

Report on measurement of socio-economic impacts of price disturbances on dairy farm performances as affected by the Covid-19



Application of the LSIPT Toolkit to measure impact of Covid19 from a rapid rural appraisal of dairy production systems in Egypt (part 2)

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Contents

	Abstract	2
1	Introduction.....	3
2	Descriptive statistical analysis of changes during the COVID-19 crisis at the farm household level	4
2.1	Family farm survey in 2020- a brief descriptive approach	4
2.2	Overall impact of Covid-19 on crop and livestock activities	6
2.3	Specific analysis of the impact of Covid-19 on livestock activity	7
2.3.1	Feed price	7
2.3.2	Veterinary services access.....	8
2.3.3	Change of live animal transaction	8
2.3.4	Change on marketing activities of dairy products.....	10
2.3.5	Dairy products	10
3	COVID-19 Impact at the farm level using LSIPT Toolkit.....	13
3.1	Main changes during the COVID-19 crisis in 2020	13
3.2	Built up of the scenarios in the LSIPT toolkit.....	14
3.3	Impact of the COVID-19 event on the technical and economic performances of dairy activity at the farm level	15
3.4	Impact of the COVID19 event on the socio-economic viability of the family fairy farms.....	19
4	Discussion and conclusion.....	Error! Bookmark not defined.
5	Acknowledgements	22
6	References.....	24
7	Appendix 1. Family farm questionnaire (short version related to dairy activity at farm level)	25
8	Appendix 2. Approach of price variability in ECORUM Excel tool.....	29

Abstract

The COVID-19 event has been a severe crisis that has affected the economic, social and environmental environment in the majority of countries whatever their socioeconomic development. While most countries have attempted to developed emergency actions oriented to mitigate the health and social effects, less attention has been paid to the effects on agricultural production systems, especially on the South countries. However, these effects may have medium and long terms implications on the overall agri-food systems, especially in the developing or intermediate countries where agricultural services are less developed.

The present research work on the measurement of socioeconomic impacts of price disturbances on dairy farm performances as affected by the Covid-19 crisis in 2020 aimed to contribute to this reflection. For that, this research proposed to use two approaches: 1) a household survey at the family farm level to analyze the declared and perceived impacts of the Covid-19 event on the agricultural activities by the family members; and 2) introduce the declared changes of prices and livestock management in the existing LSIPT Toolkit developed in Egypt to assess the medium-term effects on the dairy activity. The present analysis focuses on two zones of Egypt, Bani Suwaif governorate in the Old Lands and Al Buhaira in the New Lands.

The analysis of the socio-economic impacts of the COVID-19 event in 2020 on the dairy farms in Egypt has allowed to assess the effects of the reduction of milk price and milk production due to the lockdown and the effects of the feed price increase and livestock destocking over the 20-years period (2014- 2033). The main results show an overall reduction of the livestock activity' contribution to the family viability that will have some financial effect up to 2033, compared to a scenario without the event of Covid-19. This reduction of the livestock contribution to the financial viability at the family farm level is mainly explained by the reduction of the dairy benefit. Without some specific public intervention in the sector in regards to milk price policy or feed prices, the sector could know a progressive decline over the next decade.

1 Introduction

The COVID-19 event has been a severe crisis that has affected the economic, social and environmental environment in the majority of countries whatever their socioeconomic development. While most countries have attempted to developed emergency actions oriented to mitigate the health and social effects, less attention has been paid to the effects on agricultural production systems, especially on the South countries. However, these effects can have medium and long terms implications on the overall agri-food systems, especially in the developing or intermediate countries where agricultural services are less developed. Knowing that these services have been impeded to normally function in remote areas over 3-4 months according to the confinement period in each country in 2020. Indeed, the effects may have negative implications on small producers who were not well integrated into the overall value chains, and poor consumers in the rural and urban areas who depended on informal markets.

In parallel, since the beginning of the COVID-19 crisis, many national and international research and development organizations engaged into various assessments of the impacts of the confinement situation to analyze the implications of this crisis in terms of sustainability and resilience of agri-food systems. The present research work on the measurement of socioeconomic impacts of price disturbances on dairy farm performances as affected by the Covid-19 aimed to contribute to this reflection. For that, this research proposed to use two approaches: 1) a household survey at the family farm level to analyze the declared and perceived impacts of the Covid-19 event on the agricultural activities by the family members; and 2) introduce the declared changes of prices and livestock management in an existing LSIPT Toolkit to assess the medium-term effects on the dairy activity. A farm survey has been jointly organized in the intermediate countries of North Africa, Tunisia and Egypt. In this report we have focused on the Egypt case study where has been developed a regional LSIPT toolkit.

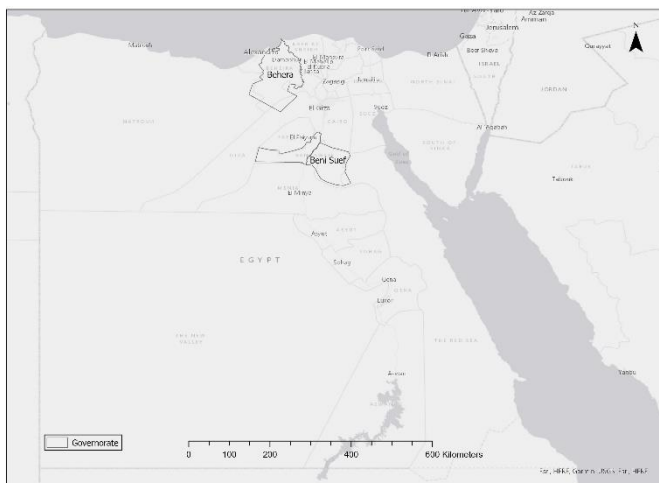
Regarding the impacts of Covid-19 confinement at the farm level, a family farm survey has been realized over 210 farms in two governorates of Egypt, Al Buhaira in the new lands of the western part of the Delta and Bani Suweif in the old lands of Middle Egypt. These farmers have been selected in the same localities surveyed in 2014 from which the data had constituted the basis of the Egypt-LSIPT toolkit implemented within the CRP livestock in 2019. This second-round family farm survey has constituted the original material to analyze the farm's perception of changes during the Covid-19 confinement based on descriptive data analysis (part 1) and conduce the socioeconomic impact assessment through the LSIPT toolkit (part2). In each part, we present the material and method that have allowed us to conduct the analysis.

2 Descriptive statistical analysis of changes during the COVID-19 crisis at the farm household level

2.1 Family farm survey in 2020- a brief descriptive approach

The family farm survey has been jointly organized between the project “Dear Brother Farmer”: Gender, agriculture and digital extension during the COVID-19 pandemic in rural Tunisia with implication for the wider MENA region (project CRP PIMS proposed and accepted in mid-2020) and the CRP Livestock within the Flagship on Livestock Livelihoods and Agrifood Systems (LLAFS). The two CRP programs aimed to empower the CGIAR response to COVID-19 pandemic in analyzing the impacts of COVID-19. Here, we proposed to focus on the effects of the confinement on the agricultural productive systems with a particular attention to the livestock activity. For that, we have completed the family farm questionnaire developed in Tunisia and Egypt with specific questions related to livestock activity management and marketing (see the questionnaire in Appendix 1), with a particular attention on health and feed management in link with the public and private services’ availability and the marketing systems.

The present report focuses on two zones of Egypt, Bani Suwaif governorate in the Old Lands and Al Buhaira in the New Lands (Map 1). Old Lands are land farmed before and after the building of the high Aswan Dam. New Lands are land cultivated after the building of the High Aswan Dam and the extension of irrigation to the desert lands. The two regions differ in economic and biophysical dynamics. Old Lands are better connected to services (extension, veterinary, financial) and markets and focused on field crops. The New Lands on the other hand focuses on cultivation of fruit tree with modest focus on field crop as well. While the New Lands vary in size between either 2.5 or 5 ha in the Old Lands the average size of a farmland is below a hectare.



Map 1. Studied sites in Egypt (@Atassi Loyal, ICARDA)

A random sample in each locality where previous farm surveys were conducted in 2014 (See Alary et al. 2019) was selected. Table 1 present the final sample according to sex respondent, land ownerships and land management for each studied governorate.

