal capital, Durame and necessitated by a disease affecting coffee production that has been difficult to manage. In contrast, in remote Harresaw, located in Eastern Tigray at the border with Afar, the struggling farming sector was strongly affected by recurrent poor rains and the disappearance of irrigation due to water scarcity over the past five years.

The changing context of smallholder farming

Increasing land scarcity constrained farming even for the older generation, and there are increasing numbers of landless young people and couples in all the four communities, with this trend being more prominent in Aze Debo and Harresaw (also see DBIII:01 Land and urbanisation). At the same time, while a good number of young people were willing to work as farmers even including some with secondary or college education, many others wanted to be engaged in non-farming activities, while others wanted to migrate for work within the country and abroad (see DBIII:04 Young people's economic experiences). That said, the expansion of the nonfarm sector in the four sites resulted both from these kinds of push factors as well as a number of pull factors, attracting richer households with larger landholdings into diversifying (see DBIII:03 Nonfarm livelihoods).

In addition to land scarcity, farmers noted that to increase their income from their land and livestock they needed to apply more modern inputs, use improved breeds and extension services (knowledge, skills and information), as a result of which capital and access to credit have become increasingly important requirements. Weed infestation and pests further increased the use of factory-made inputs for crop production. For livestock production, using modern fodder helped fatten the animals faster and enhanced the prospect of getting a good income; this was indispensable in Harresaw where droughts seriously affected the availability of grass and even straw in some years.

Owing to agricultural modernisation, urbanisation and commercialisation, the supply of chemical fertilisers, hybrid seeds, livestock breeds and other modern farm inputs has improved. This also led

to increased utilisation of these inputs, to different extents among the four communities. For instance, improved seeds were most commonly applied in Ude/Sirba and less so in Yetmen, even though Yetmen too is a highly productive, market-oriented *teff* production area – this seemed to be due to a combination of better input supply in Ude/Sirba and farmers’ preference for carefully selected native seeds in Yetmen (see below); whereas in Harresaw, drought was a major factor discouraging farmers from using modern crop growing inputs.

However, across all the four communities many respondents, especially the poor, emphasised that the changes promoted were mostly beneficial for people who have enough capital and are made aware of opportunities early. In contrast, the poor, landless young people and most female household heads were benefitting least, due to lack of these resources. In addition, those with capital also have more chance of diversifying profitably within farming, e.g. through increased market-oriented livestock production and irrigation, as well as out of farming. Examples included one of the rich farmers in Yetmen who built urban houses and rented them for residence and shop-keeping; in Ude/Sirba a 50-year old man with a two-year post-secondary education was one of the biggest traders in the community, with also a grain mill, shops, minibuses and a small grocery to sell beer, while he was also continuing as a big farmer; another rich farmer in the same site said he was leading a better life and was wealthier than his parents because of his hard work, and pursuing multiple livelihood options.

For the rich and the middle-income, this ‘imperative’ to diversify was largely out of the desire to capture opportunities and become richer; while for the poor and less-resourced it was out of necessity to survive and with the objective of minimising the risk of relying on a single option (see DBIII:03 Nonfarming livelihoods). Respondents in the four WIDE Bridge sites, particularly the poor, mentioned that diversifying out of farming was one of the major reasons for people to become rich, while inability to do so kept others poor. As a woman in Ude/Sirba remarked:

Dependency on a single source of income is difficult to support one’s living. Households have to engage in supplementary livelihood activities, including wage labour. If the people merely sit and stick to their single livelihood, their life will not be improved. It deteriorates instead. At best, those people [who do not diversify] will likely seek loans from others, or their life will ultimately deteriorate to the level of seeking support from others.

In the face of this change, some farmers and young people, especially in Harresaw and Aze Debo, were questioning government policy and practice. Respondents in Harresaw emphasised, “*The government should bring changes which are relevant to the community*” that is, promoting and supporting activities that take into consideration the recurrent drought and lack of water on the one hand, and young people’s landlessness on the other; with more focus on non-farming activities that require less or little land. Even in the other three sites where farming was doing well, there were people highlighting the potential of nonfarming activities, and the limited support provided to these activities.

A key message arising from the evidence from these communities is that farming needs to be seen in view of the overall transforming rural economy, where farm and nonfarm sectors both appear important. However, whereas many rural households, especially the better-resourced ones but also poor people, are earning a significant part of their income from non-farm enterprises, the orientation of policy and extension support still largely focuses on farming.

- Balancing government attention between the farming and non-farming sectors whilst also acknowledging that different local contexts would enable different ‘mixes’ of the two sectors would better support the ongoing rural transformation.

Modern inputs, credit and extension services for crop production

The crop subsector has been dominant in the agriculture sector and relatively recent data show that

it continued to be the main driver of agricultural growth. In its 2013/14 annual report the National Bank of Ethiopia noted that crop output represented 32% of GDP for that year, and over the past five years it had on average grown faster (with an annual growth rate of 8.8%) than the agricultural sector as a whole (which had grown on average at 7.6%) (Fantu *et al.* 2018b). This, as argued by some scholars, may well reflect the emphasis on crop production in government agricultural production and marketing policies as well as broader development strategies (Alemayehu *et al.* in Dorosh and Rashid 2012); as further discussed below, greater attention to the livestock sector potential is a more recent phenomenon.

