



Impact of Covid-19 on food value chains in Uganda

Results of surveys of farmers, traders, and processors

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SUMMARY

We examined the impact of COVID-19 on food value chains in Uganda, using the case of dairy and maize value chains. These two are important value chains in Uganda (in terms of contribution to food and nutrition security and export earnings), yet distinct in terms of terms of market orientation, organization, degree of vertical coordination and institutional setup.

We used sample lists of farmers, traders and processors interviewed in-person by IFPRI before COVID-19 in November 2018 (dairy) and July 2019 (maize), as the basis for follow-up interviews by phone during COVID-19 in November 2020 (round 1) and May/July 2021 (round 2).

The round 1 and round 2 surveys sought to: (1) determine the proportion of value chain actors that had exited operations since the start of the pandemic; and then (2) examine changes in business activity and welfare among actors that continued to operate. We compare changes between baseline (2018/2019) and round 1 (2020), and, between round 1 (2020) and round 2 (2021), to differentiate between short run effects and long run consequences of the pandemic.

In the maize value chain, we find that the impact of COVID-19 and associated measures manifests itself more downstream the value chain (at the level of the traders and particularly the millers). Closures and reductions in volumes passing through the chain seemed limited but worsen as the pandemic persists. Government measures such as a reduction of interest rates seemed to have brought some relief for traders and millers. However, all value chain actors report substantial reductions in maize revenues, household income and food security, as actors in informal value chains seem to rely on various activities to make ends meet. As a result, informal value chains such as maize in Uganda may be less able to adapt to common shocks in the long run. The appropriate policy response therefore would be to supplement some of the mitigating policies targeting businesses with more long run social protection policies to also benefit value chain actors upstream.

In the dairy value chain, we find that the COVID-19 crisis mainly affected actors through a reduction in demand due to restrictions that limited international trade, and a decrease in local consumption. As a result, prices drastically reduced at all nodes of the value chain, and the number of actors affected by the price decrease worsened as the pandemic persisted. In general, we see that while dairy business closures during COVID-19 are limited, the joint reduction in demand and price leads to widespread reductions in scale of operation, dairy revenues and household income, although these somewhat recover over time, especially among Milk Collection Centers. In the long-run, policy efforts to increase and stabilize local and export demand for dairy products seems most promising. For example, the government may institute policies that promote consumption of dairy products in schools and homes through information campaigns or temporary dairy vouchers. Government should also make it a priority to keep international trade flowing.

Finally, the study did not confirm the hypothesis that high-value commodity markets would be more adversely affected than staple value chains. Although companion studies in Bangladesh found that fish and shrimp markets were more adversely affected than those of rice, the staple, the reverse was true in Uganda. Uganda maize farmers, traders, and processors reported worse economic and welfare outcomes due to COVID-19 than their counterparts in the dairy value chain. This may be related to the fact that dairy supply chains are more structured than maize chains.

CHAPTER 1. INTRODUCTION

1.1 Background

Early 2020, the Coronavirus Disease (COVID-19) outbreak prompted governments around the world to implement measures to stem the spread of the virus. Two years later, the virus remains a global emergency; governments loosen restrictions when infections are low and strengthen restrictions again when the infections increase. The restrictions have included quarantines, business closures, movement restrictions, and limits on international trade. While these measures were necessary for public health reasons, the inevitable result is disruption of economic activity.

Like most countries, Uganda did not institute blanket measures, but tried as much as possible to keep open some sectors like agriculture that were classified “essential”. Nonetheless, food supply chains are tightly integrated into the wider economy, and will still be affected by disruptions caused, inter alia, by the need for social distancing in ‘labor-dense’ activities, restrictions on labor mobility that is causing problems in hiring seasonal labor for harvesting, handling and transportation of agricultural products, curfews that affect nightly transportation of perishable foods where temperature-controlled storage and transportation is lacking, among others. Such disruptions also affect other parts of supply chains, that is, wholesale trade, processing, and retailing and ultimately consumers.

In Sub-Saharan Africa, small- and medium-scale enterprises (SMEs) are central to the operations of key agri-food supply chains. About 80% of all food consumed in Africa is purchased, primarily from wholesale and retail wet markets with most vendors and food traders as informal SMEs, though also increasingly in the form of processed foods produced both by mostly local food processors (large and small) and distributed through local markets, shops, and supermarkets.

With COVID-19, SMEs, particularly informal enterprises, are facing significant cost pressures, lowered production, scaled down capacity, and decreased access to finance; all factors that increase the risk of business closures. The collapse of many SMEs may, in the long run, lead to rapid concentration in these segments leading to rise and strengthening of larger processing firms and supermarkets. Such consolidation and decreased competition among supply chains may drive lower profitability for small-holder farmers, for example through lower farmgate prices, and increase entry barriers for small agri-food system entrepreneurs.

Emerging evidence on the impact of COVID-19 and associated measures finds food value chains surprisingly resilient. However, most of this evidence concerns formal and higher value commodity chains which are likely to be in a better position to mitigate impact of movement restrictions and lock downs through the use of Information and Communication Technologies (ICT) and e-commerce. Higher value commodity chains such as coffee or dairy are also often better integrated, vertically. The formal relationships between the various levels of the value chain may provide for more resilient chains as for instance actors downstream may have an incentive to protect actors upstream from shocks.

The present, USAID-funded, study aims to fill some of this gap, by considering both formal (dairy) and informal (maize) food value chains in Uganda. We build on data collected through various rounds of telephone surveys among dairy and maize farmers, traders, and processors. The study, which was implemented together with similar studies in Burkina Faso and Bangladesh (see Dejene et al., 2021), was designed to facilitate monitoring of the impact of COVID-19 on business closure, input supply, scale of operation, employment, enterprise earnings, prices, demand, and household welfare in the selected value chains.

1.2 Objectives

The overall objective of this study is to contribute to our understanding of the impact of the Covid-19 pandemic on farmers and SMEs involved in the processing and distribution of food in Uganda. We compare impacts observed in the more formal high value commodity chain--- dairy versus impacts in the more informally organized maize food value chain.

More specifically, the study addresses the following questions:

- Has the pandemic increased the rate of closures among farmers and SMEs in food value chains?
- Has COVID-19 reduced the number of sellers and buyers at each stage of the value chain, with possible negative effects on competition?
- Has the pandemic affected the availability of credit, labor, and inputs which would have adverse effects on food production and marketing?
- What has been the effect of COVID-19 on the scale of operation, revenue, household income, and food security?
- Are informally organized food value chains more affected by COVID-19 disruptions than the more advanced, relatively formal food value chains?

These topics are addressed with two rounds of surveys of farmers, traders, and processors working in the dairy and maize value chains in Uganda. Because of the movement restrictions associated with the pandemic, these surveys were carried out through telephone interviews.

1.3 The case study: dairy and maize value chains in Uganda

We examined the impact of COVID-19 on food value chains in Uganda using the case of dairy and maize value chains. The two are important value chains in Uganda (in terms of contribution to food and nutrition security and export earnings), yet distinct in terms of market orientation, organization, degree of vertical coordination and institutional setup.

Both commodities are prioritized by the National Development Plan (NDP III) 2020/21 – 2024/25, as important contributors to national food and nutrition security, and export earnings in Uganda. In terms of crop area and production volume, maize is the 3rd most cultivated crop in Uganda (after cassava and bananas), grown by 61% of households in Uganda (UBOS, 2018). Judged by contribution to total export earnings, dairy and maize respectively were Uganda's 3rd and 7th most important agricultural exports in 2018 (NPA, 2020), although since the start of the COVID-19 pandemic, maize exports have declined by 41 percent (between June 2020 and June 2021) (MoFPED, 2021). The food security and nutrition importance of these commodities was further emphasized when maize flour and milk were included in the food relief package given by the Government of Uganda (GoU) to vulnerable households during the 2020 COVID-19 lockdown period.

The two commodities are, however, quite distinct in several ways. Dairy value chains in Uganda are fairly advanced, with cold chains linking dairy farmers to consumers in towns and export markets. It is also characterized by continuous production where value chain agents interact and trade with each other on a day-to-day basis, largely through formal arrangements. This has resulted from a combination

of value chain upgrading efforts focusing on increasing investment in milk processing; developing aggregation services like milk collection centers; increasing attention to quality considerations along the value chain, and adoption of improved inputs and production techniques to increase supply (Van Campenhout et al., 2020). However, while the relatively strong vertical coordination of the dairy value chains may mean supporting mechanisms are stronger, high integration in the domestic and export markets exposes the value chains to the risks of demand shocks.

The maize value chain, on the other hand, is much more informal. Maize is a staple in Uganda, generally produced for own consumption by smallholder farmers, but also sold to informal small-scale assembly traders. Maize is mainly consumed in form of maize meal, so processors who mill maize grain into flour, mainly on a small-to-medium scale (SPRING, 2017), are important actors in the value chain as well. By contrast, dairy processing, which ranges from very large to very small (DDA, 2020) processes a variety of often highly processed products such as powdered milk, ghee, butter, UHT milk, casein/whey, pasteurized milk, yoghurt, cream, ice cream, fermented milk, and cheese that are consumed locally, with substantial amounts exported to international markets. Local markets, including individuals and households, schools, prisons, and hospitals, are the largest purchasers of 83 percent of the maize flour processed in Uganda (SPRING, 2017).