Table 1. Population surveyed in 2020 according to sex-respondents and land tenure in the two governorates of Egypt (Al Buheira and Bani Suweif)

Sex-respondant	Al Buheira		Bani Suweif		All sample		
	Female	Male	Female	Male			
Land owners	49	56	105	30	29	59	164
Evicted tenants	27	28	55				55
Graduates	22	28	50				50
Help in running the farm				22		22	22
Land owner				17		17	17
Land owner & Tenant				12		12	12
Runs the farm				8		8	8
Land Tenant				24	22	46	46
Help in running the farm				14		14	14
Runs the farm				10		10	10
Tenant					22	22	22
Total Sample	49	56	105	54	51	105	210

In both studies areas (Al Buhaira and Bani Suwaif), the majority of rural households in Egypt manage an integrated crop-livestock system. The livestock system is mainly composed of 2-3 cattle or buffaloes with 3-4 sheep and goats, mainly for home-consumption. The main regional difference is the land access and crop land management. The cultivated land area is almost doubled in Al Buheira reaching 4 feddan (eq. 2 ha) compared to 2 feddan (around 1 ha) in the old lands of Bani Suweif (Table 2 & 3).

Table 2. Main farm assets of the family agricultural systems in the two studied governorates of Egypt (210 farm surveys)

Valeurs	Al Buheira	Bani Suweif	Total sample
Owned land area (acre)	3.88	0.95	2.42
Rented land area (Acre)	0.46	1.04	0.75
Sheep flock size (heads)	2.38	0.93	1.66
Goat flock size (heads)	1.35	1.51	1.43
Cattle herd size (heads)	2.58	2.72	2.65
Buffaloe herd size (heads)	0.57	0.35	0.46

Table 3. Percentage of farmers who rent land in the two studied governorates (among 210 farm surveys)

Valeurs	Al Buheira	Bani Suweif	Total général
Nos of farmers who rent land	15	76	91
Average land size in rent (feddan)	3.37	1.44	1.75
% of farmers who rent land (/ surveyed population)	14%	71%	43%

2.2 Overall impact of Covid-19 on crop and livestock activities

Based on farmers' declarations, the most affected crops have been the annual cereal and vegetable crops (notably wheat) in the Bani Suwaif governorate and the citrus trees in Al Buheira. Regarding the livestock system, in both areas, the majority of the farmers recorded a reduction of the milk production (40% and 25% respectively in Bani Suweif and Al Buheira) due to early milking stop that can be put in relation to the difficulty to access to animal health care services. In fact, due to the confinement and the difficulties to get services, almost 25-30% of farmers in each governorate have known issues of animal diseases that continued to be unresolved.

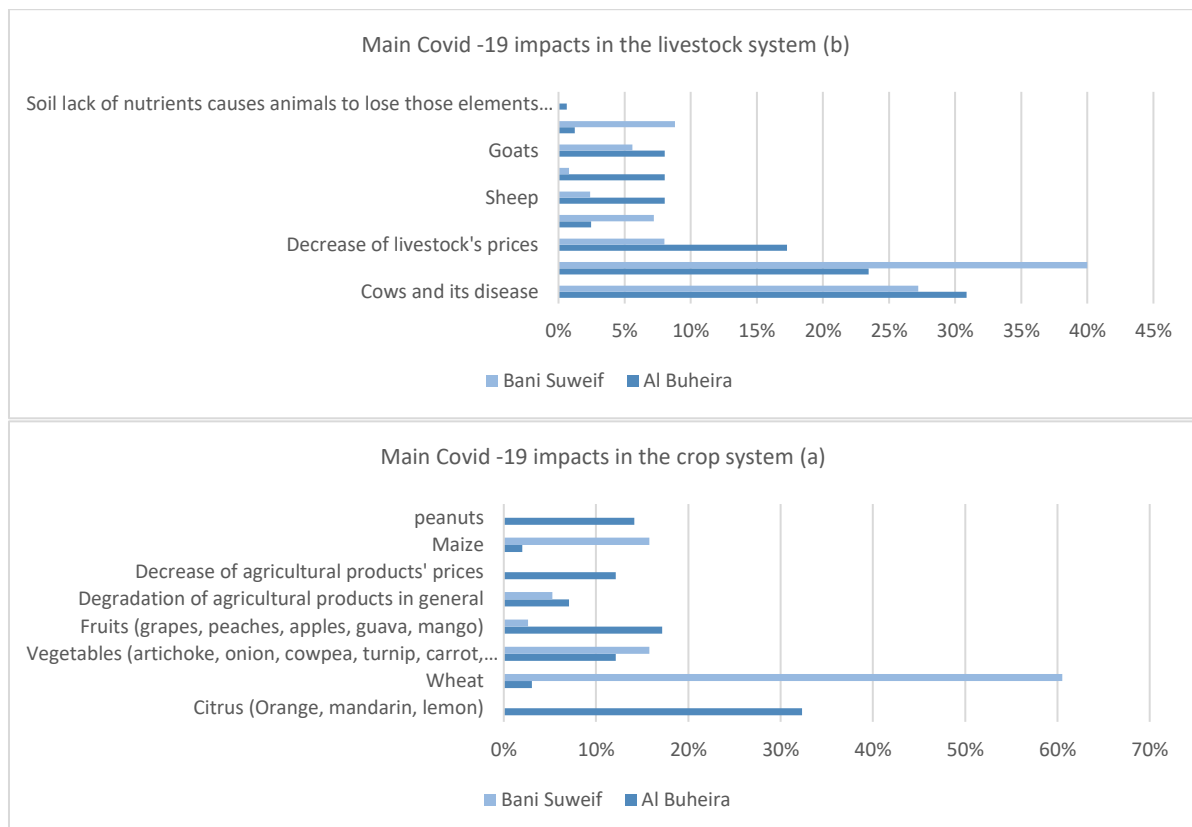


Figure 1. Declaration of the main Covid-19 impacts on the crop (a) and livestock (b) activities in the farm (287 answers recorded for livestock activities and 137 for crop activities among 210 farm surveys)

When crossing these declarations with the main reasons explaining the issues perceived during the Covid-19 period, two main factors are cited: 1) the closure of markets and 2) the unavailability of agricultural extensionists or vets due to the lockdown (representing approximately 70% of answers in the two studied zones). We can note a slight difference between the two factors, i.e., closure of market and absence of agricultural support. From the farmers' declarations, the absence of agricultural support was more important in Bani Suweif while Al Buheira suffered from the closure of market. This difference can be explained by the socio-geographical configuration of the two zones. Bani Suweif along the Nile valley, localized at 100 km from Cairo, constitutes an important supplier of agricultural foods for the large city. At opposite, in Al Buherai, the market places are quite far from the farmers settlements and so the moving to markets has been difficult.

The figure 2 shows also that Bani Suweif has been strongly affected by crop disease due to the absence of agricultural extensionists.

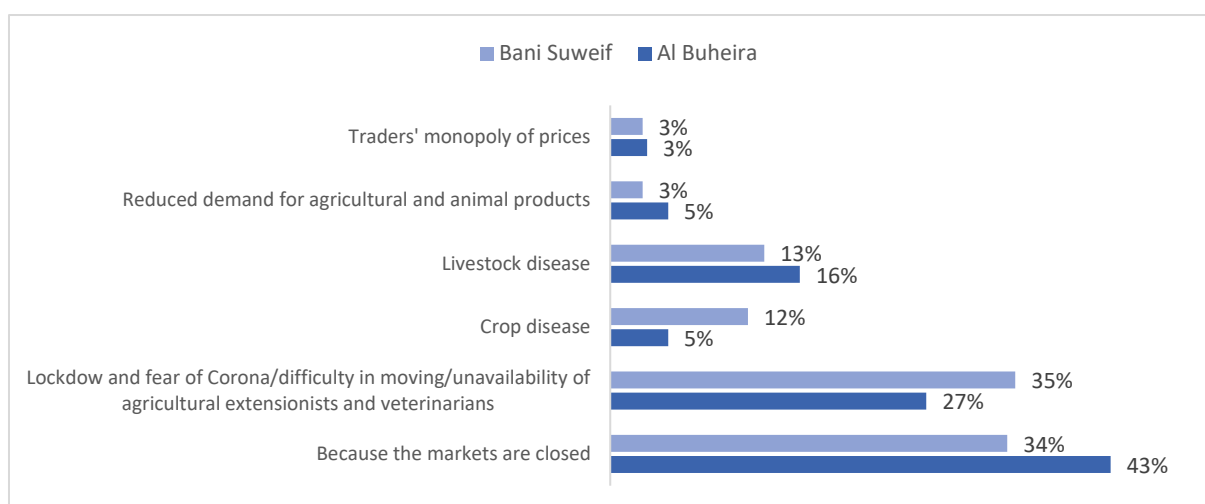


Figure 2. The most important factors that affects the farm activities during COVID-19 lockdown (210 farm survey)

2.3 Specific analysis of the impact of Covid-19 on livestock activity

2.3.1 Feed price

One of the major dependencies on the market in the breeding activity is the feed supply that usually represents around 70-80% of the production cost of livestock system (see Alary et al., 2016). The appraisal of Covid-19 impact allowed us to estimate an average increase of feed prices around 4 to 8% of the feed, with 6% for bran and 4% for corn grain from March to August 2020 (table 4).