Three of the four Bridge sites (namely Aze Debo, Ude/Sirba and Yetmen) reflected this type of upward trajectory, and their proximity to main roads and towns led to both, better provision of agricultural extension services and inputs, and greater production incentives linked to easier access to markets, compared to remote outlying Harresaw community where this is much less so. In these thriving communities, modern crop production inputs namely chemical fertilisers, improved seeds, pesticides and herbicides are assisting many farmers to increase crop production. Nonetheless, their effects are constrained by a mix of issues including increasing costs, difficulty for poorer farmers to access them, inadequate supply of improved seeds in three communities, and enforced use of inputs in some instances.⁴

However, many respondents highlighted that it is mostly the rich and middle-income households that have the financial ability to purchase and apply modern inputs, whereas the poor are largely unable to do this. In Ude/Sirba farmers appreciated the change but questioned its relevance if the poor are not benefiting as well.

Wereda agricultural development offices, farmers' service cooperatives, public research institutions and the private sector supply these inputs to farmers based on cash, group credit and in a few cases individual credit (Harresaw). Rich and middle-income households who have savings purchase them mainly with cash. However, whereas MFIs were present in or near the four sites (ACSI, Dedebit, Omo and WALQO), many poor people shied away from procuring modern inputs on credit. The factors explaining this included the fear of being unable to pay back loans because of defaulting group members or natural shocks such as drought and frost, the MFIs' strict regulations, long processes of approval by the kebele administration, and local government's enforcement of repayment. In addition, several poor farmers expressed views that the use of modern inputs might not be profitable on the small land size that they farmed; this perception may well be compounded by the fact that it is not possible to purchase fertiliser amounts of less than 50 kgs, which may be too much for some of these farmers.

Farmers in all the four communities also expressed concern that the costs of inputs have been increasing, further affecting access by the poor. For example, farmers in Aze Debo mentioned that the cost of a 50 kg bag of chemical fertiliser was 780 birr in 2014/15 and increased to 1,560 birr recently. Similarly, the same amount of improved wheat seeds which cost 300 birr in 2014/15 had risen to 580 birr in 2017/18. In Harresaw, farmers stated that improved seeds helped them to produce double when the weather was good, but costs have also doubled over the last three years. The need to use agrochemicals (fertilisers and other chemical inputs) with improved seeds may raise the cost even further, although in all the four communities there were farmers with sufficient resources to be able to use them.

Improved seeds were well accepted as production enhancing inputs. In Ude/Sirba there was enough supply: in addition to the usual government channels, farmers got improved seeds from the nearby Bishoftu Agricultural Research Institute, and seeds multiplication and supply had even become an additional source of income for farmers organised in cluster groups, with one such group established as a private limited company. However, in the other three communities the supply fell short of satisfying the demands of all farmers – reflecting a country-wide trend which various studies link to

inefficiencies in the whole improved seeds production sector and input market (Mabaya *et al.* 2017)⁵. Hence, people had to purchase improved seeds from retailers on the market, at higher prices. A female farmer from Aze Debo said, “*The government should support the community in providing adequate improved seeds on time; and the cost should be fair. Currently, one small sack is sold for 600 birr and it is not fair. They should also help the community by finding solutions for the coffee and maize disease as production is decreasing*”.

As a result of limited or no access to these inputs, many resource-poor and less-resourced farmers were forced to rent-out their land, or sharecrop in some instances in Aze Debo and Harresaw, with the rich who could afford purchasing these inputs. If it were not for lack of finance to procure these inputs, most of them could have worked their land and earned the benefit in full, which instead they had to partly forgo for the rich who leased the land. For the rich and middle-resourced households who rent-in or sharecrop-in, the constraints of the poor come as an opportunity to apply more of modern inputs, using family and hired labour to grow and harvest more crops.

The evidence indicates that despite the focus on smallholder farming, much remains to be done to improve access, utilisation and coverage of modern farm inputs. Under current conditions, the rich are able to reap most benefits out of the enabling environment created through the modernisation of smallholder agriculture and do not need convincing any longer, whereas the poor and less-resourced are unable to get their due share, even though they juggle different opportunities to improve their lot. Ideas for consideration to spread the benefits of agricultural modernisation more equitably may include:

- Creative thinking about pro-poor provision of credit services for inputs, which was mentioned in all communities as a way to address the inequality problem.
- Farmers may play a role in this process; such actions as initiating and promoting select local seeds loan systems and linking farming with nonfarm support so that the latter improves the credit worthiness of the poor might be considered.
- This should be accompanied by the expansion of affordable crop insurance systems that would alleviate some of the fears of the poorer farmers with regard to taking credit.
- Both these measures may also require considering pro-poor use of public subsidies.
- Moreover, agricultural extension services and advice could be refocused on poorer households, as also mentioned in DBIII:05 Modernisation and inequality.

Modern inputs, credit and extension services for cattle & shoats production

Ethiopia ranks first in Africa and 5th in the world in terms of its livestock population, yet, it is also widely reported that the economic potential of this subsector is not fully exploited. Moreover, studies have suggested that livestock production have contributed little to the rapid economic growth recorded in the 2004/5-2015/16 decade in Ethiopia: while livestock output grew at 5.8 percent per annum over this period, this was slower than overall GDP growth (Fantu *et al.* 2018a). In this period, out of every 100 birr added to the economy less than 5 birr came from the livestock sector, while crop output growth contributed about five times as much. However, relatively recently the subsector has begun to attract greater attention, as illustrated by initiatives such as the livestock sector development roadmap (Agricultural Transformation Agency n.d.) and the government Livestock Development Master Plan (2015). The latter, conceived as a series of five-year development plans, focuses on interventions aimed to improve livestock genetics, feed and health services around three key value chains – poultry, crossbred dairy cows, and red meat/milk from indigenous breeds.