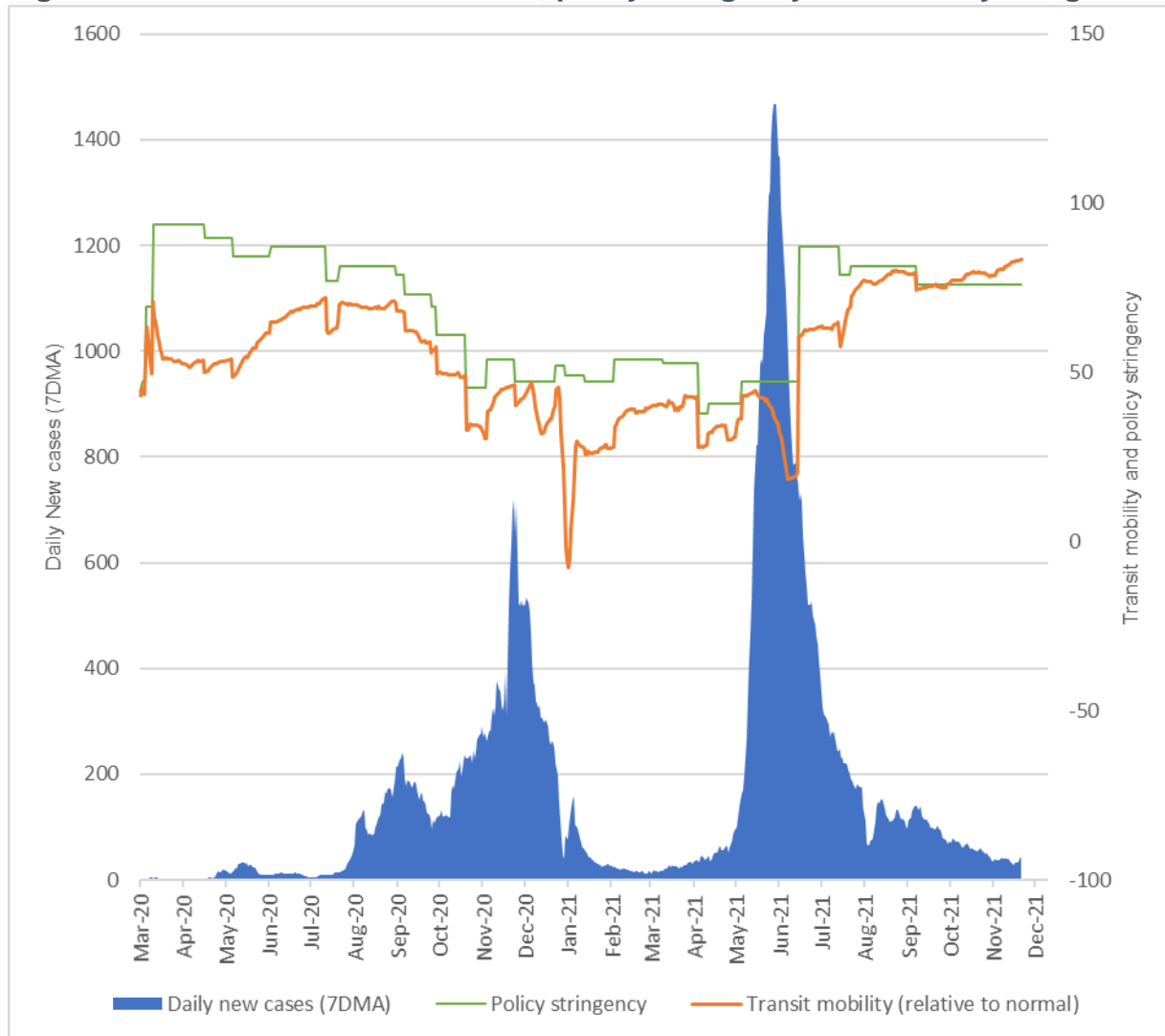
To further substantiate on the differences in market orientation between the dairy and maize value chains, our survey results show that virtually all dairy farmers sold part of the milk they produced in 2019 (before the pandemic), and this proportion stayed above 90% even during the pandemic period in 2020 and first half of 2021. By contrast, in the maize value chain, we see that 67%, 44% and 37% of farmers, respectively, sold part of their maize produce in 2019, 2020, and first half of 2021. We also found large differences in terms of trading arrangements between value chain actors; an average of 65% of all dairy value chain actors had selling agreements with their buyers before (2019) and during the pandemic, compared to only 13% among all maize value chain actors during the same period.

The dairy and maize value chains in Uganda, thus, provide a good case for evaluating the differences in the impact of COVID-19 between a more formal, high value commodity chain (dairy) against a more informal, staple food value chain (maize).

1.4 COVID-19 trend and policy response in Uganda

On 21st March 2020, Uganda reported its first case of COVID-19, and since then, the disease has continued to spread with new infections reported daily (Figure 1). To curb the spread of the disease, GoU announced various measures, comprised of curfews to restrict the movement of people, largescale shut down of economic activities, suspension of international passenger flights, a ban on public/private transport and public gatherings, and closure of all learning institutions, hotels, restaurants, and places of worship (Figure 2). Despite these measures, COVID-19 cases continued to grow, and by December 2021, Uganda had recorded a total of 140,737 COVID-19 cases and 3,294 deaths.

Figure 1: Timeline of Covid-19 cases, policy stringency and mobility in Uganda



Source: Authors' calculations using data from 1) Our World in Data harmonized dataset on daily Covid-19 cases and policy stringency, and 2) Google mobility report data on mobility at transit stations.

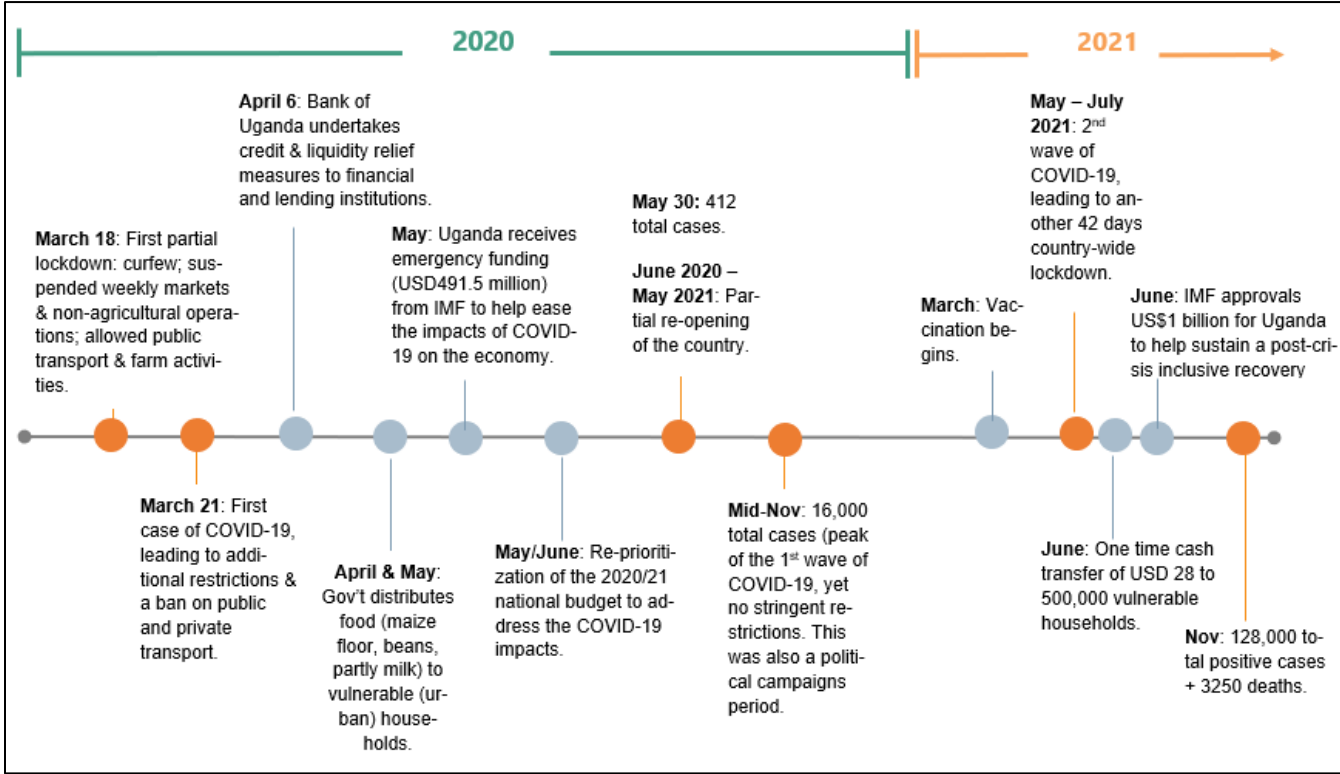
Note: 7DMA = seven-day moving average. Covid-19 policy stringency is measured on a scale of 0 (least stringent) to 100 (most stringent). Transit mobility is displayed as relative to 0, i.e., normal levels in the pre-pandemic period.

Uganda, like most countries, did not institute blanket COVID-19 control measures, but tried as much as possible to keep “essential” sectors open. For instance, while shops that sell clothes were closed, supermarkets and wet markets remained open and agricultural commodities were exempted from movement restrictions. The aim of exempting agriculture was to safeguard food supply chains as much as possible. Still, food supply chains are tightly integrated into the wider economy and will often suffer indirectly, for instance due to lower demand as restaurants close early or labour market frictions as people leave towns in search for alternative employment opportunities in rural areas.

To cushion the citizens against the adverse economic effects of the pandemic, the GoU has, since the start of pandemic, implemented various policy guidelines and cash/in-kind stimulus packages (Figure 2). These have included food relief (including maize flour, beans, milk, etc) to vulnerable households, debt repayment holidays, debt relief of up 12 months, reduction of the central bank lending rate from 9% to 8% (BoU, 2020), and cash transfer. The 2020/2021 national budget and the NDP III were also re-

prioritized to respond to the challenges caused by COVID-19 (NPA, 2020), although this move mainly targeted the social sectors, and workers in the informal sector.

Figure 2: Timeline of policy response to COVID-19 in Uganda



Source: Authors' compilations using information from 1) the public addresses on COVID-19 by the president of Uganda since March 2020; 2) reviewing information on the websites of the Bank of Uganda and Ministry of Finance, Planning and Economic Development.