Table 4. Feed purchasing price changes between before and during the Covid-19 event (March to August 2020) (among 210 farm surveys)

	Al Buheira	Bani Suweif	Av. price variation	Nos of answers
Green fodder				
Alfafa/Berseem	5.0%	9.2%	7.1%	201
Av. Green fodder	4.5%	10.4%	7.4%	210
Dry fodder				
Hay	5.7%		5.7%	54
Wheat hay	4.0%	10.4%	8.3%	154
Av. Dry Fodder	4.5%	10.4%	7.4%	210
Bran/Corn				
Corn	4.5%	3.4%	3.9%	207
Bran	7.1%	5.1%	6.0%	210
Supplementation				
Mixed concentrates	9.5%	0.0%	3.8%	5
Mixed fodder	3.2%	4.1%	3.9%	111
Oil seed	10.1%	2.8%	7.8%	25
Av. concentrates	6.4%	4.0%	4.9%	153

2.3.2 Veterinary services access

Before covid-19, almost all farmers used veterinarian services, mainly public vet services in Bani Suweif and private vet services in Al Buheira due to the weak development of vet and agricultural services in Al Buheira. During the Covid-19 peak crisis, 22% in Al Buheira have not been able to get private vet services due to the limitations of moving between the governorates. In the old lands (Bani Suweif), farmers have been obliged to use private vet services (42% during the lockdown period against 27% before) and at a higher price than before (table 5).

Table 5. Percentage of farmers who access vet services during the Covid-19 confinement by category of vet services (among 210 farm survey)

Vet service types	Before Covid-19			After Covid-19		
	Al Buheira	Bani Suweif	av. sample	Al Buheira	Bani Suweif	av. sample
No vet service	1%	1%	1%	22%	5%	13%
Public vet service	15%	72%	44%	3%	53%	28%
Private vet service	84%	27%	55%	75%	42%	59%

In total, 54% of herders (65% in the new lands and 44% in the old lands) have registered a delay for the animal vaccination, mainly regarding the vaccine against Foot and Mouth disease.

2.3.3 Change of live animal transaction

The proportion of sale of life animals ranges from 35% to 47% of the initial flock, meaning that farmers have been obliged to reduce their flock by more than one third during the studied period (Table 6). We notice different selling strategies in the two zones: if the farmers of the old lands have favored the local demand in an average radius of 3-7 km, farmers in the new lands of Al Buheira have mainly sold their live animals in the local markets at 15-33 km (Table 7). This difference could explain the price difference by animal species.

Table 6. Descriptive variable of marketing activities of the life animals during the Covid-19 confinement (210 farm surveys)

	Al Buheira	Bani Suweif	Total av.
Sheep			
Proportion of sale (/total flock)	41%	42%	41%
Distance of selling point	33	3	20
Average selling price	1794	1515	1675
Goat			
Proportion of sale (/total flock)	44%	43%	44%
Distance of selling point	24	3	14
Average selling price	1564	1362	1474
Cattle			
Proportion of sale (/total flock)	47%	40%	43%
Distance of selling point	26	7	17
Average selling price	15191	14183	14710
Buffaloes			
Proportion of sale (/total flock)	45%	35%	41%
Distance of selling point	15	5	13
Average selling price	17214	13839	16089

Table 7. Repartition of the main selling places of live animals during the Covid-19 confinement (among 210 farm surveys)

Selling place	Selling place for sheep and goats			Selling place for cattle and buffaloes		
	Al Buheira	Bani Suweif	Total av.	Al Buheira	Bani Suweif	Total av.
No answer	42%	58%	50%	3%	10%	6%
In the farm	3%	8%	5%	21%	14%	18%
Consumer/grocery	10%	13%	12%	16%	43%	30%
Market	45%	15%	30%	59%	30%	44%
Trader	0%	6%	3%	1%	4%	2%

The first reason for selling animals has been to cover the household expenses in the two zones. A second main reason is to pay the renting charge in the old lands (Figure 3). About 71% of farmers have a piece of land in rent of 1.4 feddan in average, compared to only 14% in the new lands of 3.3 feddan in average. The problem of feeding come in the fourth place. This confirms the central role of animals as saving to face unforeseeable events like the current pandemic.

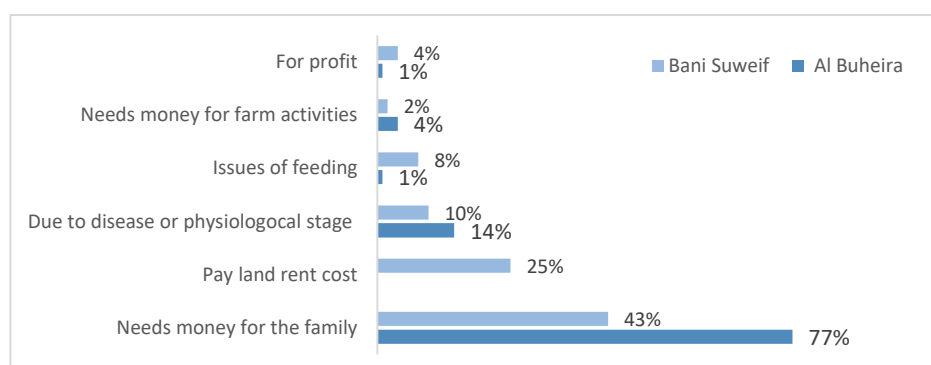


Figure 3. Prior reasons to sale cattle or buffaloes during the Covid-19 confinement

2.3.4 Change on marketing activities of dairy products

One other impact of the Covid-19 event is the reduction of the sale of dairy products from 8% in old land to around 22% in the new lands (Table 8). Due to the remoteness of the villages from urban consumers in the new lands, around 87% of farmers sold milk directly to consumers or local groceries with a lower price of around 7% than the price before the Covid-19. In the old lands, the sale of milk has been reduced by 7% with a slight reduction of the prices on dairy products. This can be explained by the proximity of the demand in this dense population region of Bani Suweif.

Table 8. Changes of the percentage of sale of milk production and prices during the Covid-19 confinement compared to before the confinement (from 210 farm surveys)

	Al Buheira	Bani Suweif	Total sample
Place of milk marketing			
Nos of farmers	3	4	7
In the farm			
Numbers of farmers	7	24	31
Distance (km)	8	2	3
Change of selling part in milk production (%)	-15%	-6%	-8%
Milk price change (%)	0%	-1%	0%
Directly to consumer/grocery			
Number of farmers	87	31	118
Distance	9	2	8
Change of selling part in milk production (%)	-23%	-12%	-20%
Milk price change (%)	-8%	0%	-6%
Milk points/centers			
Number of farmers		32	32
Distance		2	2
Change of selling part in milk production (%)		1%	1%
Milk price change (%)		-1%	-1%
Market			
Number of farmers	7	4	11
Distance	4	1	3
Change of selling part in milk production (%)	-19%	-20%	-19%
Milk price change (%)	-12%	7%	-5%
Trader			
Number of farmers		10	10
Distance		2	2
Change of selling part in milk production (%)		-27%	-27%
Milk price change (%)		-5%	-5%
Other			
Number of farmers	1		1
Distance	1		1
Change of selling part in milk production (%)	-43%		-43%
Milk price change (%)	0%		0%
Total (excluding farmers who didn't sell)			
Number of farmers	102	101	203
Distance	9	2	5
Change of selling part in milk production (%)	-22%	-8%	-15%
Milk price change (%)	-7%	-1%	-4%

2.3.5 Dairy products

Majority of farmers process their milk in cheese and butter firstly for home-consumption, but also for selling on the markets, especially in the Bani Suweif governorate (See Daburon et al., 2016). We can see that if most of farmers have continued to transform their milk in cheese and butter or ghee (table 9), majority of them have reduced the selling part by more than 10% (table 10). About 43% of farmers in Bani Suweif declared a reduction of more than 10% of the selling price of dairy products while 35% in Al Buheira didn't notice any change on the dairy prices (Table 11). However, in the old lands, we can

see that the average price of cow milk has recorded a slight increase of 2% that can be explained by both the reduction of milk production and milk sale and the traditional demand at the local level (Table 12).

In summary the farmers of Bani Suweif in the old lands were the most affected by the closure of markets and the reduction of sale of dairy products while in the new lands (Al Buheira) farmers were mainly affected by the difficulties to access to vet services.