At the household level, livestock has always had key economic and social significance for sedentary agriculturalists, agro pastoralists and nomadic pastoralists. Owners rely on livestock during economic shocks and a few decades ago, livestock were said to be for rural people what bank accounts were for the urban middle class (Daniel 1990). However, a recent diagnostic report points to a number of

factors which curtail the contribution that livestock could make to improving households' economic status, including reduced availability and access to communal grazing and pasture; insufficient access to alternative feed options; poor animal health due to disease prevalence and weak public sector-dominated livestock support service delivery; prevalence of poor quality breeds; limited adoption of improved livestock practices; inadequate processing and marketing infrastructure (World Bank 2017).

The recent WIDE data suggest that in contrast with the mixed picture presented above, livestock production and the income from this subsector had generally increased over the past five to seven years in all the four sites. An increasing number of households were said to own cross-breeds, most strikingly in Aze Debo where about 80 percent of households were estimated to have at least one cross-bred dairy cow. The income derived from the sale of milk, milk products and fattened bulls or oxen could be quite substantial, improving the economic status and living standards of many farming households. Farmers in Aze Debo illustrated these huge changes in the household economy saying that, if one sells two heifers one can build a better house with iron sheet roofing, and furnish the house with a TV and other expensive items. Many moved from thatched to tin-roofed houses in part through increased income from livestock production. In all the communities the income from dairy cows and fattened cattle was used to pay for modern farm inputs, and to start or expand non-farm businesses.

These improvements appeared to largely result from the introduction and supply of cross-bred cows and bulls through a combination of wereda agricultural extension services, a few NGOs, the private sector and local and far-away markets. Cross-breeding of local cows with foreign sires and impregnating the cows with artificial insemination by vet technicians for a small payment has also accelerated access to improved breeds. However, there remained constraints on widespread adoption of cross-bred cattle, including high market prices to purchase them and lack of access to credit. In Harresaw, farmers also wanted them to be supplied by the wereda which, they said, could ensure better quality of the breeds than the profit-seeking market. High consumption of feed and water by the hybrids was a further constraint. As a result, some respondents in Harresaw said most farmers still preferred local cows that can survive on small amounts of fodder and can be sent to Afar to survive severe periods of drought. Whilst selection and distribution of best local breeds could indeed complement other measures aimed to improve livestock production and productivity⁶, in Harresaw what happened was a 'de facto' selection as weaker cattle died or were sold, with little chance for this to over time improve the local breeds and major negative impacts on livelihoods.

In all the four sites, access to fodder and water was noted as a major constraint. One factor in this is the ever-shrinking grazing land. Moreover, the cost of both traditional and modern livestock feed was said to be increasing. In Aze Debo, people mitigated this through share-rearing among those having livestock and feed; there was also an effort to produce fodder on the FTC land, and farmers could get seedlings to grow fodder on their own land, too. In Harresaw, cut-and-carry had mostly replaced free-grazing, but lack of water due to repeated drought was an additional obstacle.

Rich farmers were buying factory residues or by-products commonly known as *fagullo* and husks called *furushka* which are nutritious for milk production and fattening. Those who could not afford the ever-increasing price of grass, straw or husks relied on lean-time feed such as cactus and acacia, as used in Harresaw. Traditional feed such as grass, straw, hay and even cactus for larger animals and acacia trees for shoats were increasingly commercialised and served as a source of income for those with few or no animals. A man in Harresaw, for instance, earned 2,000 birr from the sale of cactus, and people also started growing and selling acacia trees. However, despite the constraints and costs of keeping cross-bred animals, those with resources still found the business profitable because of higher milk yield and meat production compared to the local breeds.

One more related factor is the number of animals owned by farmers. Fantu *et al.* (2018a) indicate

that between 2004/5 and 2015/16 the livestock sector output grew mainly as a result of increase in the number of livestock and livestock owners, whereas the adoption of modern feed and livestock production practices did not contribute that much. The (more recent) WIDE data suggest a more nuanced picture, in which farmers are increasingly aware of the potential value in having fewer, better quality breeds, even if not all might yet apply this strategy. In the four sites, farmers explained that they were reducing the size of their livestock herd because of shrinking grazing land, shortage and high cost of modern feed, shortage of labour also because of children going to school, and attitudinal change moving away from viewing large numbers of livestock as a source of prestige. At the same time, they could see for themselves the increasing economic importance of livestock and livestock products due to increasing market demand and sale prices. This resonates with another study pointing to the same factors driving farmers towards reducing their herds (FDRE MoARD 2-15). However, the same study also suggests that to 'take off', such a trend needs to be supported by a range of measures including improvement in feed, health and better supply of cross-bred stock—which farmers in the WIDE sites also called for.

In this context of an improving and expanding livestock subsector, farmers in the four communities noted the same caveat, that the benefits from dairy production and large stock fattening were not fairly shared among the different socioeconomic classes. As with the crop subsector modernisation, only the rich and middle-income farmers were said to be able to purchase and keep cross-breeds; that is, those with larger land holdings and surplus production for the market, those with additional income from non-farm activities (often trading), those working with salaries, and those getting good remittances from a migrant family member (particularly in Aze Debo and to some extent also in Harresaw and Ude/Sirba). For the poorer households, livestock production was often restricted to less profitable shoats, although they were also participating to some extent in the expansion of the chicken and egg subsector (see below).