1.5 Organization of the report

The report is organized into four chapters. Following this introduction, Chapter 2 describes the methods used to implement the surveys and analyze the data. The chapter begins with the elements of the method that are standardized across the three countries that we studied (sub-section 2.1), and then describes in more detail the methods used to carry out the surveys in Uganda (sub-section 2.2). Chapter 3 provides the main results from the round 1 (December 2020) and round 2 (June/July 2021) surveys conducted during COVID-19. The first three sections (3.1 to 3.3) of this chapter focus on the changes in eleven key impact indicators (including closure of farm/business operations, number of input suppliers, number of buyers, availability of credit, commodity revenue, overall household income, food security, and concern about the pandemic), while the fourth section (3.4) summarizes results on other changes such as use of inputs, changes in marketing, etc. Finally, Chapter 4 provides a summary and identifies some key conclusions from the study.

CHAPTER 2. METHODS

2.1 General methods

This study is based on information collected from farmers, traders, and processors in the dairy and maize value chains in Uganda. The study was designed in collaboration with similar studies in Bangladesh and Burkina Faso where data was also collected from the same value chain actors operating in the rice, fish and shrimp food value chains (Bangladesh), and tomatoes, dairy and okra food value chains (Burkina Faso). Although the national context and the structure of the value chains differs between the countries, the methods used for data collection and analysis were similar in three important ways.

First, in all three countries, we were able to make use of sample frames prepared for earlier surveys. Before the COVID-19 pandemic, IFPRI had carried out surveys in all three countries, collecting key information including name, location, type of business, and phone number for many potential respondents for the current study. Using the sampling frames from the pre-pandemic studies was important because the pandemic made it difficult or impossible to obtain contact information for participants in these value chains by other means.

Second, to ensure cross-country comparability of results, the questionnaires used in each country were based on a core set of questionnaires with only modest adaptations in each commodity value chain or country. The questions in the core questionnaire were organized into the following sections:

- A) Introduction
- B) Status of closed businesses
- C) Scale of operations
- D) Labor use
- E) Procurement of inputs
- F) Sales and marketing
- G) Revenue, welfare, and access to assistance

Third, all interviews were carried out by phone, because in-person interviews were not advisable due to the pandemic or not possible because of COVID-related restrictions. In each country, teams of enumerators were trained on the questionnaire and the use of tablets to record responses. The tablets had a SurveyCTO program installed to guide enumerators through the questionnaire, following skip patterns based on the responses to questions.

The data analysis was carried out in parallel in each country using Stata, the statistics analysis software package. Eleven main indicators of the impact of Covid-19 were identified and table templates were generated to ensure consistency in reporting these key results across the three countries. This report for Uganda also focuses on changes in the eleven indicators including closure of farm/business operations, number of input suppliers, number of buyers, availability of credit, commodity revenue, overall household income, food security, and concern about the pandemic.

Sub-sections 2.2 to 2.4 provide additional details on the methods used to collect and analyze the survey data in Uganda.

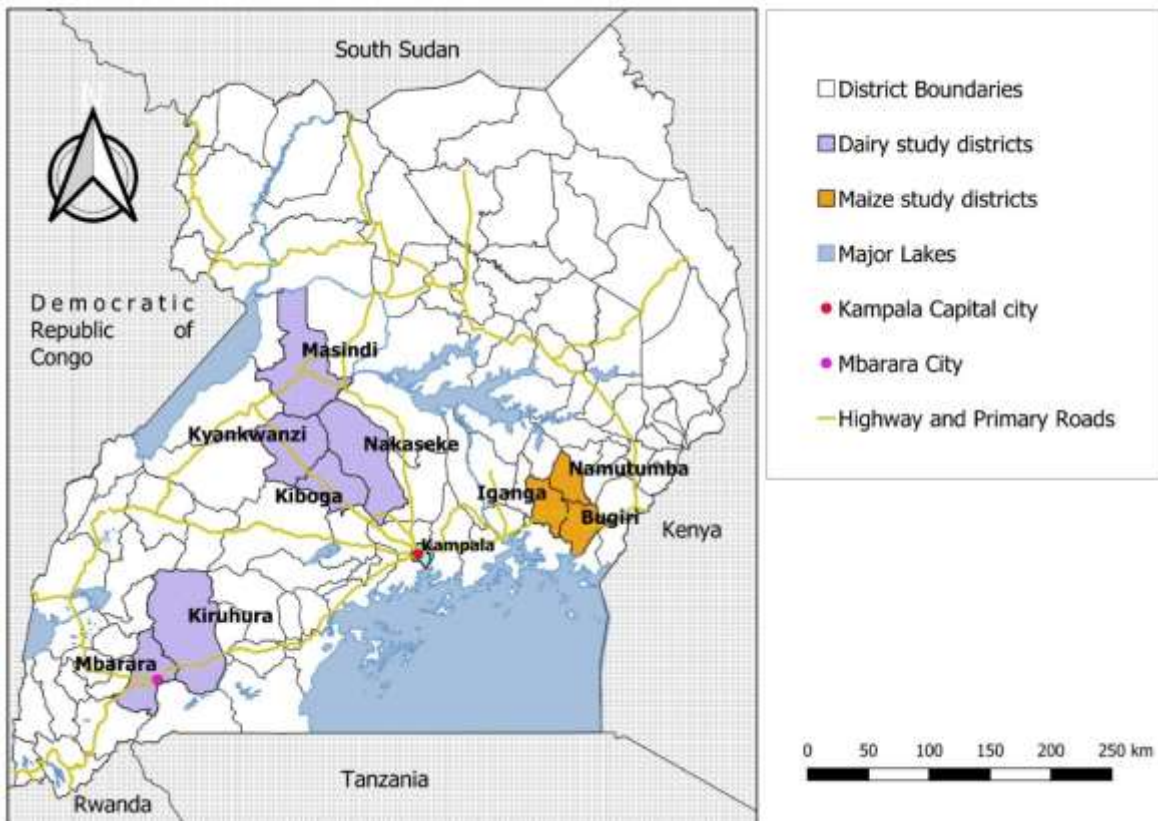
2.2 Surveys in Uganda

2.2.1 Sample size and distribution

We selected the respondents (farming households, traders and processors) of the dairy value chains from the two main milk producing areas in Uganda, known as the southwestern milkshed and the central milkshed, covering the districts of Mbarara, Kiruhura, Masindi, Kiboga, Kyankwanzi, and Nakaseke (Figure 3). Milk production activities in Uganda are zoned into six milksheds, each with different characteristics in terms of agro-ecological conditions, farm typologies and market dynamics. Our study sites, the central and southwestern milksheds combined, contribute about 50% of the national milk production¹.

For the maize value chains, we collected data from farming households, traders and processors in the Eastern districts of Iganga, Bugiri and Namutumba (Figure 3). Unlike milk production, maize in Uganda is grown in most parts of the country but mostly in the eastern districts which account for approximately 47% of the national production (Daly et al., 2017). Iganga, in Eastern Uganda, is the leading maize farmer in Uganda.

Figure 3: Map of Uganda and data collection sites



Source: Prepared by authors based on survey sample.

In both value chains, we collected data from farming households, traders and processors who had been surveyed in earlier IFPRI studies using in-person interviews in December 2018 (dairy) and July 2019 (Maize). These earlier studies became the sampling frames (base sample) for the two follow-up survey rounds that we conducted during COVID-19 in November 2020 (round 1) and May/July 2021 (round 2).

¹ <https://dda.go.ug/dairydata.php>

Specifically, dairy respondents in our Round 1 and Round 2 surveys were drawn from the sample (base sample) of IFPRI’s 2018 study on *Innovating for Efficient and Inclusive Value Chains in Africa* (Van Campenhout et al., 2021). Dairy farmers and processors in the base sample had earlier been randomly selected using sub-county lists of dairy households and processors, while dairy traders had been selected using a systematic sampling technique where enumerators interviewed the “nth” trader that came to deliver milk to the milk bulking center. The base sample for our Round 1 and Round 2 maize respondents was IFPRI’s 2019 value chain survey on *Policy and regulatory reform options for seed market development* (Van Campenhout & De, 2021). Maize farmers in this base sample had earlier been randomly selected using village household lists, while maize traders and processors had been systematically sampled by interviewing the traders and processors that had been referred to by maize farmers.

The target for Round 1 and Round 2 surveys was to re-interview all the base sample respondents (farmers, traders and processors) who were 2404 for dairy, and 2042 for maize. Overall, the response rate among maize respondents (72% in Round 1 & 67% in Round 2) was higher than for dairy respondents (64% in Round 1 & 57% in Round 2) (Table 1). Within the value chains, dairy traders and maize processors were the most difficult to trace and re-interview. For most of the respondents that were unreachable, their phone numbers were unavailable throughout the survey periods.

Table 1: Survey rounds and sample size

	Dairy				Maize			
	Farmers	Traders	Processors	Total	Farmers	Traders	Processors	Total
Base sample: 2018/2019	1616	695	93	2404	1527	341	174	2042
Round 1: Nov/Dec 2020	1121	360	64	1545	1060	289	116	1465
Response rate* (%)- round 1	69%	52%	69%	64%	69%	85%	67%	72%
Round 2: May/July 2021	995	313	54	1362	987	268	103	1358
Response rate (%)- round 2	62%	45%	58%	57%	65%	79%	59%	67%

Note: Response rates in each survey round are totals of respondents for each actor type calculated as a percentage share of the respective totals in the base sample.

2.2.2 Data collection and management

The surveys in Uganda were implemented by IFPRI, in three local languages, by trained enumerators, supervised by IFPRI staff. We collected the data via the Computer Assisted Telephone Interviews method, to minimize the possible risk of COVID-19 spread that would likely result from in-person field interviews.

All data storage, management and analysis were done by IFPRI staff on secured, password-protected computers and servers, and backed up in line with IFPRI’s data governance policies. Data with participant identifiers was stored in a location separate from the anonymized data, and on a secure IFPRI server with password-protected access limited to the study team. Data analysis and reporting was conducted using the anonymized data.