Table 9. Percentage of farmers who process their milk (210 farms)

Items	Al Buheira	Bani Suweif	Total
Cheese	99%	90%	94%
Butter/ghee	90%	88%	89%
Cream	3%	2%	2%
Qasta	7%	0%	3%
Total	99%	91%	95%

Table 10. Change of sale of dairy products during the Covid-19 confinement compared to before (210 farm surveys)

Items	Al Buheira	Bani Suweif	Total
Decrease more than 10%	51%	57%	54%
Decrease less than 10%	29%	16%	23%
No change	20%	21%	20%
Increase less than 10%	0%	5%	3%
Increase more than 10%	0%	2%	1%
Total sample	105	91	196

Table 11. Change of selling price of dairy products during the Covid-19 confinement compared to before (210 farm surveys)

Items	Al Buheira	Bani Suweif	Total
Decrease more than 10%	32%	43%	37%
Decrease less than 10%	30%	35%	32%
No change	35%	17%	27%
Increase less than 10%	0%	1%	1%
Increase more than 10%	2%	4%	3%

Table 12. Variation of milk price during the Covid-19 confinement compared to before (210 farm surveys)

Milk price	Al Buheira	Bani Suweif	Total
Cow milk	-6%	2%	-2%
Buffalo milk	-3%	-1%	-2%

In summary, majority of farmers in Egypt have known a reduction of their agricultural income during the Covid-19 period from March to August 2020, mainly in link with the closure of the markets and the difficulty to access to agricultural services (Figure 4). These two factors have particularly affected the livestock activities that are based on quasi-daily or weekly moving regarding the dairy activities. To assess the impacts of this covid-19 period on the farm incomes and their trend, we proposed to use the LS IPT toolkit by referring especially to the module of financial impact at the farm level (see Dutilly et al., 2019).

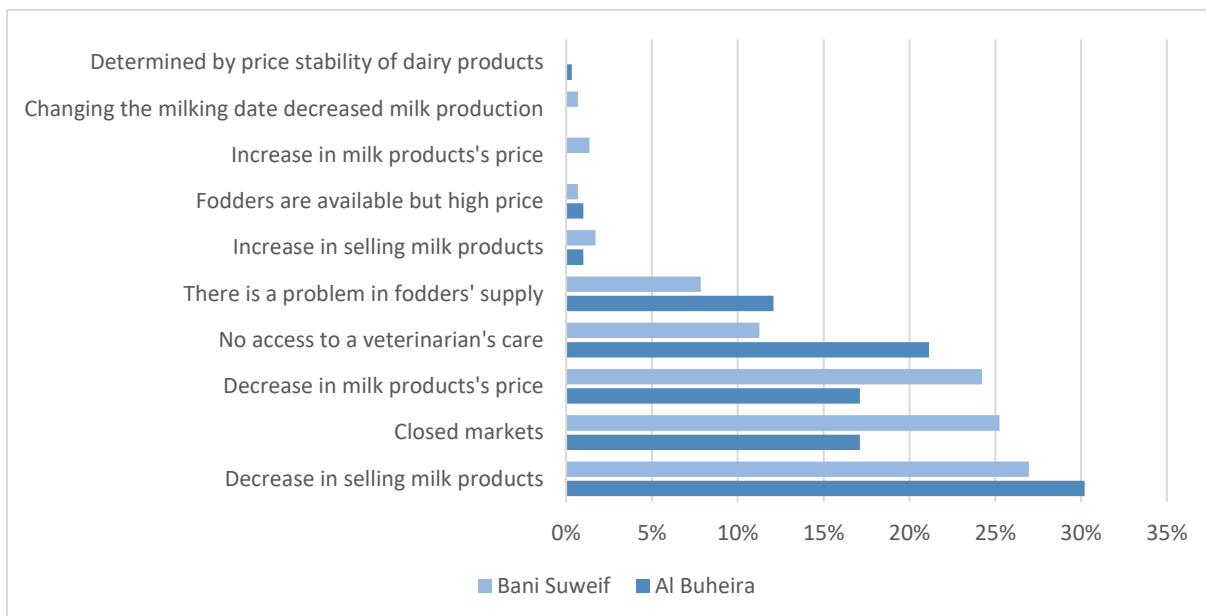


Figure 4. Main declared impacts of Covid-19 lockdown on milk activity in the old lands (Bani Suweif) and the new lands (Al Buheira) in Egypt (210 farm surveys)

3 COVID-19 Impact at the farm level using LSIPT Toolkit

3.1 Main changes during the COVID-19 crisis in 2020

In summary, regarding the livestock activity, in both studied zones, a significant proportion of farmers recorded a reduction of the milk production (40% and 25% respectively in Bani Suweif and Al Buheira) due to early milking stop that can be put in relation to the animal health cares. During the studied Covid-19 period in 2020, 22% in the New Reclaimed Lands (NRL) have not been able to get private vet service and, in the old lands, farmers have been obliged to use private vet service (42% during Covid against 27% before) at a high price. Besides 54% of herders (65% in NRL and 44% in old land) have registered a delay for the animal vaccination, mainly regarding the vaccine against Foot and Mouth disease.

From the farmers' declarations, the absence of agricultural support was more important in Bani Suweif while Al Buheira suffered from the closure of market. This difference can be explained by the socio-geographical configuration of the two areas. Bani Suweif along the Nile valley, localized at 100 km from Cairo, constitutes an important supplier of agricultural foods for the large city. At opposite, in Al Buherai, the market places are quite far from the farmers settlements and so the moving to markets has been difficult. In addition, the rapid appraisal on Covid-19 impact allowed us to estimate an average increase of feed prices around 4 to 8%, with an increase of about 6% for bran and 4% for corn grain that represent the main complements in the feed ration.

The proportion of sale of life animals ranged from 35% to 47% of the initial flock, meaning that farmers have been obliged to reduce their flock by more than one third during the Covid-19 period. The main reason for selling animals was to cover the household expenses in the two studied zones. A second main reason was to pay the renting charge in the old land (71% rent land, 1.4 feddan in average; compared to only 14% in the NRL with 3.3 feddan). The problem of feeding came in the fourth place. Farmers also registered a reduction of the sale of dairy from 8% in the old lands to around 22% in the NRL, a reduction lower than the milk production reduction. So due to the need of cash, farmers have attempted to sell the maximum of milk at the detrimental of the consumption. This confirms the central role of animals as saving and cash flow to face unforeseeable events like the current pandemic. All major changes are reported in the table 13.

Table 13. Main observed changes from farm survey conducted between July to November 2020

Parameters	Impact description	Construction of the ex-post scenarios
Reduction of milk production	40% and 25% resp. in Bani Suweif and Al Buheira	The reduction of milk production is based on the reduction of lactating period. This reduction concerns only the year 2020.
Reduction of milk selling price and milk marketing	Farmers also registered a reduction of the sale of dairy from 8% in the old lands to around 22% in the NRL, a reduction lower than the milk production reduction.	We have only considered the reduction of milk selling price by farm type.
Vet care and vaccination	22% in the NRL have not been able to get private vet service and, in the old lands, farmers have been obliged to use private vet service (42% during Covid-19 against 27% before) at a higher price. Besides 54% of herders (65% in NRL and 44% in old land) have registered a delay for the animal vaccination, mainly regarding the Foot and Mouth disease.	In the new lands (Al Buhaira), the vet cost per animal is proportionally reduced in link with the reduction of visit to the private vet. In the old lands (Bani Suweif), we have assumed an increase of 1.5 times the vet cost for the percentage of visit to the private vet due to the problem to consult public vet.
Increase of feed price	Average increase of feed prices around 4 to 8% of the feed, with an increase of about 6% for bran and 4% for corn grain that represent the main complements in the feed ration	We have introduced a proportional increase of mixed concentrates and bran in 2020.

Selling price of live animals	We use to declared selling prices per animal category for the year 2020. Then we suppose that the prices recover their normal trends in 2021.
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3.2 Built up of the scenarios in the LSIPT toolkit

The baseline scenario is based on the baseline model of the LIPT toolkit implemented in Egypt using the research data collection realized in 2014 (Alary et al., 2019). Due to the high impact of the currency devaluation in 2016 (Loss of around 50% of the value of the Egyptian pound) with a continuous inflation along the following years, we have adapted the ECORUM tool at the farm level by considering the price variability as described in Alary et al. (2020) (see Annex 1). This approach of price anticipation has been implemented in the six farm models oriented to cattle or buffalos raising for milk production in the two studied zone, i.e. Bani Suweif in the old land (Middle Egypt) and Al Buhaira in the new lands (Lower Egypt).

The six farm models are presented in table 14. They have been conceived based on the size of the dairy herd composed of large ruminants (cattle and buffalos).