In conclusion, the livestock and especially, the cattle sub-sector, has been thriving for many households in the WIDE Bridge sites. There has been a significant increase in the use of improved breeds of cattle, in dairy production with cross-bred dairy cows, and in the fattening of both cross-bred and native bulls and local shoats. These activities have become important sources of smallholder livelihoods despite increasing shortage of feed and water. However, like for crop farming the benefits of modernisation in this sub-sector are also largely reaped by the rich and the middle-income farmers while the poor are often left out. Similar suggestions might therefore be considered about:

- Reorientation of agricultural extension services towards the poorer farmers;
- Creative thinking in combining pro-poor credit provision, expansion of livestock insurance and potentially the pro-poor use of public subsidies with a view to ensuring credit and insurance affordability by poor farmers;
- Alongside further enhancing ongoing efforts to strengthen veterinary services.

Chickens and eggs production are picking up

Chickens and eggs production are more accessible for poor households because of the need for less land and other resources, although diseases and mass losses of chicken, which a number of studies (Tadelle *et al.* 2013; Fisseha *et al.* 2010) have found to be frequent and were mentioned in Yetmen, are bigger problems for the poorer households. In the WIDE Bridge sites, hybrid chicken rearing for eggs and meat steadily increased over the years except in Yetmen (see below).

In Harresaw, residents indicated that chicken production and sale has become one of the most practised activities, overtaking shoat fattening and sale, while cattle fattening remained in third position. According to the wereda plan for agricultural clusters, Harresaw, like all other rural kebeles in Atsbi wereda, is going to be part of a 'chicken cluster'. Government support in relation to poultry was appreciated although some women noted this did not go much beyond advice and veterinary

services. In the wereda, farmers have easy access to hybrid chickens thanks to private or cooperative-based local suppliers, who incubate chicks in nearby areas, while some residents also keep hybrid hens and local cocks for cross-breeding at home. Among the factors that encouraged chicken and egg production people noted good access to hybrid chickens, good advice from DAs and vets, and little capital and less land required. The economic advantages of producing chickens were widely acknowledged, with some residents mentioning that the expansion of this activity was one of the reasons there were relatively fewer poor and very poor people.

In Ude/Sirba, hybrid chickens and eggs production is dominated by 'external investors' (Ethiopians from other areas and some non-Ethiopians as well) with some large and medium-scale poultry farms. Nonetheless, the number of local farmers who are engaged in hybrid chicken production has increased as well; it has become a major means through which the livelihood of many households has improved. Farmers can easily access good quality hybrid chickens from the Bishoftu Agricultural Research Institute and from the markets in Bishoftu town. Poultry farms run by investors are serving as models for some smallholders who started increasing the scale of their businesses. However, some community members complained about the negative environmental (sanitary) effect of poultry production. Moreover, some farmers experienced failure or difficulty in managing hybrid chickens; diseases wiped out many chickens, especially as the concentration of producers increases the risks of contagion; and the very close and intensive follow up required to keep chicken healthy led some to give up the enterprise.

In Aze Debo as well, poultry production is widely practised. Some said that all households keep between 3 and 20 improved breed chickens provided by the wereda office of agriculture; others said that about 35 percent of households have hybrid chickens and noted that some households were too poor or scared of disease and only kept local breeds. The wereda that started by distributing chickens to the community has gradually moved to organising women to work in groups to grow one day chickens which the wereda itself buys to distribute to other farmers. The kebele FTC is also engaged in the introduction of improved breeds of chickens, also encouraging farmers by demonstrating in a poultry site inside the kebele compound. The sale of chickens and eggs is common, and families are also feeding children more eggs than in the past.

Compared to the picture of positive change in the other sites, hybrid chickens and eggs production was much less prominent in Yetmen. Earlier attempts to adopt hybrid chickens some six years ago were not very successful due to the misconception that eating their meat and eggs would cause diseases, and lack of sufficient extension advice to counteract this misconception. Traders were reluctant to buy the eggs and chickens and when they did, offered very low prices discouraging the people who started, causing them to gradually revert to traditional production of local breeds. More recently, people re-started with hybrids, obtaining them from individual traders; vaccination service was provided but feed for hybrid chickens was very difficult to obtain so that only a few households kept them. Moreover, for various reasons including limited support and awareness, many people lost their chickens to diseases, some losing up to 30 hybrid chickens as there was no vaccination or other treatment available at the time. The data also suggest that this still timid revival has been the result of a broad diffusion effect rather than any focused effort by the government. This, in turn, highlights the importance of informal social learning already noted in earlier WIDE findings (see DBII:10 Knowledge, learning, technology transfer and change), a point which is further discussed below.

Poultry has traditionally been the domain of women and children. In the past few years it appears that the subsector has become more profitable, which might have led to men taking a bigger or even dominant role, as seems to be the case with dairy probably because of the size of investment capital required and the perception that men's involvement is needed given the bigger responsibility. The data suggest that in Harresaw and Aze Debo poultry production now extends to some young people including young men, in groups or not. In Sirba/Ude the shift towards commercialised poultry

production is more pronounced, and when this is local investment, men are indeed involved. This may over time lead to women's marginalisation in the sector, although the data we have does not allow concluding on this at this stage.

In conclusion, in three of the four Bridge sites people have started appreciating the benefits of chicken and egg production as sources of income, as there is a high demand for household consumption and markets locally or in neighbouring urban areas, and prices are increasing. This also has positive nutritional effects.