A third round for the dairy value chain was carried out at the beginning of December 2021. Because of the timing of this round, it was not possible to include the results of the third round in this report.

2.2.3 Ethical considerations

Ethical clearance was obtained from the relevant local and institutional Research Ethics Committees prior to the implementation of the surveys. Local approval was obtained from the Makerere University Social Sciences Research Ethics Committee (MAKSS REC10.20.465) and the Ugandan National Council for Science and Technology (SS699ES). IFPRI's Institutional Review Board (IRB) provided the institutional approval.

Informed consent was sought from all research subjects in the respective local languages prior to the interview. In reading out the consent statement, participants were informed that their participation was voluntary, and that their responses would be kept confidential and used only for research purposes. Interviews only proceeded with the verbal consent of the participant, which was recorded by clicking "Yes" (if the respondent accepted) or "No" (if they declined) on the tablet.

Interviewers were trained on research ethics and conducting telephone interviews. Training of interviewers, supervision of data collection, data analysis and storage were led by IFPRI researchers with a CITI-certified training on social and behavioral research. To ensure the confidentiality of responses, analysis was conducted on anonymized data.

There were no direct benefits to participating in this study. However, all respondents did receive a nominal amount of UGX. 7,000 in mobile phone credit per round as compensation for the time spent participating in this research.

CHAPTER 3. RESULTS

This chapter presents results on the impact of COVID-19 and associated measures on economic activity and welfare of dairy and maize value chains in Uganda. In sections 3.1 to 3.3, we report on the changes in eleven key indicators including closure of farm/business operations, number of input suppliers, number of buyers, availability of credit, commodity revenue, overall household income, food security, and concern about the pandemic. Section 3.4 presents a summary of other results including changes in the purchase of agro-inputs, use of hired workers, and marketing, etc. For all results, we compare changes before COVID-19 (2019) and round 1 survey (2020), and, between round 1 (2020) and round 2 (2021) surveys, to differentiate between short run effects and long run consequences of the pandemic. In the case of negative changes (for instance, closures or decrease in the scale of operation), we asked respondents to indicate if they perceived COVID-19 as the reason for the negative change. It should be kept in mind that this is based on perceptions and hence we cannot conclusively argue that all the observed/reported changes are due to the pandemic.

3.1 Impact on farmers

3.1.1 Closure of farms

One of the study objectives was to determine the proportion of value chain actors that closed operations since the start of the pandemic. For each value chain actor that we contacted in round 1 (2020) and round 2 (2021) surveys, we asked if they were still involved in dairy/maize activities. Because these surveys took place one to two years after the baselines, we focused the analysis on only closures that reportedly happened in early 2020 (start of the pandemic) onwards.

We found very few self-reported closures (1%) among both dairy and maize farmers in the first year of COVID-19 in 2020 (Table 2, upper pane), and although the closure rate slightly increased in 2021, it still remained low at 3% among dairy farmers, and 2% among maize farmers (Table 2, upper pane). The few closures among farmers may be related to the predominantly subsistence nature of agricultural production in Uganda, which necessitates farming households to continue farming even during times of hardships, lest families go hungry. However, the fact that the closures among farmers increase over time, signals a limited ability of farms to handle prolonged stress.

Table 2: Share (%) of farmers reporting business closures

		Dairy farmers	Maize Farmers	Total
Closed permanently	Round 1	1	1	1
	Round 2	3	2	3
Estimated closures (temporarily or permanently) among similar respondents (average %)	Round 1	3	7	5
	Round 2	2	7	5
N	Round 1	1,121	1,060	2,181
	Round 2	995	987	1,982

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

Secondly, we expect that due to survivorship bias, the figures for self-reported closures are an underestimation of closures in the value chain. Therefore, we also show results for an alternative measure of

closures. In particular, we asked each actor to give an estimate of the percentage of actors similar to them they think closed dairy and maize operations since the start of the pandemic. We see that dairy and maize farmers combined estimate that about 5 percent of similar farmers in their areas closed, and this is independent of the survey round. Maize farmers are most pessimistic about closures of similar actors.

Next, we examine changes in the number of suppliers of agro-inputs (such as seed, fertilizers, acaricides, feeds, pesticides) and the buyers of maize grain and raw milk (Table 3).

Unlike agro-input shops that were considered an essential function for agriculture (and hence were spared from some of the COVID-19 measures), the purchasing ability of buyers during COVID-19 was subject to the instituted movement restrictions and loss of income. Indeed, it seems that the COVID-19 and associated measures had no impact on agro-input dealers as a majority of dairy and maize farmers in both survey rounds did not perceive a decrease in the number of input dealers. In fact, a relatively high share of dairy and maize farmers reported an increase in input dealers compared to those who reported a decrease. Perhaps the limited mobility of farmers prompted input dealers to become more aggressive in marketing their products, hence the perceived increase in input dealers as reported by farmers.

Table 3: Share (%) of farmers reporting change in input dealers and buyers

		Change	Dairy farmers	Maize Farmers	Total
Change in the number of input dealers	Round 1 (compares 2019 and 2020)	Increase	26	34	30
		No change	61	53	57
		Decrease	13	14	13
		Total	100	100	100
		N=	1,023	902	1,925
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	33	33	33
		No change	58	54	56
		Decrease	8	13	11
		Total	100	100	100
		N=	919	888	1,807
Change in the number of buyers	Round 1 (compares 2019 and 2020)	Increase	38	31	34
		No change	44	37	40
		Decrease	18	32	25
		Total	100	100	100
		N=	1,030	1,019	2,049
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	46	32	39
		No change	42	36	39
		Decrease	13	32	23
		Total	100	100	100
		N=	918	952	1,870

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

Interestingly, there is no clear pattern in the evolution of the number of buyers in both value chains, with virtually equal shares of farmers reporting no change, an increase or a decrease (Table 3). This is surprising, given the demand side disruptions emanating from restrictions on movement of people and vehicles, closure of business premises, and income losses. Maize is a staple in Uganda, so a combination of panic and speculative buying of maize grain for hoarding and maize flour by households just before the lockdowns (Fowler, 2020) could explain the rather unexpected stability in buyers among farmers.

3.1.2 Scale of operations

While we find very few closures than expected, and also the number of up- and downstream actors seemed reasonably stable among farmers, we go one step further and look at quantities produced.

The statistics in Table 4 are based on annual changes comparing volumes produced in 2020 against those of 2019 (Round 1). Round 2 changes are semi-annual comparison of volumes produced for the first season of 2021 compared with volumes from the first season of 2020. We define instances where volumes increase between years as an increase in volume in excess of 10%, while a decrease means volumes between years reduced by more than 10%.

Survey results in Table 4 show production volumes shrinking considerably in the initial periods (2020) of the pandemic, as reported by 65 percent and 49 percent of maize and dairy farmers respectively. Volumes seemingly recovered by the first half of 2021, but not for most maize farmers (51%) who still reported a decline in production. For most of the farmers (77% for maize and 68% for dairy) that reported a decrease in production, the reasons were unrelated to the pandemic but linked to changes in weather (both dairy and maize), and change in the number of cows and grazing area (dairy).

Table 4: Share (%) of farmers reporting change in production relative to previous round

		Change	Dairy farmers	Maize Farmers	Total
Change in production	Round 1 (compares 2019 and 2020)	Increase	24	24	24
		No change	26	11	19
		Decrease	49	65	57
		Total	100	100	100
		N=	938	889	1,827
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	51	43	47
		No change	11	6	9
		Decrease	38	51	45
		Total	100	100	100
		N=	904	913	

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

Overall, detailed results from the surveys suggest that maize farmers increasingly faced more production challenges emanating from both COVID-19 and non-COVID-19 related disruptions. Firstly, the proportion of maize farmers attributing the decrease in production to COVID-19 pandemic increased slightly from 23 percent in Round 1 to 25 percent in Round 2, while that of dairy farmers decreased from 32 percent to 20 percent. Secondly, the proportion of maize farmers attributing the decrease in

production to weather changes increased from 76 percent to 88 percent. Thirdly, it appears that the weather and COVID-19 related challenges reduced farmers' investment in maize as the proportion of farmers attributing the decrease in maize production to changes in area under cultivation increased from 15 percent to 26 percent in round 1 and round 2 respectively.

3.1.3 Availability of credit

In times of stress and in environments where access to insurance is lacking, credit can help individuals or households to deal with shocks (Kansiime et al., 2021). Access to credit is therefore likely to be an important determinant of resilience. At the same time, common shocks such as COVID-19 may also affect the availability of credit.

We asked farmers whether the availability of credit (for either business or household expenditure) had changed in 2020 compared to the 2019 pre-pandemic period (Round 1 survey), and during the pandemic period (between round 1 survey and the first half of 2021 (Round 2 survey)). For a majority of the farmers (55%) (Table 5), availability of credit remained the same as before the pandemic. This was the case for both dairy and maize farmers, although 28 percent of maize farmers in the early stages of the pandemic also reported a decrease in access to credit. The impact of COVID-19 on availability of credit in Uganda seems to have been reduced by the credit and liquidity measures undertaken by government, especially the reduction of the interest rate by the central bank.

Table 5: Share (%) of farmers reporting change in availability of credit

		Change	Dairy farmers	Maize Farmers	Total
Change in access to credit	Round 1 (compares 2019 and 2020)	Increase	25	16	20
		No change	55	56	55
		Decrease	21	28	25
		Total	100	100	100
		N=	672	928	1,600
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	28	-	-
		No change	63	-	-
		Decrease	9	-	-
		Total	100	-	-
		N=	747	-	-

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

Note: * Round 2 survey data on credit availability for maize farmers is missing because of an error in coding the digital questionnaire

3.1.4 Earnings

How, and to what extent has the COVID-19 pandemic affected the earnings of participants in food value chains in Uganda? The study answered this question by looking at the changes in the revenue of the target commodity and overall household income.