Table 14. Distribution of cattle and buffaloes by herd category and their representativeness at the national level

Agro-ecological zones	Label of farm type	Av. herd size	% of representation of the farm type at the national level
Mixed irrigated systems in the New lands (MR)	B1MR	2.4	1.6%
	B2MR	4.9	3.5%
	B3MR	17.2	15.5%
Mixed irrigated systems in the old lands (MI)	B1MI	1.9	5.0%
	B2MI	3.4	20.0%
	B3MI	8.7	53.0%

Based on the herd size of the farmers involved in the farm survey conducted in 2020, we have classified the 210 farmers in the 6 categories to generate the indicators of changes during the studied Covid-19 period. The table 15 gathers the major changes observed during this period that will be introduced in the scenarios WITH change.

Table 15. Major changes in the dairy sector for each farm type according the herd size

Changes	Parameters	B1MI	B2MI	B3MI	B1MR	B2MR	B3MR
Dairy production	Milk price before COVID19	5.42	5.31	5.96	6.13	6.49	5.2
	Milk price during COVID19	5.27	5.26	5.75	5.63	5.96	4.7
	Milk price variation (%)	-2.8%	-0.942%	-3.5%	-8.2%	-8.2%	-9.6%
	Lactating period Before COVID19 (days)	250	210	230	210	180	240
	Reduction of lactating period during COVID19 (% farmers)	15%	16%	18%	14%	7%	13%
	Milk yield (l/head/day)	5.8	6.6	9.3	4	11	12
Feed prices	Change of price of mixed concentrates(%)	4%	3%	4%	4%	10%	15%
	Change of price of bran (for roughage) (%)	7%	1%	4%	7%	7%	12%
Sale of lives animals	Change of ratio of animal sales (for cattle and buffaloes)	19%	16%	9%	43%	35%	33%

Average selling price of live animals during COVID19 by farmers (EGP)						
Female Young	3921	4090	4757	4427	4611	4852
Subadult	11437	11930	13874	12913	13448	14152
Adult	14705	15339	17838	16602	17290	18195
Male Young	3921	4902	5534	5113	5763	5946
Subadult	11437	11930	13874	12913	13448	14152
Adult	16993	17725	20612	19185	19980	21026

3.3 Impact of the COVID-19 event on the technical and economic performances of dairy activity at the farm level

Table 16 presents the main changes of the technical indicators in 2020 and over the 20-year planning period considered (i.e. from 2014 to 2033). The percentage of variation represents the average variation over the 20-year period between the situation without Covid-19 (baseline scenario) and the situation with Covid-19 (real situation). Due to the important destocking of dairy animals in 2020, we can note an overall increase of the offtake rate around 2% with a reduction of the rate of productivity, except for B3MI that records the lowest rate of destocking and B2MR due to the herd structure with young male and female to reconstitute the herd.

In link with the reduction of the reproductive female in the herd and the earlier stop of milking in 2020 compared to rest of the years over the planning period, the milk yield registers a reduction between 13% and 18% in 2020, except in the type B2MR in link with the lowest destocking.

The reduction of the milk price in 2020 has a higher negative impact for the two small dairy farms over the planning horizon who record an overall reduction of the milk price of around 17% for the small dairy farm type in the old lands and 6% for small dairy farm type in the New lands. At opposite, except the small farm type in the old lands, the change of the average meat price in 2020 has no significant impact on the average meat price over the 20-years period. We can even note a slight increase of the meat prices over the 20 years for the medium and large dairy farm in the old lands.

These changes on the herd management and prices in 2020 have consequently significant impacts on the milk and meat productivity. Table 17a and 17b shows the changes of the structure of products and costs and the effects on milk and meat unit margins, respectively in the Old and New lands. Firstly, we can note an overall increase of the productive cost in the cattle and buffalo activity of around 12-15% in the old lands up to 16-17% for the small and large dairy farms in the new lands. A large part of this increase is due to the overall increase of the feed cost that varies between 11% to 18%. This increase has not major effect on the structure of costs knowing that the feed cost represents in average more than 75% of the total costs, up to 93-96% for the small dairy farms in old land and the large dairy farms in the New lands. These two types are the most dependent farmers on purchased feed due to the lack of land of the small dairy farmers in the old land and the intensive orientation of the large dairy farmers in the new land. However, this change of feed cost in 2020 would have the major negative impacts of the small and medium dairy farms in the two zones over the 20-years horizon.

The second major impact is the reduction of milk price that has negative effect of the milk gross unitary benefit of the dairy activity over the 20 years horizon, with a reduction of the margin from 0.38 EGP to 1.1 EGP per liter.

Table 16. Variation of technical performances of dairy farm system between the scenario without Covid-19 event (baseline) and the situation with the Covid

	B1MI					B2MI					B3MI									
	2020		20-years plan			2020		20-years plan			2020		20-years plan							
	Baseline	With Covid	Baseline	With Covid	% variation	Baseline	With Covid	Baseline	With Covid	% variation	baseline	With Covid	baseline	With Covid	% variation					
Old lands (Bani Suwaif governorate)																				
<u>Technical performance of a livestock production system (dominant species)</u>																				
Offtake rate (by zootechnical unit)	44%	66%	45%	45%	2%	43%	59%	44%	45%	2%	44%	54%	45%	45%	1%					
Rate of productivity in numbers	44%	40%	46%	45%	-1%	68%	68%	45%	45%	-1%	68%	68%	46%	45%	0%					
Rate of herd growth			1.17%	-0.30%				1.29%	0.23%				1.17%	0.53%						
<u>Production and year-based herd/flock productivity indicators</u>																				
Meat	Average weight of animals used					224	300	224	230	3%	227	287	227	231	2%	176	227	176	179	2%
	Total meat production (kg)					91.9	78.5	92.5	76.5	-17%	187.4	167.6	188.8	164.4	-13%	398.9	374.5	399.6	367.3	-8%
Milk	% reproductive females in the herd					58.2%	51.6%	61.3%	60.7%	-1%	57.6%	53.0%	60.7%	60.3%	-1%	58.2%	55.5%	61.3%	61.0%	0%
	Milk productivity (l/reproductive female/year)					1291	1097	1291	1281	-1%	1234	1036	1234	1224	-1%	1904	1561	1904	1887	-1%
	Total herd milk production (l/year)					1900	1359	1944	1597	-18%	3651	2703	3742	3233	-14%	15412	11693	15770	14363	-9%
	Organic matter production (kg/year)					19573	16863	19735	16354	-17%	39541	35464	39929	34801	-13%	107654	100633	108545	99792	-8%
Price structure	Average price of meat (per kg)					74.6	75.5	90.3	74.6	-17%	88	91	107	110	3%	115	122	139	147	5%
	Average price of milk (per litre)					5.8	5.7	7.0	5.8	-17%	7	7	8	8	0%	6	6	7	8	2%
New lands (Al Buhaira governorate)																				
<u>Technical performance of a livestock production system (dominant species)</u>																				
Offtake rate (by zootechnical unit)	42%	63%	44%	45%	2%	35%	52%	36%	36%	2%	32%	43%	32%	33%	2%					
Rate of productivity in numbers	49%	49%	43%	42%	-1%	29%	29%	35%	35%	0%	31%	30%	32%	32%	-1%					
Rate of herd growth			-1.09%	-2.50%				-0.75%	-1.61%				-0.33%	-1.06%						
<u>Production and year-based herd/flock productivity indicators</u>																				
Meat	Average weight of animals used					184	275	181	187	3%	246	268	244	245	1%	257	289	257	259	1%
	Total meat production (kg)					112.2	97.4	112.2	93.2	-17%	299.5	249.0	303.5	269.2	-11%	950.1	861.5	964.2	871.8	-10%
Milk	% reproductive females in the herd					56.2%	50.0%	57.4%	56.9%	-1%	50.6%	48.6%	50.1%	50.0%	0%	46.3%	43.8%	46.9%	46.7%	0%
	Milk productivity (l/reproductive female/year)					748	643	748	742	-1%	1762	1639	1762	1756	0%	2563	2230	2563	2547	-1%
	Total herd milk production (l/year)					1663	1207	1709	1408	-18%	8326	6963	8354	7393	-12%	37965	30164	38601	34711	-10%
	Organic matter production (kg/year)					29983	25905	30487	25341	-17%	66059	60001	66376	59075	-11%	220750	204517	222437	201909	-9%
Price structure	Average price of meat (per kg)					119	119	144	144	0%	114	117	138	141	2%	143	143	174	174	0%
	Average price of milk (per litre)					5	5	6	6	-6%	4	4	5	5	-5%	9	9	11	11	0%