- Institutional support in the form of loans and skills training to scale-up chicken and egg production would likely further boost the sub-sector, with potentially significant positive effects on income and nutrition, including for households otherwise constrained by resources such as capital, labour and land (see also Tadelles *et al.* 2013; Fisseha *et al.* 2010).⁷

The production of vegetables is slowly expanding but also facing constraints

Ethiopia has good potential for household and commercial production of vegetables (Akalu and Dürr 2016; Nimona 2017), considered as inexpensive sources of energy as well as vitamins and minerals useful for human body-building. Despite this, it is common knowledge that the production and consumption of vegetables has for long remained quite limited in the country, among others, because of cultural preferences for cereals, and meat as 'holiday food'.⁸ This is slowly changing, with various native and exotic species of vegetables being grown through rainfed and irrigation agriculture; some studies show that the demand for vegetables has increased for home consumption and local markets, whilst most of the exported production is carried out by larger-scale commercial producers, Ethiopians and foreigners (Nimona 2017).

The four Bridge communities have been practicing small-scale and household irrigation of vegetables such as tomatoes, potatoes, cabbages, carrots, green peppers and sweet potatoes, although the expansion of irrigated production was affected by different constraints. In three of the sites (Aze Debo, Ude/Sirba and Yetmen), in early 2018 residents used a variety of water sources and mainly small-scale technologies, including pond water, river water, hand-dug wells using diesel operated pumps, rope and bucket systems, diversion weirs and related simple technologies. Irrigated vegetables were an additional source of household income and nutrition for many rural households who could obtain water throughout the year. The rich were able to purchase and use diesel pumps and to dig well-prepared but costly hand-dug wells (costing up to 10,000 birr in Ude/Sirba, somewhat less in Aze Debo), whilst some less-resourced households could grow vegetables during the rainy seasons. Some farmers used diesel operated pumps in all four sites. However, water shortage sometimes rendered this equipment idle, notably in Yetmen, where damming of the river by upstream rural kebeles significantly reduced the ability of farmers and newly organised youth groups to grow vegetables, and in Harresaw (see below). In Ude/Sirba, a large-scale government-supported irrigation scheme under development for more than five years was not yet complete, so that vegetables production was dependent on water from wells dug and owned by private individuals, with many households also producing vegetables during the wet season.

Private hand-dug wells and seasonal rivers were used as sources of water for vegetables production in Aze Debo, as well as communal ponds recently dug with PSNP Public Works and some machinery support by the wereda. Moreover, there was an additional opportunity to carry out rainfed vegetables production in some areas of the kebele where the land retains sufficient water from rainfall precipitation of the wet season. Together with eucalyptus wood, the sale of vegetables was partly compensating for the loss of income from coffee, decreasing because of diseases that the extension services had been unable to tackle yet. Some farmers earned up to 8,000 birr from one season of irrigated production.

In contrast in Harresaw, persistent drought and limited rainfall in the past five years had very significantly reduced vegetables production, sale and use, with the dam that used to irrigate more than 220 hectares of land becoming nearly empty, and other smaller water sources also going dry.

The above indicates that on the whole, vegetables production which was emerging five-six years ago had somewhat picked up and irrigated vegetables were an important source of income and nutrition in Aze Debo, Ude/Sirba and Yetmen. However, this was not as significant as might have been the case with greater irrigation-focused support. Ideas to strengthen irrigated production of vegetables include:

- Investment in modern irrigation infrastructures to exploit groundwater; and timely completion of planned government-financed infrastructure
- Better management of watershed and water and especially, of upstream/downstream issues
- Focused seeds supply and technical advice by the government and other actors involved in strengthening household and small-scale agriculture.

In Harresaw, the effects of drought were severe, not only for irrigation but also for farming in general. Despite this, many residents still considered farming as their major source of livelihood because of limited alternatives and going through a cycle of hope and despair from good to bad years. In the words of one of the respondents:

The on and off of rainfall in the area is causing unnecessary hope in the community. When there is good rainfall one year, the hope rises again to get better production next year so that we invest more on farming such as using fertilisers and improved seeds and planting in lines. However, then there will again be no rainfall so that we lose our money for no production. The situation of farming in our area needs not only the attention of the kebele, wereda, or regional government but also the federal government's attention.

- In communities like Harresaw, and as also suggested in DBIII:05 Modernisation and inequalities, more fundamental rethinking may be required in order to develop more meaningful interventions addressing the challenge of recurrent drought on farming as a source of livelihood.

Combining science and technology with local knowledge

All the four communities have been using chemical fertilisers as soil fertility improvers at least over the last three or four decades to enhance the production mainly of cereal crops. There is general agreement among farmers that the land is less productive if chemical fertilisers are not applied for cereal crops, especially *teff*. Some farmers in Ude/Sirba have recently started applying them for chickpeas, a crop otherwise mainly sown in rotation to improve soils. Farmers are generally aware of the benefits of manure or compost, but in the Bridge communities some farmers reflected that compost preparation and transportation are challenges. The preparation of manure or compost requires biomasses and dung. The former is affected by depleting vegetation cover; whereas dung is more easily available for the usually richer households who have livestock. Dung is also used as household fuel; hence the gender dimension comes in as traditionally women are the ones to collect and process dung for fuel to make an income. As a result, chemical fertilisers have remained far more largely used. Moreover, while the resource-rich use chemical fertilisers and other inputs most, all socioeconomic classes seem to agree that recently, they have to apply more fertilisers than before. This may well have contributed to explain the increase in intensity of fertilisers' application, alongside acceptance of extension advice more usually noted as explanatory factor (see e.g. Fantu *et al.* 2018b).