Emerging evidence indicates that the COVID-19 pandemic has substantially impacted on individual and overall household earnings through job loss, business loss/closure, reduced pay, reduced business activity, and reduced remittances (Heifer International Uganda, 2020; Kansime et al., 2021; Mahmud & Riley, 2021).

Similarly, the current survey results show that earnings (especially overall household income) of our surveyed farmers worsened during the period of the pandemic compared to the pre-pandemic period. Specifically, the proportion of those reporting a decline in earnings in the two survey rounds ranged between 45% and 71% for revenue, and 57% and 78% for household income (Table 6). When we compare farmers in the two value chains, the reduction in earnings was more pronounced among maize farmers than dairy farmers. A substantial share of dairy farmers (ranging between 22% and 33%) also reported an increase in revenue and household income. This was just 11 percent to 18 percent of maize farmers who reported the same.

Table 6: Share (%) of farmers reporting change in revenue and household income:

		Change	Dairy farmers	Maize Farmers	Total
Change in revenue from target commodity	Round 1 (compares 2019 and 2020)	Increase	33	18	26
		No change	22	17	20
		Decrease	45	65	54
		Total	100	100	100
		N=	1,049	829	1,878
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	33	18	26
		No change	21	12	17
		Decrease	46	71	57
		Total	100	100	100
		N=	874	703	1,577
Change in household income	Round 1 (compares 2019 and 2020)	Increase	24	13	18
		No change	19	12	16
		Decrease	57	76	66
		Total	100	100	100
		N=	1,047	1,019	2,066
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	33	11	22
		No change	23	11	17
		Decrease	44	78	61
		Total	100	100	100
		N=	916	952	1,868

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

COVID-19 was cited as the main contributor to the decrease in overall household income for most of the farmers (78% of maize farmers and 65% of dairy farmers) in the first year (2020) of the pandemic. In 2021, COVID-19 disruptions on earnings became even more severe for 80% of maize farmers.

3.1.5 Household welfare

In addition to changes in earnings, we also examined the impact of the pandemic on three other welfare indicators, namely food (in)security, access to external assistance, and a more subjective measure (level of concern about the pandemic).

We measured food (in)security using the respondents' answers to the eight questions of the Food Insecurity Experience Scale (FIES) developed by the Food and Agriculture Organization of the United Nations (FAO, 2015). The first question asks if there was a time when the household was worried about not having enough to eat, the second about not being able to eat healthy and nutritious food because of lack of money or resources, and so on until the eighth question about whether there was a time when the household went a full day without eating because of lack of money or resources. In round 1, the reference period was the previous 12 months (December 2019 to November 2020). In round 2, the reference period was the previous six months (December 2020 to May/June 2021).

To be consistent with the other cases studies, we also follow the analysis method outlined in Kansime et al. (2021), where a household is considered moderately food insecure if it gives 4-6 "yes" responses to the eight questions, and severely food insecure if it gives 7 or 8 "yes" responses. We report two values: the proportion of households experiencing moderate to severe food insecurity, and those experiencing severe food insecurity.

In the first year of the COVID-19 pandemic in 2020, the prevalence of moderate to severe food insecurity among the surveyed maize and dairy farmers in Uganda seems low (19% of dairy farmers & 21% of maize farmers) (Table 7). These proportions are nonetheless about double the pre-pandemic national average (10%) estimated by Kansime et al (2021). By the Round 2 survey in 2021, the food insecurity (moderate to severe) situation had reduced greatly among dairy farmers, but only slightly among maize farmers. Severe food insecurity among maize farmers had also increased slightly to 21 percent from 20 percent. We, thus, find that the COVID-19 impact on food insecurity was somewhat higher among maize farmers than dairy farmers. Overall, when compared to the pre-COVID-19 situation, the evidence presented in Table 7 is indicative of a deteriorating food security situation among farmers. This is in line with findings related to earnings discussed in the previous section.

Regarding access to external assistance, the proportion of dairy and maize farmers who stated that they received aid of any kind (for business or family) since the start of the pandemic, is low, at 14 percent and 15 percent, respectively. In Round 2, the proportion for maize farmers marginally increased to 17 percent, but reduces for dairy farmers. This increase in the likelihood of receiving assistance among maize farmers may be due to the worsening situation in their earnings (Table 7) and food insecurity (Table 7) during the pandemic period.

Finally, we look at the level of concern about the pandemic. We asked respondents to rate, on a scale from 1 to 5, their levels of concern (higher is more concerned). Taking a rating of greater than three (3) as being concerned, our results show that majority continued to be concerned about the pandemic, and this became worse over time for maize farmers, increasing from 67 percent in Round 1 to 87 percent in Round 2 (Table 7). By contrast, the proportion of dairy farmers who were concerned about the pandemic reduced from 63 percent in Round 1 to 46 percent in Round 2. This is again consistent with the

results above which indicate that the earnings situation for dairy farmers improves somewhat over time, while it deteriorates for maize farmers.

Table 7: Household welfare indicators among farmers (% of respondents)

			Dairy farmers	Maize Farmers	Total
Prevalence of food insecurity by FIES method	Round 1 (12 months reference period)	Moderate to severe	19	21	20
		Severe	10	20	15
	Round 2 (six months reference period)	Moderate to severe	10	18	14
		Severe	5	21	13
Received assistance of any type	Round 1 (six months before survey)		14	15	14
	Round 2 (six months before survey)		12	17	15
Concerned about the pandemic (>3 on scale of 1-5)	Round 1		63	67	65
	Round 2		46	87	66

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.2 Impact on trading SMEs

3.2.1 Closure of trading SMEs

We also found few self-reported closures at the trading node of the value chain (between 5% - 12% in both survey rounds) (Table 8), but these are higher than what we observed among farmers. And, as was the case at the production level, the rate of closures among traders increase as the pandemic persisted. Whereas we observe relatively more closures among dairy traders, results from our second measure of business closures (estimated percentage of similar traders that closed) signal a high level of pessimism among maize traders about the general survival of maize traders during hardships.

At this level of the value chain, most closures in round 1 were attributed to COVID-19 (60% maize traders & 41% dairy traders). In round 2, the most cited reason for closure was unprofitability of the business, which could be an indirect effect of the COVID-19 disruptions. Again, care should be taken when interpreting these figures due to the low level of overall closures we captured.

Table 8: Share (%) of traders reporting business closures

		Dairy	Maize	Total
Closed permanently	Round 1	8	2	5
	Round 2	15	6	10
Estimated closures (permanently or temporarily) among similar respondents (average %)	Round 1	6	17	12
	Round 2	6	18	12
N	Round 1	360	289	649
	Round 2	313	268	581

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

The study also examined changes in the number of suppliers that provide traders with maize and raw milk. Results in Table 9 indicate that the number of suppliers among traders seems to have remained stable over time, although this was mainly for dairy traders. For maize traders, a significant share reported a decrease in the number of suppliers, especially in the second survey round. The decrease in suppliers among maize traders can be explained by the fact that, as we saw in Table 4, maize farmers reported a decline in production volumes in both survey rounds.

For changes in the number of buyers, we see a contrasting trend between dairy and maize traders; most maize traders reported a decline in buyers throughout the pandemic, while most dairy traders report an increase. The fact that many maize traders report a reduction in the number of buyers may be related to the COVID-19 measures that prevent regional and international trade. Indeed, a 41% decline in maize exports is observed between June 2020 and June 2021 (MoFPED, 2021). The closure of schools also seems to have contributed to the decline in the number of buyers among traders.

Table 9: Share (%) of traders reporting change in suppliers and buyers

		Change	Dairy	Maize	Total
Change in the number of suppliers	Round 1 (compares 2019 and 2020)	Increase	44	41	42
		No change	35	18	27
		Decrease	22	41	31
		Total	100	100	100
		N=	264	235	499
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	46	34	40
		No change	36	18	27
		Decrease	18	48	33
		Total	100	100	100
		N=	246	243	489
Change in the number of buyers	Round 1 (compares 2019 and 2020)	Increase	40	28	34
		No change	52	27	40
		Decrease	9	45	26
		Total	100	100	100
		N=	306	274	580
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	50	32	41
		No change	38	24	31
		Decrease	13	44	28
		Total	100	100	100
		N=	252	243	495

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.2.2 Scale of operations

Among maize traders, the scale of operation (as measured by quantities traded) initially decreased in the first year of the pandemic (Table 10), probably as a trickle-down effect from the decrease in production volumes observed among maize farmers. By the mid-2021, 67 percent of maize traders were reporting an increase in volume of trade despite a further decrease in production among maize farmers in their localities. The easing of movement restrictions seems to have helped traders source maize from other parts of the country. Aside from the reduction in production volumes at farmer level, COVID-19 disruptions were reported to have substantially contributed to the reduction in maize traders' trade volumes, as reported by 76 percent and 75 percent of maize traders in round 1 and round 2 surveys respectively.

Dairy traders also operated at a lower scale in the first year (2020) of the pandemic but later recovered in the second year by mid-2021. Among dairy traders that reported a decline in the of volume of traded milk, majority attributed it to change in milk supply (82% in round 1 & 78% in round 2), and then COVID-19 pandemic (43% in round 1 & 42% in round 2).

Table 10: Share (%) of traders reporting change in trade volume

		Change	Dairy	Maize	Total
Change in trade volume	Round 1 (compares 2019 and 2020)	Increase	34	26	30
		No change	29	10	20
		Decrease	37	64	50
		Total	100	100	100
		N=	265	235	500
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	54	67	60
		No change	12	5	8
		Decrease	34	28	31
		Total	100	100	100
		N=	238	227	465

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.2.3 Availability of credit

As with the case among farmers, a majority of the traders in both value chains did not perceive a decrease in the availability of credit during the COVID-19 as compared to before the pandemic (**Error! Reference source not found.**). We, however, also see that a larger share of maize traders think availability of credit

reduced, rather than increased. Again, the credit and liquidity measures undertaken by the GoU to support financial and lending institutions during the pandemic may have reduced the impact of the pandemic in credit availability.