Table 17a. Variation of technical-economic cost and prices between the scenario without Covid-19 event (baseline) and the situation with the Covid in the Old lands (Bani Suweif governorate)

	B1MI				B2MI				B3MI			
	2020 Baseline	2020 With Covid	20-years horizon Baseline	20-years horizon With Covid	2020 Baseline	2020 With Covid	20-years horizon Baseline	20-years horizon With Covid	2020 Baseline	2020 With Covid	20-years horizon Baseline	20-years horizon With Covid
Operational costs per reproductive female												
Production costs and general expenses per reproductive female	7 730	8 646	9 289	9 999	11 035	12 409	13 244	14 725	16 971	19 501	20 368	21 622
Feed cost/reproductive female	7 238	8 049	8 700	9 356	8 004	8 810	9 615	10 342	12 849	14 314	15 412	16 022
Structure of production costs and general expenses (%)												
Salaried labour	0.00%	0.00%	0.0%	0.0%	0.00%	0.00%	0.0%	0.0%	6.63%	6.23%	6.7%	6.9%
Feeds	93.6%	93.1%	93.7%	93.6%	72.5%	71.0%	72.7%	70.7%	75.7%	73.4%	75.6%	74.3%
Veterinary costs + artificial insemination	4.7%	5.1%	4.7%	4.5%	3.3%	3.9%	3.3%	3.1%	0.0%	0.0%	0.0%	0.0%
Other (water+taxes)	1.6%	1.8%	1.6%	1.9%	24.2%	25.1%	24.1%	26.2%	17.7%	20.4%	17.8%	18.8%
Product structure (%)												
Meat	39.3%	62.5%	38.8%	39.1%	42.1%	58.5%	41.6%	39.9%	33.8%	47.8%	33.2%	33.1%
Milk	60.7%	37.5%	61.2%	60.9%	57.9%	41.5%	58.4%	60.1%	66.2%	52.2%	66.8%	66.9%
Unit margin for meat												
Production cost (EGP/kg)	47.1	25.0	57	60	22.7	14.3	27	30	93.0	66.6	112	117
Sale price (EGP/kg)	74.6	75.5	90	91	88.2	97.2	107	110	115.1	121.7	139	147
Gross unitary benefit (EGP/kg)	27.5	50.5	33.1	31.4	65.5	82.9	79.2	80.2	22.1	55.1	27.0	29.7
Profit rate (gross benefit/production cost)	0.6	2.0	0.6	0.5	2.9	5.8	2.9	2.7	0.2	0.8	0.2	0.3
Unit margin for milk												
Production cost (EGP/liter)	3.7	4.9	4	5	7.8	10.4	9	10	8.3	11.6	10	11
Sale price (EGP/liter)	5.8	5.7	7	7	6.6	6.6	8	8	6.2	6.3	7	8
Gross unitary benefit (EGP/liter)	2.1	0.8	2.5	2.2	-1.2	-3.8	-1.3	-2.4	-2.1	-5.3	-2.5	-3.0
Profit rate (gross benefit/production cost)	0.6	0.2	0.6	0.4	-0.2	-0.4	-0.1	-0.2	-0.3	-0.5	-0.3	-0.3

Table 17b. Variation of technical-economic cost and prices between the scenario without Covid-19 event (baseline) and the situation with the Covid in the New lands (Al Buhaira governorate)

	B1MR				B2MR				B3MR			
	2020 Baseline	2020 With Covid	20-years horizon Baseline	20-years horizon With Covid	2020 Baseline	2020 With Covid	20-years horizon Baseline	20-years horizon With Covid	2020 Baseline	2020 With Covid	20-years horizon Baseline	20-years horizon With Covid
<u>Operational costs per reproductive female</u>												
Production costs and general expenses per reproductive female	8 146	9 517	9 775	11 150	12 299	13 628	14 824	16 423	26 951	31 256	32 378	33 190
Feed cost/reproductive female	6 821	8 044	8 191	9 324	8 810	9 919	10 618	11 670	26 046	30 279	31 291	31 996
<u>Structure of production costs and general expenses (%)</u>												
Salaried labour	0.00%	0.00%	0.0%	0.0%	1.65%	1.66%	1.7%	1.7%	1.30%	1.23%	1.3%	1.4%
Feeds	83.7%	84.5%	83.9%	83.7%	71.6%	72.8%	71.6%	71.1%	96.6%	96.9%	96.7%	96.5%
Veterinary costs + artificial insemination	3.3%	2.8%	3.3%	2.9%	6.5%	5.0%	6.5%	6.0%	1.0%	0.9%	1.0%	1.0%
Other (water+taxes)	12.9%	12.7%	12.8%	13.4%	20.3%	20.5%	20.3%	21.1%	1.0%	1.0%	1.0%	1.1%
<u>Product structure (%)</u>												
Meat	57.9%	79.5%	58.3%	60.4%	48.2%	62.2%	48.5%	48.7%	28.3%	38.4%	28.5%	27.3%
Milk	42.1%	20.5%	41.7%	39.6%	51.8%	37.8%	51.5%	51.3%	71.7%	61.6%	71.5%	72.7%
<u>Unit margin for meat</u>												
Production cost (EGP/kg)	113.6	55.8	136	151	107.1	71.9	129	140	154.2	112.0	185	186
Sale price (EGP/kg)	118.8	119.2	144	144	114.2	117.1	138	141	143.5	146.3	174	177
Gross unitary benefit (EGP/kg)	5.1	63.4	7.7	-6.5	7.1	45.3	9.5	0.4	-10.7	34.3	-11.4	-9.8
Profit rate (gross benefit/production cost)	0.0	1.1	0.1	0.0	0.1	0.6	0.1	0.0	-0.1	0.3	-0.1	-0.1
<u>Unit margin for milk</u>												
Production cost (EGP/liter)	3.3	4.4	4	5	3.1	3.7	4	4	6.6	8.8	8	8
Sale price (EGP/liter)	5.3	4.9	6	6	4.3	4.0	5	5	9.1	8.4	11	10
Gross unitary benefit (EGP/liter)	2.1	0.5	2.5	1.5	1.1	0.3	1.4	0.7	2.4	-0.5	3.0	2.1
Profit rate (gross benefit/production cost)	0.6	0.1	0.6	0.3	0.4	0.1	0.4	0.2	0.4	-0.1	0.4	0.3

3.4 Impact of the COVID19 event on the socio-economic viability of the family dairy farms

Table 18a and Table 18b show the effects of the COVID19 event occurred in 2020 on the financial viability, the monetary vulnerability (in terms of coverage of the monetary family needs) and food security (related to the capacity to cover the family cereal requirement and the contribution of animal products in the household nutritional needs in terms of calories and protein). For each livestock dominant systems oriented to cattle and buffalo raising, the tables present the impacts in 2020 and the impacts over the 20-years periods (2014-2033). The baseline scenario corresponds to the situation in which the activities would have continued as usual over the 20-years period.

The results show that only the small dairy farms (B1MI) in the old land maintain a positive gross margin of the dairy activity faced to the COVID-19 event. All the other groups recorded a negative gross margin due mainly to the increase of the prices of feed and concentrates on the market and the relatively high dependence of the farmers on purchased feed supply.

Moreover, due to the average destocking estimated between 25 to 40% of dairy animals, we note a reduction of intermediate costs per animal but an increase of the intermediary costs per liter of milk as mentioned in the previous part (2.3). The main consequences are that livestock become a non-profitable activity in 2020 and also over the 20-years planning horizon. We can also observe a reduction of the contribution of livestock activity in the family food security with a consequent reduction of their intake in the calories and protein requirement of the household.

Without public interventions in the sector, we can conclude to a drastic reduction of the capacity of the dairy activity to cover the household need. For instance, in regards to the number of people financially covered by the dairy activity in the farm, this indicator is reduced from a ratio around 2 to 4 in the Old lands. In the New lands, the dairy activity become costly for the small and medium dairy farms that might reinforce the current abandon of the dairy activity in the zone.