Farmers in Aze Debo, Ude/Sirba and Yetmen were concerned by this trend, explaining that the land has become less responsive to chemical fertilisers and they have to keep applying more of it on the same unit of land to counterbalance this negative effect and obtain the same amount of production. However, this may in turn further affect the soil sub-system so that, when another optimum

production point is reached, it may no longer be possible to increase productivity by just continuing to apply ever more fertilisers. In Ude/Sirba, smallholders have started applying three types of soil-specific fertilisers since the last two or three years – a significant change compared to the blanket supply and application of the same fertilisers on all types of soils in the other three sites. Farmers in Ude/Sirba are quite happy about the new fertilisers and ecologically this might also have lesser negative impact. However, Ude/Sirba is the only case in the Bridge sites illustrating this effort by the government to adapt fertiliser formulae to soil types.⁹ Moreover, this too will require monitoring as the soil quality could still be affected in the long run by the new fertilisers.

The application of pesticides and weed killers is not as common and the supply is also not very reliable, especially given the cost which is not affordable by many farmers. Nonetheless, in addition to manual treatment of weeds and pests, a number of chemicals are applied. Despite their effectiveness, farmers complained that pesticides and weed killers harmed bees. One of the inputs mentioned as a recent innovation is Round-Up, a holistic weed killer that destroys all weeds in a field. A male farmer in Ude/Sirba said, *“Round-up indiscriminately kills all vegetations, including grasses which it automatically kills, leaving just the bare soil”*. Respondents suggest that this innovation is widely accepted by those who have the means to procure it: it is seen as a useful input greatly saving time, energy and cash since weeding has been labour-intensive and therefore costly. Nonetheless, farmers have realised that when Round-Up is applied on a field crop one year, the land needs to be planted with another crop the next year; otherwise, the effect of the weed killer would affect productivity. In the meantime, in the US and several countries in Europe Round-up is banned as having highly damaging health effects, something farmers have not been made aware of.

With regard to improved seeds, the case of Yetmen stands out. Scientifically-improved seeds were introduced in all the four communities and are in use to different extents in all of them, with variations across sites and depending on crops. However, in Yetmen, where *teff* has been cultivated for ages with high profit, farmers preferred using their own seeds, carefully selected and preserved from their production, with some of them even selling these ‘locally improved seeds’ to others. This had not attracted any attention from government bodies involved in agricultural modernisation.

As noted earlier with the case of the re-attempt of keeping hybrid chickens in Yetmen, informal social learning plays an important role in agriculture modernisation. This resonates with earlier WIDE findings (DBII:10, Knowledge, learning, technology transfer and change) and a number of other studies (e.g. Krishnan & Patnam 2014, in Buehren *et al.* 2017).¹⁰

The above findings suggest the following:

- Firstly, there is a need to carefully monitor the impacts of all kinds of chemical inputs beyond short-term production gains, paying attention to their effects on the local ecology, which might endanger production in the long term, as well as their effects on human health.
- Second, and as part of this, it would be useful to ‘listen’ to the smallholders who are quick at detecting some of the less positive effects of some modern inputs, but, in the absence of alternatives, may continue using them.
- Thirdly, farmers also possess experience-based knowledge, e.g. on seeds, which could be valuable to complement scientific knowledge developed by research institutions which remains, to this day, the main source of innovation in the government-led agriculture modernisation programme.
- Fourthly, there would be value for the formal extension system to recognise and build upon existing social learning practices and networks among farmers.

Conclusion: Rethinking smallholder agriculture in changing rural contexts

The last two to three decades have been characterised by greater emphasis on smallholder agriculture for its contribution to poverty alleviation, food self-sufficiency, economic growth and

inequality reduction, as well as in terms of provision of raw materials for industry and exportable items to earn foreign currency. Different strategies of smallholder agricultural development along with the provision of inputs, credits and extension services have been put into practice, raising the productivity and production of millions of smallholder households across the country. The WIDE data and a number of other studies mentioned above indicate that this emphasis on smallholder farming has taken place in the context of changing rural economies, communities and households, particularly those close to towns and cities and those along or close to main roads, facilitating increasing linkages to towns and markets. These changes suggest a need for some re-thinking, which could consider the following directions:

- The increasingly blurred urban-rural distinction in many communities still considered and managed as 'rural' may call for reviewing existing concepts, policies and practices, so that the needs of the growing number of 'transitioning' communities could be better addressed.
- As part of this refocusing, the farming and nonfarming sectors need to be supported as complementary and feeding one another, while also acknowledging that different local contexts would enable different 'mixes' of the two sectors.

The focus on smallholder farming has brought the opportunity for millions of farmers to access and utilise modern inputs, credit and extension services. However, in the WIDE Bridge sites better access, utilisation and coverage were largely limited to households who have the financial resources to procure these inputs. Some inputs were also limited, notably improved seeds, even for those who could afford purchasing them. Therefore:

- New mechanisms may need to be developed to serve the poor and less-resourced smallholder farmers to further improve accessibility, utilisation and coverage of modern farm technologies/resources.
- The role of the public sector in this regard remains important given weak purchasing power of the less-resourced and asymmetrical access to information between them and richer households/individuals.
- At the same time, further scaling up the role of the private sector (including, for instance, through commercial lending to private companies) in the breeding, multiplication and distribution of improved seeds might help in offering a larger choice and better quality inputs, which would also support richer farmers to further grow.