Table 11: Share (%) of traders reporting change in availability of credit

		Change	Dairy	Maize	Total
Change in access to credit	Round 1 (compares 2019 and 2020)	Increase	23	28	25
		No change	54	40	48
		Decrease	23	32	27
		Total	100	100	100
		N=	264	186	450
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	30	21	25
		No change	59	51	55
		Decrease	11	29	20
		Total	100	100	100
		N=	218	213	431

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.2.4 Earnings

A large proportion of dairy and maize traders in both survey rounds experienced a decrease in commodity revenue, and overall household income (Table 12). Similar results were observed among dairy and maize farmers, except that, for trader's, revenues somewhat improved by the second year of the pandemic in mid-2021 when some restrictions had been relaxed. On the other hand, because of the time lag between production and the sale of agricultural produce, revenues among the dairy and maize farmers continued to worsen even after the relaxation of the restrictions.

Overall, household income among dairy and maize traders significantly deteriorated during the pandemic period. The situation was very severe among maize traders (80% and 76% reported a decline in household income in 2020 compared to 2019, and between the end of 2020 and mid-2021 respectively). When we compare the percentages of traders reporting a decline in household income, we see that farmers and traders in both value chains were almost equally affected.

Almost all maize traders (93% in round 1 survey and 96% in round 2 survey) who reported a decrease in household income, pointed to the COVID-19 disruptions as the main cause. These proportions are only a few percentage points higher than the proportions we observed among maize farmers. The proportions of dairy traders reporting the same are also high, but reduce over time, and do not exceed 60%.

Table 12: Share (%) of traders reporting change in revenue and household income

		Change	Dairy	Maize	Total
Change in revenue from target commodity	Round 1 (compares 2019 and 2020)	Increase	39	24	32
		No change	20	9	15
		Decrease	41	67	53
		Total	100	100	100
		N=	311	275	586
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	42	28	35
		No change	13	9	11
		Decrease	45	63	53
		Total	100	100	100
		N=	231	195	426
Change in household income	Round 1 (compares 2019 and 2020)	Increase	30	12	22
		No change	22	8	15
		Decrease	47	80	63
		Total	100	100	100
		N=	306	276	582
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	42	19	31
		No change	19	6	12
		Decrease	40	76	57
		Total	100	100	100
		N=	240	225	465

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.2.5 Household welfare

Lastly, among the trading SMEs, we look at their access to aid of any kind (for business or family) during the pandemic, their level of concern about the pandemic, and the level of food insecurity within 12 months during the pandemic (round 1 survey), and six months after the first survey round.

We found a higher prevalence of moderate to severe food insecurity among the trading SMEs in both survey rounds (Table 13) compared to that observed among farmers. Concern about the pandemic was high among traders; it increased over time among maize traders (79% to 83%), but reduces among dairy traders (54% to 28%). Only a few dairy and maize traders (about 13% in round 1 survey, and less than 7% in round 2 survey) received aid of any kind six months prior each of the survey rounds undertaken during the COVID-19 period.

Table 13: Household welfare indicators among traders (% of respondents)

			Dairy	Maize	Total
Prevalence of food insecurity by FIES method	2020 (12 months reference period)	Moderate to severe	22	29	25
		Severe	12	15	14
	2021 (6 months reference period)	Moderate to severe	12	24	17
		Severe	4	15	9
Received assistance of any type	Round 1 (6 months before survey)		13	12	12
	Round 2 (6 months before survey)		6	3	5
Concerned about the pandemic (>3 on scale of 1-5)	Round 1		54	79	66
	Round 2		28	83	55

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.3 Impact on processor SMEs

3.3.1 Closure of processor SMEs

Self-reported closures among processors are also lower (between 6% to 11%) (Table 14), increase over time. Using our second measure of closure (estimated percentage of similar processors that closed), it appears that processors in both value chains are most optimistic about the general survival of processors during hardships, with only 0% to 6% of competitors estimated to have exited the business.

The COVID-19 pandemic seems to have contributed little to the closures among processors except in round 1 where half of the dairy processors attributed the closures to COVID-19. By the second survey round in mid-2021, most closures were attributed to unprofitability of the business, which is likely an indirect effect of the COVID-19 pandemic. The usual disclaimer for low numbers of overall closures applies.

Table 14: Share (%) of processors reporting business closures

		Dairy	Maize	Total
Closed permanently	Round 1	6	7	7
	Round 2	11	9	10
Estimated closures (temporarily or permanently) among similar respondents (average %)	Round 1	1	6	4
	Round 2	0	6	4
N	Round 1	64	116	180
	Round 2	54	103	157

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

Regarding the changes in the number of suppliers and buyers among processors, we see a contrasting pattern and trend between the dairy and maize value chains. Similar to maize traders, maize processors

report reductions in suppliers, especially in the second year of the pandemic in 2021 (Table 15). Given that a majority of farmers and traders did not exit maize operations, the reduction in the number of maize suppliers among maize processors may have originated from the reduction in maize production and movement restrictions.

Secondly, we also observed important reductions in the number of buyers of maize flour. As we saw among maize traders, the reduction in buyers among maize processors may have resulted from COVID-19 measures that prevented regional and international trade, and the closure of schools which are major consumers of maize meal.

Among dairy processors, we do not see a decrease in the number of milk suppliers, and the buyers of processed dairy products remained virtually the same in 2020 compared to 2019, and thereafter (Table 15). Looking at the entire value chain, the number of suppliers and buyers for traders and processors in the maize value chain worsened over time during the pandemic, but virtually remained the same for all dairy actors (farmers, traders and processors), with a substantial share of dairy actors also reporting an increase in buyers and suppliers.

Table 15: Share (%) of processors reporting change in suppliers and buyers

		Change	Dairy	Maize	Total
Change in the number of suppliers	Round 1 (compares 2019 and 2020)	Increase	51	40	43
		No change	33	14	20
		Decrease	16	46	36
		Total	100	100	100
		N=	45	93	138
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	52	22	32
		No change	41	11	22
		Decrease	7	67	46
		Total	100	100	100
		N=	46	87	133
Change in the number of buyers	Round 1 (compares 2019 and 2020)	Increase	18	22	20
		No change	67	16	36
		Decrease	16	62	44
		Total	100	100	100
		N=	57	87	144
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	17	22	20
		No change	80	15	40
		Decrease	2	63	40
		Total	100	100	100
		N=	46	78	124

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.3.2 Scale of operations

We examined changes in the processors' scale of operation by evaluating the changes in the volumes processed. Compared to maize traders, we found an even larger share of maize processors that experienced an initial decrease in their scale of operation (in 2020 compared to the 2019 pre-COVID-19 period) and later an increase by mid-2021 (Table 16). About half of the maize processors reporting COVID-19 as the main factor that affected volumes processed. This may be related to the COVID-19 movement restrictions.

There were also widespread reduction in the volumes processed by dairy processors in 2020 compared to 2019, and thereafter. This reduction seems to have emanated from the reduction in milk supply from upstream actors (partly due to movement restrictions) as stated by 85 percent and 97 percent of dairy processors in round 1 and round 2 respectively.

Table 16: Share (%) of processors reporting change in processing volume

		Change	Dairy	Maize	Total
Change in processing volume	Round 1 (compares 2019 and 2020)	Increase	33	20	24
		No change	24	19	21
		Decrease	42	61	55
		Total	100	100	100
		N=	45	96	141
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	49	81	69
		No change	18	3	8
		Decrease	33	17	23
		Total	100	100	100
		N=	45	77	122

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.3.3 Availability of credit

At the processing node of the value chain, results in Table 17 show that availability of credit also remained unchanged or improved for most processors. The situation was even better in round 2, especially among dairy processors.

Table 17: Share (%) of processors reporting change in access to credit

		Change	Dairy	Maize	Total
Change in access to credit	Round 1 (compares 2019 and 2020)	Increase	20	35	29
		No change	58	45	50
		Decrease	22	20	21
		Total	100	100	100
		N=	45	69	114
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	24	23	24
		No change	72	50	59
		Decrease	4	27	17
		Total	100	100	100
		N=	46	60	106

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.3.4 Earnings

Dairy and maize revenues among processors in both value chains initially declined (Table 18), like what we observed among farmers and traders. In the second year of the pandemic in mid-2021, the reduction in revenue further worsened for most of the maize processors while the situation improved among dairy processors.

The impact of the pandemic on overall household income was particularly severe among the processor level respondents that we interviewed in the maize value chain (Table 18). There were improvements by mid-2021, but the share of maize processors still reporting a decline in household income remained high at 68 percent. When we compare actors in each value chain, household income worsened over time during the pandemic among maize farmers, but marginally improved among maize traders and processors (although a majority still reported a decline in household income). Within the dairy value chain, the household income situation becomes better over time for all actors (farmers, traders and processors).

Our results also suggest a high contribution of COVID-19 to the reported decrease in household income among maize processors (88% and 69% in round 1 and round 2 respectively point to COVID-19 as the reason for the reported decline in household income). This was linked to three major COVID-19 related factors: inability to work due to the government mandated closure of business; movement restrictions which affected ability to earn; and reduction in consumer demand for maize flour.