Table 18a. Impact of the COVID19 event in 2020 on the socioeconomic indicators of the dairy activity contribution to the household viability in the Old lands (Bani Suwaif Governorate, Egypt)

	B1MI				B2MI				B3MI			
	2020		20-years period		2020		20-years period		2020		20-years period	
	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi
Financial indicators												
Net income from animal production (gross margin)	6 814	2 596	8 348	4 877	9 158	-1 015	11 434	3 884	5 868	-28 604	8 592	-898
Net income per active family member	3 199	1 219	3 919	2 290	3 053	-338	3 811	1 295	2 934	-14 302	4 296	-449
Net income per animal	2 697	1 161	3 322	2 379	1 784	-216	2 235	846	422	-2 176	631	-82
Net income per reproductive female	4 630	2 095	5 621	4 027	3 095	-389	3 810	1 398	725	-3 819	1 024	-208
Profit margin (net income/product)	37.5%	19.5%	38.1%	30.3%	21.9%	--	22.9%	11.0%	4.1%	--	6.0%	--
Total net income after financing the loan for working capital	22 923	16 504	27 841	23 844	29 860	19 687	36 485	28 935	285 606	251 134	347 104	337 614
Intermediate costs												
% intermediate cost per animal	59.4%	30.9%	59.6%	66.1%	18.3%	12.5%	18.4%	21.4%	58.1%	43.0%	57.9%	60.0%
% intermediate cost per litre of milk	62.9%	84.0%	61.7%	68.6%	89.2%	118.1%	87.7%	94.1%	102.0%	135.8%	99.4%	102.3%
Offtake rate	43.9%	65.6%	44.5%	45.5%	43.3%	58.9%	43.9%	44.5%	43.9%	53.6%	44.5%	45.0%
Poverty line per person												
Monetary vulnerability												
Net income from livestock production/Total net income	10.2%	3.9%	10.4%	6.8%	27.3%	--	29.0%	13.1%	7.5%	--	11.4%	2.3%
Number of reproductive females needed to reach the poverty threshold (per person)	2.4	5.3	2.4	3.4	3.6	--	3.5	9.7	15.4	--	13.8	--
Live capital needed to reach the poverty threshold (per person)	55 792	112 020	66 887	87 066	87 170	--	103 244	296 701	363 587	--	427 712	--
Number of people covered by the system	0.6	0.2	0.6	0.4	0.8	--	0.9	0.4	0.5	--	0.8	0.2
Food security												
Household cereal requirements covered by animal production (in months)	2.39		2.59		5.04		5.88		9.13		13.55	24.61
Number of animals needed to cover household cereal requirements	12.66		11.94		12.24		11.07		18.26		16.30	3.05
Household nutritional requirements covered by animal production												
Calories	14.2%	10.2%	14.5%	11.9%	32.2%	23.9%	33.1%	28.6%	0.0%	0.0%	0.0%	0.0%
Proteins	23.0%	16.4%	23.5%	19.3%	55.9%	41.4%	57.3%	49.5%	0.0%	0.0%	0.0%	0.0%

Table 18b. Impact of the COVID19 event in 2020 on the socioeconomic indicators of the dairy activity contribution to the household viability in the New lands (Al Buhaira Governorate, Egypt)

	B1MR				B2MR				B3MR			
	2020		20-years period		2020		20-years period		2020		20-years period	
	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi	Baseline	With Covi
Financial indicators												
Net income from animal production (gross margin)	2 995	-1 568	3 754	-55	10 908	-3 693	13 574	1 126	79 774	-72 549	101 114	31 307
Net income per active family member	2 995	-1 568	3 754	-55	10 908	-3 693	13 574	1 126	39 887	-36 274	50 557	15 653
Net income per animal	758	-447	942	-68	1 167	-432	1 440	94	2 492	-2 420	3 156	1 045
Net income per reproductive female	1 346	-835	1 662	-143	2 309	-869	2 858	194	5 386	-5 363	6 766	2 224
Profit margin (net income/product)	14.2%	-9.6%	14.6%	1.0%	15.8%	--	16.2%	3.2%	16.7%	--	17.4%	7.3%
Total net income after financing the loan for working capital	30 595	26 032	37 153	33 344	113 533	98 932	134 568	122 121	505 127	157 986	615 836	536 287
Intermediate costs												
% intermediate cost per animal	90.5%	47.5%	88.3%	96.4%	83.2%	59.4%	82.0%	93.1%	106.0%	97.4%	104.1%	122.2%
% intermediate cost per litre of milk	53.4%	78.9%	52.7%	62.8%	63.2%	79.9%	63.1%	71.8%	71.4%	103.4%	70.8%	77.2%
Offtake rate	41.5%	62.9%	43.6%	44.5%	35.1%	52.2%	35.5%	36.2%	31.5%	43.5%	32.0%	32.6%
Poverty line per person												
Monetary vulnerability												
Net income from livestock production/Total net income	4.5%	--	4.6%	--	19.5%	--	20.0%	--	59.4%	--	62.6%	25.2%
Number of reproductive females needed to reach the poverty threshold (per person)	8.3	--	8.2	--	4.8	--	4.7	--	2.1	--	2.0	6.1
Live capital needed to reach the poverty threshold (per person)	169 226	--	200 184	--	104 326	--	123 852	--	65 557	--	76 091	238 937
Number of people covered by the system	0.3	--	0.3	--	1.0	--	1.0	--	7.1	--	7.5	3.0
Food security												
Household cereal requirements covered by animal production (in months)		--	17.67	--	3.16	--	4.46	--	68.90	--	72.12	--
Number of animals needed to cover household cereal requirements	0.00	--	0.15	--	35.46	--	31.01	--	5.57	--	5.60	--
Household nutritional requirements covered by animal production												
Calories	13.7%	9.9%	14.0%	11.6%	40.2%	33.6%	40.4%	35.7%	7.6%	7.2%	7.7%	7.0%
Proteins	20.5%	14.9%	21.1%	17.4%	64.1%	53.6%	64.3%	56.9%	13.3%	13.1%	13.5%	12.3%

4 Discussion and conclusion

This analysis of the socio-economic impacts of the COVID-19 event in 2020 on the dairy farms in Egypt has allowed to assess the effects of the reduction of milk price and milk production due to the lockdown and the effects of the feed price increase and livestock destocking over the 20-years period (2014- 2033). The main results show an overall reduction of the livestock activity' contribution to the family viability that will have some financial effect up to 2033, compared to a scenario without the event of Covid-19. This reduction of the livestock contribution to the financial viability at the family farm level is mainly explained by the reduction of the dairy benefit. Without some specific public intervention in the sector in regards to milk price policy or feed prices, the sector could know a progressive decline over the next decade.

As observed in other sub-Saharan African countries, COVID-19 has come to undermine milk production systems whose vitality lies in part on the price and access to feed to maintain milk production and flexibility of mobility in the valuation of products. Moreover, as observed in Burkina Faso, Senegal, Kenya and Madagascar, the Covid-19 event coincided with the main milk production season (APESS, 2020; Vall et al, 2021). However, as highlighting by Vall et al (2021), COVID 19 has also strongly affected the dairy marketing system, especially young people and women who are involved in milk marketing, in the local market (formal or informal) and the local dairy industries. Pursuing this research impact analysis over the full dairy value chain would allow seeing how the milk sale reduction has affected all the sector in Egypt that constitute one of the main sources of protein of the majority of consumers and a huge source of employment (Alary et al., 2016).

From a methodological point of view, this analysis in terms of impact assessment of the Covid-18 crisis through the LSIPT toolkit allowed to represent the effects of a shock over a plan horizon. The Toolkit helps to develop a comprehensive assessment of the impact of the COVID-19 event on the different farm systems and their respective resilience levels. This medium-term approach is fundamental in the livestock sector where livestock is a live capital that needs time to be reconstituted. Moreover, the approach allows to cross the effects of change of prices on the overall viability of the family farms thanks to the gamut of indicators at the farm and household level.

However, this approach shows also some rigidities of the current version of the LSIPT toolkit in regards to the marketing decision. Dairy farmers have been able to change their marketing decisions on milk and live animals during and after the Covid-19 events that we have not be able to consider in the impact assessment. This could be considered in a new improved version of the LSIPT Toolkit.

5 Acknowledgements

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7 Appendix 1. Family farm questionnaire (short version related to dairy activity at farm level)

Phone Questionnaire : _____
Date of the interview: _____
Governorate : _____
District: _____
Village: _____

Name of the interviewee (preferably the person who own the land or the person who manage the farm): _____

Education of the Interviewee: (No read no write, Coranic, primary, prep-school, High secondary, technical or faculty diploma)

Age of the Interviewee?

Marital situation: (Maried; Single; Widow)

Total number of persons in the hamily (economically dependent of the family head)? _____

Total number of family members living in the house of the family head? _____

How many family adult members working in the farm? _____

Among them, how many adult women among them? _____

How many children work partially in the farm? _____

How many members have another full-time activity out of the farm? _____

How many members have another part time activity out of the farm? _____

What are the main sources of incomes at the household level?