The balance in the traditional crop-livestock mix appears to have been changing, with livestock production growing in importance and in some cases possibly overtaking crop production. Uses of cross-bred animals, dairy production, fattening as well as poultry production have all improved.

- Examining the balance in the livestock/crop production mix and within the livestock subsector, and possibly rebalancing attention depending on local context, might create an enhanced path for smallholder agriculture and rural development.
- However, as with crop production, this would require developing mechanisms facilitating access to these income and nutrition-enhancing activities by the less-resourced households and individuals.

Small-scale, particularly household irrigation contributes to household nutrition and economy. In the Bridge communities, irrigation expansion has taken place largely through individual initiatives responding to the market, and has gradually increased the importance of vegetables production, which traditionally had a limited place in the farming and household food systems.

- Scaled-up government attention and investment may serve as a development path that currently appears to be under-exploited.
- An integrated irrigation development approach might be considered, combining attention to site-specific tailored infrastructure investment, focused extension services and input provision, and support to management issues.

While continuing to strengthen access to modern farm inputs and technologies, there could be benefits in also considering and expanding the use of local knowledge-based and more organic solutions. This might include:

- Reconsidering the value of native seeds that can be high-yielding and have other positive qualities such as drought resistance; along with measures encouraging farmers to invest in the multiplication and sale of not only modern seeds but also selected traditional seeds;
- Along with the use of inorganic fertilisers, encouraging the use of organic fertilisers; this could be facilitated by supporting rural young people and inviting investors to engage in small-or larger-scale production and sale of these inputs;
- Carefully monitoring the effects of the use of industrial pesticides and herbicides, notably on apiculture, as well as the effects on soils of the new generation of fertilisers, with a view to adjusting formulae as and when necessary;
- Possibly continuing to encourage hand weeding and other traditional means, especially when there are strong indications that some of the commercialised inputs may have negative long-term effects.

In general, carrying out research on the potential usefulness of traditional ecological knowledge, practices and resources such as native seeds varieties along with the use of modern science and technology maybe a worthwhile investment with a view to both promoting economic growth, and contributing to sustainable use of natural resources over the long term (Cf. Diriba 2018).¹¹

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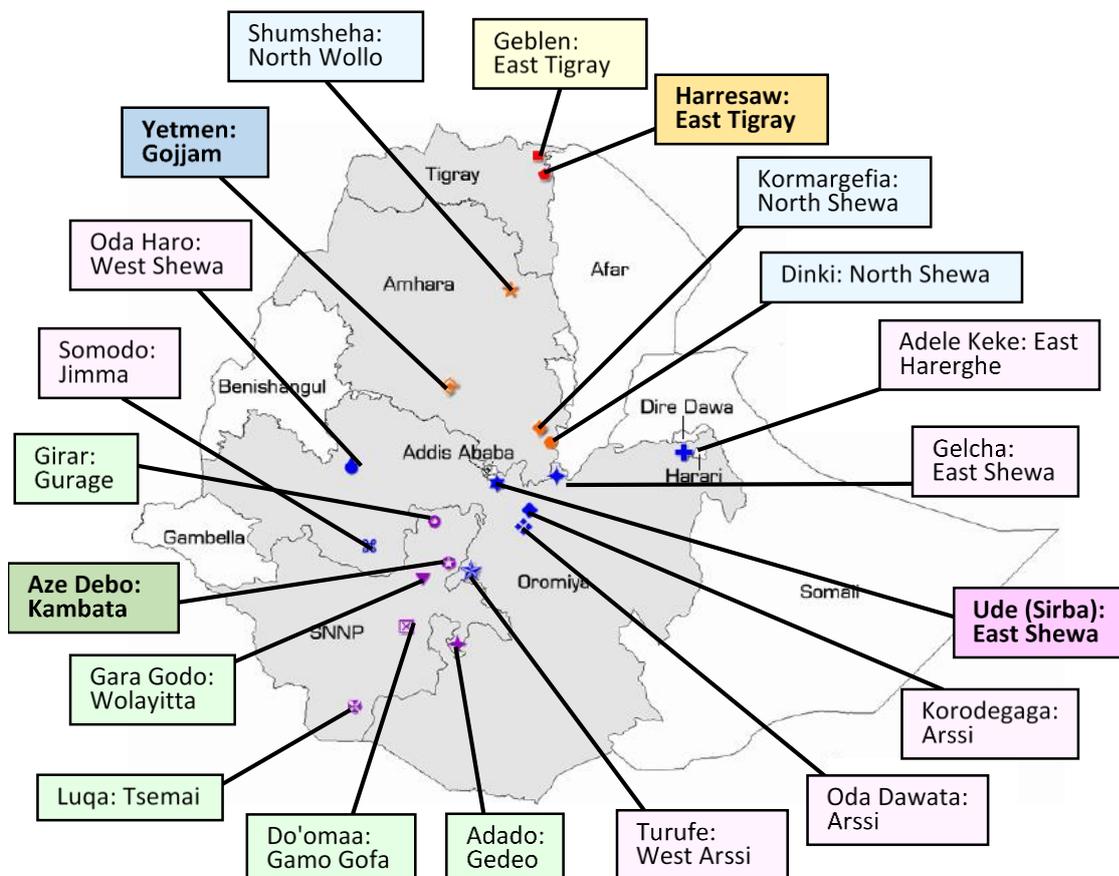
Note: Discussion Briefs from the WIDE research

This brief is part of a series of seven discussion briefs produced by the Ethiopia WIDE team on the topics of land, farming systems, non-farming systems, youth economic experiences, social protection, inequalities and governance, based on research carried out in four communities in the first quarter of 2018.