Table 18: Share (%) of processors reporting change in revenue and household income

		Change	Dairy	Maize	Total
Change in revenue from target commodity	Round 1 (compares 2019 and 2020)	Increase	35	30	32
		No change	19	16	17
		Decrease	46	53	50
		Total	100	100	100
		N=	57	92	149
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	51	20	32
		No change	18	14	16
		Decrease	31	66	52
		Total	100	100	100
		N=	45	70	115
Change in household income	Round 1 (compares 2019 and 2020)	Increase	25	11	16
		No change	21	8	13
		Decrease	54	81	72
		Total	100	100	100
		N=	57	101	158
	Round 2 (compares 1 st half of 2020 and 1 st half of 2021)	Increase	50	22	32
		No change	26	10	16
		Decrease	24	68	53
		Total	100	100	100
		N=	46	87	133

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.3.5 Household welfare

The household food insecurity experience reported in Table 12 is for respondents who were interviewed on behalf of the processing SMEs, and not for the owners or all workers of the processing SMEs that we contacted. The findings show that, compared to the households of actors operating at production and trading nodes of the value chain, fewer households of respondents operating at the processing level experienced a reduction in food security. Also, fewer respondents from the processing SMEs received any type of assistance for their families or business compared to the respondents contacted at the production and trading nodes. Maize processors expressed a very high level of concern about the pandemic, and this is worse in round 2 survey.

Table 19: Household welfare indicators among processors (% of respondents)

			Dairy	Maize	Total
Prevalence of food insecurity by FIES method	2020 (12 months reference period)	Moderate to severe	17	22	20
		Severe	8	13	11
	2021 (six months reference period)	Moderate to severe	0	8	5
		Severe	2	11	8
Received assistance of any type	Round 1 (six months before survey)		12	12	12
	Round 2 (six months before survey)		7	6	6
Concerned about the pandemic (>3 on scale of 1-5)	Round 1		47	82	29
	Round 2		2	92	71

Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

3.4 Other results

This section provides a summary of other results from the surveys that we conducted in Uganda.

Use of supplementary feeds and acaricides in dairy: The use of external inputs such as acaricides and supplementary feeds in dairy is important for maintaining good animal health and increasing yield. We find that virtually all dairy farmers (98%) sprayed their animals with acaricides in 2019 and this proportion stayed above 97% even during the pandemic in 2020 and first half of 2021. On the other hand, the share of dairy farmers using supplementary feeds reduced from 46% in 2019 before the pandemic, to 41% in 2020 and the 24% in by mid-2021. Majority of the dairy farmers (84% in round 1 and 95% in round 2) who continued to use supplementary feeds during the pandemic used the same as before the pandemic.

Use of improved seed and inorganic fertilizer in maize: In the maize value chain, majority of the farmers (90%) used improved maize seed in 2019 against 52% who used inorganic fertilizer. After the start of the pandemic, the share of maize farmers using fertilizer moderately reduced to 43% in 2020 and later increased to 50% by mid-2021. Farmers' use of improved seed was adversely affected by the pandemic--- used by only 44% in 2020 and 56% in the first half of 2021 (from 90% in 2019). Maize farmers who continued to use improved seed during the pandemic (80% in both survey rounds) did not reduce the amounts used. Respondents cited movement restrictions and increase in the price of inputs as the main COVID-19 related factors that led to lower use of the purchased inputs in maize production.

Source of inputs. In both round 1 and round 2 surveys, agro-input vendors (private) remained the main source of agro-inputs for over 91% of dairy and 85% of maize farmers. Government agencies were the second-most cited source of inputs for 6% of the maize farmers, although this proportion reduced to 3% during the pandemic while that of fellow maize farmers increased from 2% to 8%. Cooperatives were the second most important source of inputs for dairy farmers during the pandemic.

Credit. Regarding access to credit, we find that the number of dairy and maize value chain actors who obtained a loan before the pandemic in 2019 ranged between 24% and 41%. This proportion initially declined in the first year of the pandemic in 2020 to between 16% and 25% and later increased to between 26% and 39% in the first half of 2021. The uncertainties and disruptions in the market seem to

have discouraged value chain actors from seeking loans despite the stability/increase in the availability of credit as reported all value chain actors.

Source of credit. Before, and after the start of the pandemic, banks, microcredit institutions (MCIs) and cooperatives remained the most important sources of credit for dairy value chain actors. In fact, the proportion of dairy actors obtaining loans from banks and cooperatives respectively increased over time from 36% and 20% in 2019 (before the pandemic), to 39% and 27% in the first year of the pandemic in 2020, and then to 45% and 28% in the second-year pandemic in 2021 (first half). We thus find that a combination of formal and semi-formal value chain financing options were available in the dairy value chain even after the start of the pandemic.

In addition to Banks and MCIs, friends and relatives were an important source of credit in the maize value chain, increasing from a mere 2% before the pandemic in 2019 to 22% in the first year of the pandemic in 2020, before dropping to 15% in the second year of the pandemic in 2021. This means that, in a long-term perspective, formal and semi-formal sources of credit are the most effective.

Hired workers. Virtually all dairy and maize value chain actors (more than 98%) hired workers in 2019 prior to the start of the pandemic. During the COVID-19 pandemic in 2020, the number of actors hiring workers remained the same among maize farmers (99%) and dairy processors (100%), marginally decreased to 97% among maize processors, moderately reduced to 79% and 85% among dairy farmers and maize traders respectively, and significantly reduced to 67% among dairy traders.

We also looked at the changes in actual number of male, female, full-time and casual hired workers. Survey results show that, in 2019, an average farmer or trader or processor in either of the value chains hired one worker, mostly males and casual workers (with the exception of dairy and maize processors who hired more full-time than casual workers). This remained the case even during the pandemic period in 2020. However, results covering all dairy and maize value chain actors show that, compared to 2019, value chains actors during the pandemic in 2020 hired one person less of each category of hired workers---male, female, and casual workers. Detailed results also show that casual hired workers were the most laid off in the dairy value chain.

In both round 1 and round 2 surveys respectively, between 53% and 87% of dairy actors, and 33% maize value chain actors cited COVID-19 as the main reason for reducing the use of hired worker. This was related to an increase in labour prices, movement reductions and the decision by the value chain actor to reduce scale of operation.

Marketing. Almost all dairy farmers (96%) in the sample sold part of the raw milk they produced in 2019 before the pandemic, and during the pandemic in 2020 (90%), and during the first half of 2021 (98%). This is compared to 67%, 44% and 37% of maize farmers who sold part of the maize they produced over the same period. Majority of the maize farmers (81% in round 1 survey and 91% round 2 survey) attributed the reduced sales to a decrease in production.

Selling price. A majority of maize farmers (62%), traders (75%) and processors (78%) reported an initial decline in the selling price in 2020 compared to the price before the pandemic in 2019. By mid-2021, only between 13% and 24% of all the maize respondents reported a decline in the selling price. By contrast, increasingly more dairy value chain actors report a decline in the selling price as the pandemic persisted.

Contract selling. In 2019, before the pandemic, 72% of dairy value chain actors had a selling agreement with their buyers, compared to only 18% of maize value chain actors. Most of the dairy actors with

the selling agreements were processors (89% in 2019) and dairy traders (74%). These proportions of dairy traders and processors with selling agreements remained the stable even during the first year of the pandemic but that of traders later dropped to 45% in the second year (first half of 2021). Dairy farmers with agreements with buyers of liquid milk became fewer over time from 53% in 2019 to 43% in 2020 and then 40% in the first half of 2021. The proportion of all maize value chain actors that had a selling agreement with the buyers initially dropped from 18% (in 2019 before the pandemic) to 9% before raising to 13%. The terms contained in the selling agreements remained the same for both dairy and maize value chain actors over time.

CHAPTER 4. SUMMARY OF RESULTS AND CONCLUSIONS

4.1 Summary

We examined the impact of COVID-19 on food value chains in Uganda using the case of dairy and maize value chains. These two are important value chains in Uganda (in terms of contribution to food and nutrition security and export earnings), yet distinct in terms of terms of market orientation, organization, degree of vertical coordination and institutional setup.

We used sample lists of farmers, traders and processors interviewed in-person by IFPRI before COVID-19 in November 2018 (dairy) and July 2019 (maize), as the basis for follow-up interviews by phone during COVID-19 in November 2020 (round 1) and May/July 2021 (round 2).

The round 1 and round 2 surveys sought to: (1) determine the proportion of value chain actors that had exited operations since the start of the pandemic; and then (2) examine changes in business activity and welfare among actors that continued to operate. We compare changes between baseline (2018/2019) and round 1 (2020), and, between round 1 (2020) and round 2 (2021), to differentiate between short run effects and long run consequences of the pandemic.

We summarize findings in Figure 4 and Figure 5 below, focusing on key outcomes (business closures, decrease in quantities being transacted, decrease in buyers, decrease in revenues, decrease in household income, and prevalence of moderate to severe food insecurity).

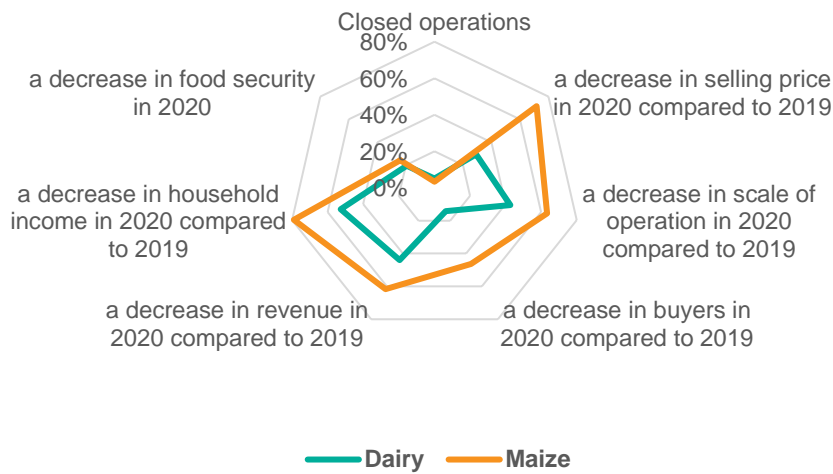
We find few closures in both value chains, but they are slightly higher in the dairy value chain (Figure 4) and become relatively more among downstream actors (traders and processors) in both value chains (Figure 5). We also record a slight increase in the rate of closures as the pandemic persists.

