Dataset for GRAIN, "EU-Mercosur trade deal will intensify climate change from agriculture", November 2019

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Methodological Note

The methodology used to compile this data set consisted of assessing the potential effects of the EU-Mercosur FTA by accounting for direct impacts in terms of GHG emissions. By direct impacts we mean GHG emissions directly related to changes in traded volumes. These include changes in production levels to meet FTA quotas and adjusted emissions levels to account for sea freight as mode of transportation.

Quantitative estimates for the two dimensions were partially based on the available literature and partially on explicit assumptions. For each item it was assumed that projected changes in traded volumes would trigger equal increases in domestic production.

After the definition of the "activity data", emission factors for each item selected were retrieved from the literature. When possible, emission factors were deconstructed according to the stage of the item lifecycle, from the farm to the final market (excluding consumption).

By multiplying activity data and relative emission factors, several tables were obtained (see tab.2_calculations). Data sources and technical notes can be found attached to the tables in "Tab.3 activity data" and "Tab.4 Emission factors".

Authorship

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Table 1.1 Estimated impact of the EU-Mercosur FTA: additional CO$_2$-eq emissions

Item	---(1,000 t Co2-eq)---
Direct impact (increased production for export and increase in sea-freight transportation)	8,705.2
Current emissions due to UE-Mercosur trade	25,464.1
Additional emissions as % of current emissions	34%

Table 1.2 Most impacting products

Item	---(1,000 t Co2-eq)---	---(percent)---
Beef	7146.1	82.09%
Poultry	561.2	6.45%
Ethanol	435.2	5.00%
Cheese	365.1	4.19%
Rice	25.2	0.29%
SMP	127.2	1.46%
Infant Formula	38.1	0.44%
Sugar	7.1	0.08%
TOTAL	8705.2	100.00%

Table 1.3 Most impacting processes

Item	---(1,000 t Co2-eq)---	---(percent)---
Farm	5843.3	67.12%
Land Use Change	2541.5	29.19%
Post-farm	220.5	2.53%
Sea-freight transportation	100.0	1.15%
TOTAL	8705.2	100.00%

Table 1.4 Most impacted regions

	UE	Mercosur
	---(1,000 t Co2-eq)---	*---(1,000 t Co2-eq)---*
EU-Mercosur current trade emissions	106.7	25464.1
EU-Mercosur projected trade emissions	637.2	33638.8
Percentage change	497%	32%

Table 2.1 UE-Mercosur FTA: CO_2-eq emissions from current trade volumes. Reference year 2018

	Bilateral trade (export)	
Item	*---(1,000 t Co2-eq / t)---*	
	U.E.	*Mercosur*
Beef[a]	.	13,142.2
Poultry[a]	.	1,862.8
Soybeans	.	9,994.3
Sugar[b]	.	335.2
Ethanol	.	80.3
Rice[c]	.	49.2
Cheese	51.4	.
SMP	10.6	.
Infant Formula	44.7	.
TOTAL	106.7	25,464.1

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 2.2 UE-Mercosur FTA trade scenario: direct CO_2-eq emissions from projected volumes

	Bilateral trade (export)	
Item	*---(1,000 t Co2-eq / t)---*	
	U.E.	*Mercosur*
Beef[a]	.	20,288.2
Poultry[a]	.	2,424.0
Soybeans	.	9,994.3
Sugar[b]	.	342.3
Ethanol	.	515.5

Item		
Rice[c]	.	74.4
Cheese	416.5	.
SMP	137.9	.
Infant Formula	82.8	.
TOTAL	637.2	33,638.8

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 2.3 UE-Mercosur FTA scenario: direct CO_2-eq emissions net change

Item	---(1,000 t Co2-eq / t)---		---(percent)---	
	U.E.	Mercosur	U.E.	Mercosur
Beef[a]	.	7,146.1	.	87.4%
Poultry[a]	.	561.2	.	6.9%
Sugar[b]	.	7.1	.	0.1%
Ethanol	.	435.2	.	5.3%
Rice[c]	.	25.2	.	0.3%
Cheese	365.1	.	68.8%	.
SMP	127.2	.	24.0%	.
Infant Formula	38.1	.	7.2%	.
TOTAL	530.5	8,174.8	100.0%	100.0%

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 2.4 UE-Mercosur FTA scenario: CO_2-eq emissions from projected volumes of production and trade