Ethiopia WIDE is a rigorous independent longitudinal study of 20 rural communities in Amhara, Oromia, Southern Nations, Nationalities and Peoples, and Tigray regions, selected in 1994 by researchers from Addis Ababa and Oxford Universities, as exemplars of different types of rural communities in Ethiopia. They represent wide variations in a range of key parameters notably livelihoods (including surplus producing, drought prone, cash-crop and agro-pastoralist sites), remoteness or ease of access, cultural institutions, and religious and ethnic composition. The team has recently published a book entitled *Changing Rural Ethiopia: Community Transformations*, as well as a compilation of an earlier series of discussion briefs under the title: *Twenty Rural Communities in Ethiopia: Selected discussion briefs on change and transformation*. Further reports and data are available on the website www.ethiopiawide.net.

In the current Bridge Phase, 4 sites were selected one from each of the 4 regions for a fourth round of research (in the map below, the names of the Bridge sites are bold and darker colours have been used for the boxes). Links have been established with 4 universities: Ambo University, Bahir Dar University, Hawassa University, and Mekelle University. We anticipate that these institutions will take on an increasing role in continuing to track change in communities across the country.

Map of WIDE communities with Bridge sites shaded



¹This brief was prepared by Mulugeta Gashaw. The author is grateful for comments from other members of the WIDE team (Alula Pankhurst, Catherine Dom, Philippa Bevan, Sarah Vaughan and Agata Frankowska).

² These include the Comprehensive Integrated Package projects (1968-1973), the Agricultural Development-Led Industrialisation (ADLI) strategy (2002), and the strategies and programmes outlined in the successive national development plans of the country, from the Sustainable Development and Poverty Reduction Strategy (2002/3-2004/5) to the Growth and Transformation Plan II (2015/6-2019/20).

³This site was called Sirba in 2013.

⁴ A decade ago, studies already highlighted that the incentive structure in the agricultural extension service, whereby the amount of inputs use was applied as a measure of extension performance, were causing most extension agents to consider the distribution of fertilisers and credit as their major responsibility rather than provision of technical assistance and advice, and led to inputs being provided regardless of their actual profitability (EEA/EEPRI 2006, cited in Spielman *et al.* 2011). In both Aze Debo and Harresaw, practices of enforcement were reported: in Aze Debo households receiving PSNP transfers had to purchase fertiliser and the cost was deducted from the amount of transfers they received whether they wanted this or not; in Harresaw, the provision of emergency food aid was delayed by the kebele administration until all farmers had purchased the 'quota' of fertiliser allocated to each household.

⁵ A recent review of the seeds sector (Mabaya *et al.* 2017) indicates that whilst the participation and coordinating role of public entities in the 'formal' seed sector remains important, the contribution of private producers and other forms of producer organisations (such as community-based seed production systems) is slowly increasing. However, this is uneven across crops. Private companies are most active in maize, which as a non-self-pollinating species is also the most attractive for them as farmers have to procure seeds every year. Seed companies are largely dependent on the government extension system to inform farmers on varieties and point out deficiencies in this respect (satisfaction rate 55%). Nonetheless, Fantu *et al.* (2018b) point that whilst supply is slowly improving, the use of improved seeds is also expanding: for all types of cereals the proportion of farmers applying improved seeds increased from 10.1% in 2003/4 to 21.5% in 2013/4, with most of the increase occurring in the last five years of the period. This is, however, uneven across types of crops as well, with for instance, 27.6% farmers using improved maize seeds against only 4.6% doing so for teff.

⁶ An earlier 'livestock master plan' promoted the improvement of local breeds through selection (selective breeding) and distribution of best performing ones for areas in which the local resource basis might not allow carrying crossbred and exotic animals (FDRE MoARD 2015).

⁷ Fisseha *et al.* (2010) highlights the importance of also improving indigenous chicken production through 'a holistic and multi-disciplinary support', including veterinary service, training and credit, as well as research to build on the unique qualities of indigenous genetic resources. A smaller-scale qualitative study (Tadelle *et al.* 2013), focusing on two weredas including that in which Ude/Sirba is located, also emphasises the need to address what they identify as major constraints on the subsector notably, technical advice, training, input supplies (mostly breeding stocks) and health services.

⁸ In 2014, 1.8 percent of the total area under crop was covered by vegetables while vegetables contributed to 2 percent of the total national crop produce (CSA 2014, in Akalu and Dürr 2016)

⁹ The government has undertaken to move from blanket application of Urea and DAP to multi-nutrient application of blended fertilisers that suit different soil types, nutrient deficiencies and crop types. This started in the 2013/14 production year with some imported fertilisers and has been consolidated with the opening of five fertilisers blending facilities in different regions (IFDC 2015).

¹⁰ For instance, based on 1994 to 2009 longitudinal survey data, Krishnan & Patnam (2014, in Buehren *et al.* 2017) compared the impact of formal extension and peer learning in the adoption of improved seeds and fertilisers and found that "extension services had a significant initial impact on adoption but that by 2009, adoption mainly takes place through social learning and extension services become irrelevant". Other localised studies also show the impact of peer influence and social learning in the diffusion, acceptance and promotion of new crops and agronomic practice.

¹¹ In a review of rural development policy of the past successive three regimes, Diriba (2018) found that "over-reliance on fertilizers and underutilized techniques for soil and water conservation" are part of the problems of rural development in Ethiopia.