We also found evidence of a decline in the number of buyers in the maize value chain as reported by over 46% of the maize value chain respondents in both survey rounds (Figure 4). In the dairy value chain, we find that whereas the number of buyers and selling price is reported to have initially remained the same as before the pandemic, there was a drastic increase in the share of dairy actors reporting a decline in the selling prices later as the pandemic persisted (Figure 4). This seems to have resulted from the decrease in demand for milk and dairy products due to prolonged restrictions on international trade, and as households reduced consumption of more expensive foods due to income losses. By value chain segment, traders and processors in both value chains found it increasingly more difficult to find buyers, while a decrease in selling prices mainly affected farmers.

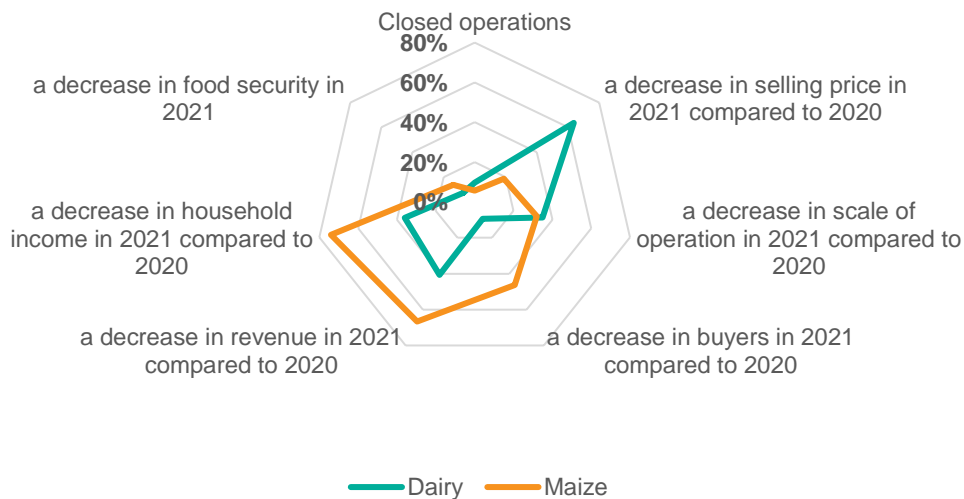
Despite limited closures, we found substantial reductions in the scale of operation (quantities produced, traded and processed), revenue of the target commodities and overall household income, more so in the maize value chain. The scale of operation in both value chains reduced substantially in 2020 but seemingly recovered in early 2021, although this was mostly among traders and processors who also reported improvements in revenue and household income. Lower production quantities among farmers were not attributed to COVID-19 disruption but rather changes in weather, whereas traders and processors attributed the reduction in volumes traded/processed to reduction in supply and change in demand.

Figure 4: Summary of COVID-19 impacts by value chain (% of respondents)

Round 1: Percentage of respondents reporting:



Round 2: Percentage of respondents reporting:



Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

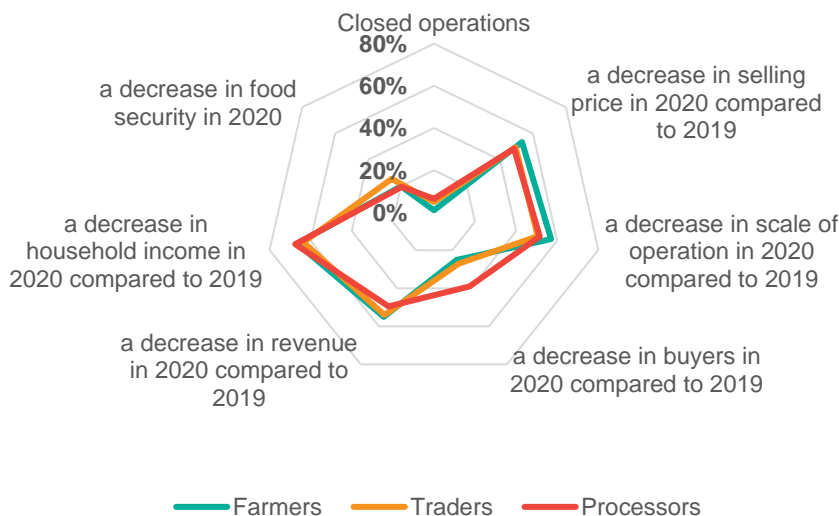
Note: Each line in the radar represents 20%. Percentages are 'unfiltered' percentages reported across all actors in the value chain.

There were significant revenue losses in both value chains, and across all actors, although the situation becomes worse over time in the maize value chain, and among dairy and maize farmers combined. Despite reporting an increase in the number of buyers, farmers suffered more revenue losses over time during the pandemic, possibly due to the reduction in volumes transacted and the selling price.

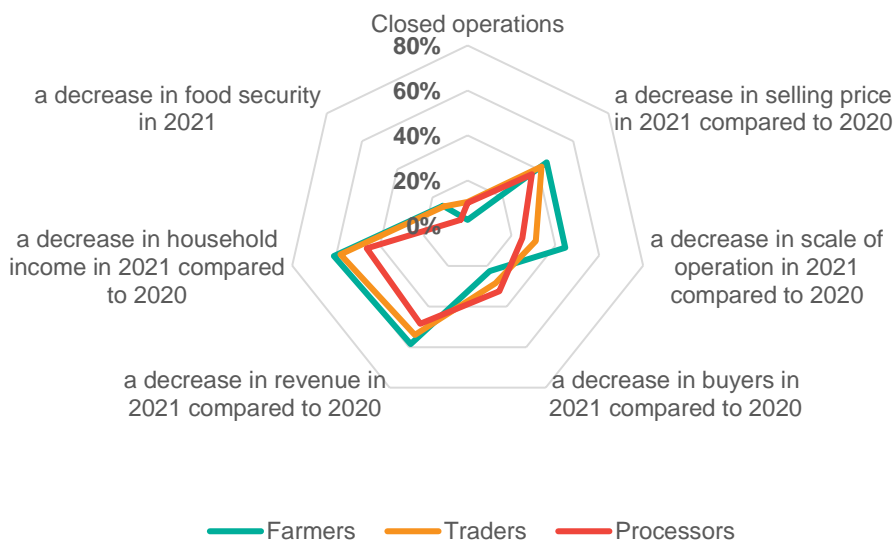
Reduction in household income was also more prominent in the maize value chain as reported by 79% and 74% of maize respondents in round 1 and round 2 respectively.

Figure 5: Summary of COVID-19 impacts by value chain actor (% of respondents)

Round 1: Percentage of respondents reporting:



Round 2: Percentage of respondents reporting:



Source: Analysis of IFPRI study of the impact of Covid-19 on food value chains.

Note: Each line in the radar represents 20%. Percentages are 'unfiltered' percentages reported by actor type across all value chains.

We find that the number of input dealers remained constant or increased during the pandemic as reported by over 87% of the dairy and maize farmers combined, in both survey rounds.

Availability of credit for all value chain actors in both value chains also seemed to have generally remained the same as before the pandemic, probably due to the credit and liquidity measures, especially the reduction of the interest rate by the central bank. However, because of the market uncertainties and disruptions, fewer dairy and maize value chain actors obtained loans during COVID-19 than before.

4.2 Conclusions

In this section we point to eight general conclusions that can be drawn from the results in Uganda.

The study found little evidence of many closures among farmers and agrifood SMEs, during the pandemic. One of the hypotheses behind this study was that the closure of traders and other SMEs in the value chain might increase the level of concentration, thus reducing competition and increasing marketing margins. This concern does not seem to have been borne out by the COVID-19 crisis in these two value chains. Whereas business closures were limited, there were also worrying signs that over time, more businesses exit, especially in the dairy value chain and among traders and processors. This suggests a limited ability of farms and SMEs to handle prolonged stress.

Agro-input dealers seem less affected by the pandemic. Most dairy and maize farmers report that the number of agro-input dealers has remained constant or increased. The government efforts to keep agro-input shops open seemed to have shielded input dealers to some extent. There is evidence that the purchase of seed, fertilizer, animal feeds, and other inputs in 2020 and 2021 decreased from the pre-pandemic levels, but this was related to movement restrictions more than closure of the input shops.

Availability of credit for agriculture remained the same, or even increased compared to before the pandemic. The liquidity measures, especially the reduction of the interest rate by the central bank, seems to have reduced the damage by increasing credit supply. However, due to market side disruptions resulting from COVID-19 measures, fewer farmers and SMEs obtained loans compared to the period before.

The COVID-19 pandemic has had varying effects on buyers. The number of buyers in the dairy value chain remained stable as before the pandemic. We think that this is due to the strong vertical coordination between dairy value chain actors, but also the existence of cold chains that link dairy actors to consumers in towns and export markets. For the maize value chain which has informal traders as the main buyers and relies on weakly enforceable contracts between value chain actors, the number of buyers sharply declined during COVID-19.

While closures were limited, most farmers, traders and processors experienced heavy losses in production, sales, revenue, and household incomes, especially in the first year of the pandemic. The decline in household income suggests that the welfare of actors involved in food value chains are also affected through other channels such as wage employment or remittances. Therefore, it is important that government puts broad social protection measures in place to also support food supply chains indirectly.

Movement restrictions was cited by all dairy and maize value chain actors as the factor that most adversely affected revenues and household income. Policymakers, thus, need to be aware of the economic impact of movement restrictions and seek ways to target the restrictions in a way that maintains public health without unnecessarily constraining the ability of households to work and earn.

Finally, the study did not confirm the hypothesis that high-value commodity markets would be more adversely affected than staple value chains. Although the study in Bangladesh found that fish and shrimp markets were more adversely affected than those of rice, the staple, the reverse was true in Uganda. Uganda maize farmers, traders, and processors reported worse economic and welfare outcomes due to COVID-19 than their counterparts in the dairy value chain. This may be related to the fact that dairy supply chains are more structured than maize chains.

Overall, while the COVID-19 measures were applied uniformly, the impacts varied widely across commodity value chains, and over the different types of participants in the value chains.

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