Item	---(1,000 t Co2-eq)---
Increased Production	8,605
Increased sea-freight trade	100
TOTAL	8,705

Table 2.5 UE-Mercosur FTA scenario: breakdown of estimated additional CO_2-eq emissions per product and stage of production

Item	LUC and ILUC ---(1,000 t Co_2-eq)---		Farm ---(1,000 t Co_2-eq)---		Post-farm ---(1,000 t Co_2-eq)---		Sea-freight ---(1,000 t Co2-eq)---	Total excluding sea-fright ---(1,000 t Co_2-eq)---		Total including sea-fright ---(1,000 t Co_2-eq)---	
	UE	Mercosur	UE	Mercosur	UE	Mercosur		UE	Mercosur	UE	Mercosur
Beef[a]	.	2155.0	.	4954.9	.	15.2	20.9	.	7125.1	.	7146.1
Poultry[a]	.	222.3	.	274.9	.	40.6	23.5	.	537.7	.	561.2
Sugar[b]	.	2.9	.	2.7	.	0.8	0.7	.	6.5	.	7.1
Ethanol	.	161.3	.	147.3	.	80.7	45.8	.	389.3	.	435.2
Rice[c]	.	.	.	21.0	.	.	4.2	.	21.0	.	25.2
Cheese[d]	.	.	294.4	.	67.4	.	3.4	361.8	.	365.1	.
SMP	.	.	113.1	.	13.0	.	1.1	126.1	.	127.2	.
Infant Formula[e]	.	.	35.1	.	2.7	.	0.3	37.8	.	38.1	.

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 3.1 UE-Mercosur FTA: Current production and trade. Reference year 2018.

Item	Current production ---(1,000 t)---		Bilateral trade (export) ---(1,000 t)---	
	U.E.	Mercosur	U.E.	Mercosur
Beef[a]	7820	14335	.	194
Poultry[a]	12475	15755	.	392
Soybeans	2600	188400	.	7,780
Sugar[b]	20300	36020	.	469
Ethanol	3600	27306	.	101
Rice[c]	2008	9463	.	117
Cheese	10160	1310	3.7	.
SMP	1525	179	0.8	.
Infant Formula	810	.	2.7	.
Butter	2345	128	0.8	.

Sources: production data are from USDA-FAS dataset. Production data for sugar are from USDA-ERS "sugar and sweeteners yearbook". Production data for Cheese and Butter are from USDA-FAS (2019). Production data for SMP from CLAL (EU) and USDA-FAS (2019) for Argentina and Brazil. Production data for ethanol is from RFA (2019). Production data for infant formula are from GIRA (2018). Trade data is from UN comtrade (averages 2016-2018). Ethanol trade data is from Epure (2019).

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 3.2 UE-Mercosur FTA: Estimated impacts on production and trade.

Item	Estimated changes in production ---(1,000 t)---		Estimated changes in bilateral trade (export) ---(1,000 t)---	
	U.E.	Mercosur	U.E.	Mercosur
Beef[a]	.	105.3	.	105.3
Poultry[a]	.	118.1	.	118.1

Item	U.E.	Mercosur	U.E.	Mercosur
Soybeans	.	.	.	.
Sugar[b]	.	10.0	.	10.0
Ethanol	.	548.7	.	548.7
Rice[c]	.	60.0	.	60.0
Cheese	26.3	.	26.3	.
SMP	9.2	.	9.2	.
Infant Formula	2.3	.	2.3	.
Butter	.	.	.	.

Sources: Production estimates for beef and rice are from LSE (2019), conservative scenario. Production estimates for soybeans are from Kirkpatrick and George (2009, p. 35). Production and trade estimates for poultry, sugar, ethanol, cheese, SMP, and infant formula are calculated on the assumption that both production and trade will be equal to the new quotas established by the EU-Mercosur FTA. Trade estimates for beef and rice are calculated assuming that the new quotas will increase trade volumes by the same amount. Production and trade estimates for butter were calculated by assuming that trade volumes will remain constant in monetary terms while the effect of decreasing Mercosur import tariffs by 30% increases the quantity of goods imported for the same amount of money.

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 3.3 Production and trade under UE-Mercosur FTA scenario.