1. Nature of activity: _____ Amount per year: _____ EGP/Year

2. Nature of activity: _____ Amount per year: _____ EGP/Year

3. Nature of activity: _____ Amount per year: _____ EGP/Year

4. Nature of activity: _____ Amount per year: _____ EGP/Year

Who own the land? 1. Man 2. Women _____

Who manage the farm? 1. Man 2. Women _____

Size of land in ownerships (feddan): _____

Size of cultivated land (feddan): _____

How much of this land do you, yourself own alone? _____

And jointly with someone? _____

Specify the someone(s) _____

Number of livestock head of sheep: _____

How many of these heads do you yourself own alone? _____

And Jointly with someone? _____

Specify the someone(s) _____

Number of livestock head of goats: _____

How many of these heads do you yourself own alone? _____

And Jointly with someone? _____

Specify the someone(s) _____

Number of livestock head of cattle: _____
How many of these heads do you yourself own alone? _____
And Jointly with someone? _____
Specify the someone(s) _____

Number of livestock head of buffalo : _____
How many of these heads do you yourself own alone? _____
And Jointly with someone? _____
Specify the someone(s) _____

Average number of dairy and milking animals during the last 3 months: _____
How many of these heads do you yourself own alone? _____
And Jointly with someone? _____
Specify the someone(s) _____

Between March to July 2020:

Do you sell dairy products? (Y/N): /___/ From goat: /___/ From Cattle: /___/ Buffalo : /___/

Where do you sell?

At farm: /___/

Directly to other consumers/groceries: /___/

Milk point/center: /___/

Markets/souk: /___/

Average distance: ___ (km)

Percentage of selling of milk production: ___%

Percentage of selling before Covid-19: ___%

Average selling milk price : ___

Average selling milk price before Covid-19: _____

Do you sell live animals (sheep and goats)? (Y/N): goat: /___/ sheep: /___/

Physiological stage (number):

Reproductive females: /___/, young male/___/, young female/___/,

adult male/___/. non weaned animals: /___/

Where have you sold your animals: At farm, directly to consumers or butchers, In the Souk(market)

Which markets (list in terms of priority): _____

Average distance: ___ (km)

Average selling price for sheep (EGP/head) : _____

Average selling price for goat (EGP/head) : _____

Do you sell live animals (cattle and buffalo)? (Y/N): Cattle: /___/ Buffalo: /___/

Physiological stage (number):

Dairy___, heifer___, young male___, young female___,

adult male__ non weaned animals: _____

Why: Too old___; need money___; no enough feed___; Other___

Where have you sold your animals: At farm, directly to consumers or butchers, In the Souk(market)

Which markets (list in terms of priority): _____

Average distance: ___ (km)

Average selling price for cattle (EGP/head): _____

Average selling price for buffalo (EGP/head): _____

Do you sell other agricultural products? (Y/N): _____
If yes, what? _____
Which markets (list in terms of priority): _____
Average distance: _____ (km)

Change of livestock practices from March to July 2020:

In case of emergency/ problem do you address at:

Before Covid-19: Public vet _____ Private vet: _____ Traditional medicine: _____ no support: _____

During Covid-19: Public vet _____ Private vet: _____ Traditional medicine: _____ no support: _____

Did you get some delay in the vaccination plan during COVID-19 as compared to before COVID-19?
Y/N _____

If YES, for which vaccine (FMD, internal parasite (Ivomac), 8-Diseases, Rift Valley Fever, Other):

What is the types of feeds, quantity (in Kg/heads) and price during Covid-19?

Forage: Type: _____ Quantity (kerat/day/ for all animals)

Roughage Type: _____
Quantity (straw)..... (kg/day/ all animals)

Average unit price of wheat straw (/kg): _____ before Covid-19: _____

Feedstuff: Type: _____ (Corn, Wheat bran, Soybean, Cotton Seed cake, Wheat flour, other)

Quantity (kg/day/all animals)

Average unit price of corn grain (EGP/kg): _____ Before Covid-19: _____

Average unit price of wheat bran (EGP/kg): _____ Before Covid-19: _____

Concentrate feed mixture Type: _____

Quantity(kg/day/all animals)

Average unit price (EGP/kg): _____ Before Covid-19: _____

Do you transform milk at home? Cheese, Butter/Ghee, Cream, Other

Percentage of transformation of the milk production during covid-19:

No transformation: _____ Less than 30%: _____ More or less the half: _____ Majority: _____

Percentage of transformation of the milk production before Covid-19:

No transformation: _____ Less than 30%: _____ More or less the half: _____ Majority: _____

Percentage of sale of milk products during covid-19:

No sale: _____ Less than 30%: _____ More or less the half: _____ Majority: _____

Change of sale during covid-19:

No change: _____ Decrease less than 10%: _____ Decrease more than 10%: _____

Increase less than 10%: _____ Increase more than 10%: _____

Change of price during covid-19:

No change: _____ Decrease less than 10%: _____ Decrease more than 10%: _____

Increase less than 10%: _____ Increase more than 10%: _____

What is the price of milk:

Cattle milk (Egp/liter): _____ Before Cond-19: _____

Buffalo milk (Egp/liter): _____ Before Cond-19: _____

Where did you usually sell?

At home: _____ Directly to consumers in the village: _____ In the souk: _____

What have been the change during the Covid-19 period (March to July 2020)? **(Multiple choice)**

Reduce sell of milk products : /___/
Increase sell of milk products : /___/
Reduce price of milk products : /___/
Increase price of milk products : /___/
Problem of feed availability : /___/
No access to vet care : /___/
Closure of market (souk) : /___/
other. Precise.... : /___/

Opened and qualitative interviews :

- Can you tell us more whether and how did the lockdown and COVID-19 crisis affected your agricultural and livestock livelihood in general?
 - o If yes, what is the most affected animal species or products? And why?
 - o If not yet, how do you foresee that your agricultural and livestock livelihood would be affected due to COVID-19?
- Has your access to vaccination and veterinary services been affected due to COVID-19?
- Globally, are you able to sell your dairy livestock and/or agricultural products as you have done before COVID-19 crisis?
 - o Are you selling **more** of a specific dairy livestock and/or agricultural products? Please explain for each product, why?
 - o Are you selling **less** of a specific dairy livestock and/or agricultural products? Please explain for each product why?
 - o What have been your coping mechanism to maintain your sales? Please explain for each product whether you have been doing something differently now?
- In case you cannot sell your products, what are you doing (based on product)?
- Is access to livestock feed been disrupted due to COVID-19? Please explain why or why not.
 - o How have you coped with that? Please explain.
- Is your access to water have been disrupted due to the COVID crisis? Please explain.
 - o How have you coped with that? Please explain.
- Are you having current problems in livestock diseases? Please explain. And how are you dealing with that?

8 Appendix 2. Approach of price variability in ECORUM Excel tool

Extracted from : <https://hdl.handle.net/20.500.11766/12538>

In the LSIPT frame (presented in Dutilly et al, 2019), ECORUM Excel tool proposes a dynamic demographic model for the studied animal population within a production system (called Dynmod) and then a financial and economic appraisal of the production system based mainly on gross margin, profit, and net income over a planning horizon corresponding to the projection of animal population. In its current form, the planning horizon for animal demography is 20 years. In the demographic model (Dynmod), the main parameters are demography parameters like prolificacy, the sex ratio at birth, mortality, offtake rate, and market price for live animals. From this market price and the average live weight of animals, it is estimated an average meat price used in the financial appraisal. However, in the present version, the prices for other animal products and inputs (feed, vet services, wages, etc.) are determined the first year (based on the market price) and remain constant all over the 20 years. From this current version, two improvements are proposed in the Dynmod sheet:

1. Based on the literacy review (part 2), the first and simple improvement is to consider the inflation that impacts the majority of production cost and products in one country;
2. A second improvement is to link the prices of live animals in the sheet DYNAMOD to the variability of supply of live animals (estimated from the off-take rate) based on the growth rate.

The formula (Eq. 1) could be written as:

$$P_{a,t}^* = P_{a,t-1}^* (1 + I^*) [1 - [Tx(S_{a,(t-1,t)})r_a]] \quad (\text{Eq. 1})$$

With:

$P_{a,t}^*$: price of the category of animal a at the time t

I^* : average annual inflation rate over the period

$S_{a,t}$: Number of off-take live animal a

Tx_t : the growth rate of the animal population (a) over one period. Here we propose to choose the growth rate over the current year assuming that this rate directly influences the current price compared to the price in $t-1$.

r_a : the part of the animal population in this production system/total animal population. Meaning that the fluctuation of supply of animal in this livestock production (LP) will affect the price differently according to the weight of the supply of animal from this livestock system in the total national supply. For the specific production cost related to livestock activity like feed and concentrates that generally represent the majority of the production cost of livestock system, we can opt for a similar formula (Eq 1). For non- specific production costs like fertilizers and chemical inputs in the crop system, we propose to only use the rate of inflation.