	Estimated production		Estimated Bilateral trade (export)	
Item	---*(1,000 t)*---		---*(1,000 t)*---	
	U.E.	*Mercosur*	*U.E.*	*Mercosur*
Beef[a]	7820	14440	.	299
Poultry[a]	12475	15873	.	510
Soybeans	2600	188400	.	7780
Sugar[b]	20300	36030	.	479
Ethanol	3600	27855	.	650
Rice[c]	2008	9523	.	177
Cheese	10186	1310	30	.
SMP	1534	179	10	.

Item		
Infant Formula	812	.	5	.
Butter	2345	128	.	.

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 3.4 Production and trade under UE-Mercosur FTA scenario (% change with respect to 2018 baseline).

	Estimated production		Estimated Bilateral trade (export)	
Item	---*(percent)*---		---*(percent)*---	
	U.E.	*Mercosur*	*U.E.*	*Mercosur*
Beef[a]	0.0%	0.7%	.	54.4%
Poultry[a]	0.0%	0.7%	.	30.1%
Soybeans	0.0%	0.0%	.	0.0%
Sugar[b]	0.0%	0.0%	.	2.1%
Ethanol	0.0%	2.0%	.	541.8%
Rice[c]	0.0%	0.6%	.	51.2%
Cheese	0.3%	0.0%	710.8%	.
SMP	0.6%	0.0%	1197.0%	.
Infant Formula	0.3%	.	85.2%	.
Butter	0.0%	0.0%	.	.

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) milled rice

Table 4.1 Emission factors

Item	LUC and ILUC $Kg. Co_2$-eq / kg. product		Farm $Kg. Co_2$-eq / kg. product		Post-farm $Kg. Co_2$-eq / kg. product		Sea-freight $Kg. Co_2$-eq / kg.product	Total excluding sea-fright $Kg. Co_2$-eq / kg.product		Total including sea-fright $Kg. Co_2$-eq / kg.product		Source
	UE	Mercosur	UE	Mercosur	UE	Mercosur		UE	Mercosur	UE	Mercosur	
Beef[a]	1.1	20.5	17.2	47.0	0.2	0.1	0.2	18.4	67.7	18.6	67.9	FAO, GLEAM emissions values
Poultry[a]	.	1.9	.	2.3	.	0.3	0.2	.	4.6	.	4.8	FAO, GLEAM emissions values
Soybeans	.	0.1	.	0.3	.	0.7	0.1	.	1.2	.	1.3	Da Silva and van der Werf (2010)
Sugar[b]	.	0.3	.	0.3	.	0.1	0.1	.	0.6	.	0.7	Mekonnen et al. (2018)
Ethanol	.	0.3	.	0.3	.	0.1	0.1	.	0.7	.	0.8	Mekonnen et al. (2018)
Rice	.	.	1.5	0.4	.	.	0.1	1.5	0.4	.	0.4	FAOSTAT
Cheese[d]	.	.	11.2	.	2.6	.	0.1	13.8	.	13.9	.	FAO (2010)
SMP	.	.	12.3	.	1.4	.	0.1	13.7	.	13.8	.	FAO (2010)
Infant Formula[e]	.	.	15.3	.	1.2	.	0.1	16.4	.	16.6	.	Karlsson et al (2019)
Butter	.	.	15.9	.	0.4	.	0.1	16.3	.	16.5	.	FAO (2010); Finnegan et al. (2017)

a) carcass weight equivalent (c.w.e.)

b) sugar raw centrifugal (c.r.w.)

c) ship freight data assumes an average transportation distance of 9945.7 km (Velazco-Bedoya *et al.*, 2013). Data for beef and Poultry were retreived from Opio *et al.* (2013); emissions for soybeans, rice and sugar transportation has been assumed to be 0.007 kgCO2/ton*km, a value typical of large ships carrying solid cargo (Cefic and ECTA, 2011); emissions for ethanol were assumed to be equal to 0.0084 kgCO2/ton*km, a value in line with emissions from chemical tankers (*ibid.*). Emissions for cheese and butter were assumed equal to the average emissions of refiregerated cargo ships (0.0129 kgCO2/ton*km) (*ibid.*). SMP and infant formula were assumed being transported through large conatiners, with emissions equal to 0.0125 kgCO2/ton*km) (*ibid.*).

d) Cheese is assumed to be of cheddar type

e) Data for infant formula refer to France

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