



JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD ADDITIVES

Fifty-third Session

GENERAL STANDARD FOR FOOD ADDITIVES (GSFA)

GENERAL INFORMATION ON THE AVAILABILITY OF DATA RELATED TO NITRATES AND NITRITES

Replies to CL 2021/82 -FA of Brazil, Costa Rica, European Union, Indonesia, Peru, the Republic of Korea and Saudi Arabia

Brazil

Brazil has available data on the following:

- (i) data on natural occurrence of nitrates and nitrites in vegetables and milk from published literature and;
- (ii) monitoring data on levels of nitrates and nitrites in meat products occurring from use as additives.

These data were not provided in the first call of data requested before 15 January 2019 to the GEMS on-line database. However, Brazil could provide these data in case a new call for data is issued.

Costa Rica

Costa Rica thanks the Secretariat of the Codex Committee on Food Additives for the opportunity to comment on the availability of data related to nitrates and nitrites.

In this regard, Costa Rica would like to point out that at the national level there are no studies on the natural presence and/or contamination levels of nitrates and nitrites in food or data on the presence and/or dietary exposure of nitrates and nitrites from all sources.

However, as part of the surveillance work conducted on processed meat products in which these additives are used, Costa Rica has compiled a history of the levels of nitrates and nitrites that are produced from the use of nitrites, which are summarized in Table 1. Annex I contains the complete history for consultation if necessary.

Additionally, it is estimated that the average amount of processed meat products (sausage) consumed by the Costa Rican population is 7.8 kg per person per year, as shown in Table 2.

Table 1. Average results of the sampling of nitrites in the main processed meat products (Sausage) by category, of the Costa Rican market, conducted by the competent authority for surveillance purposes, 2019-2021 period.

Category	Sausage Sample	Residual average NaNO ₂	Residual average NO ₂ ⁻¹
08.3.2	Sausage	88.76	61.98
08.3.2	Mortadella	80.15	53.07
08.2.2	Ham (beef, pork)	61.89	37.86
08.2.2	Turkey ham	36.25	24.15
08.3.2	Salchichón [<i>salami-type sausage</i>]	94.71	63.56
08.3.1	Chorizo [<i>pork sausage</i>]	105.83	70.80
08.2.2	Pepperoni	44.60	19.08

08.3.2	Salami	31.77	21.2
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SOURCE: Codex Costa Rica, with data from the National Animal Health Service (SENASA, MAG-CR).

Table 2. Average consumption of processed meat products (Sausage) by the Costa Rican population, 2nd Semester 2021- 1st Semester 2022.

Sausage Consumption in Costa Rica	Kg/month	g/person*
Jun-21	2,680,776	643
Jul-21	2,689,848	645
Aug-21	2,694,384	646
Sept-21	2,698,920	647
Oct-21	2,703,456	648
Nov-21	2,707,992	649
Dec-21	2,707,992	649
Jan-22	2,703,456	648
Feb-22	2,707,992	649
Mar-22	2,712,528	650
Apr-22	2,721,600	653
May-22	2,766,960	663
TOTAL	32,495,904	7791

SOURCE: Codex Costa Rica, with data from Central America Data and INEC**.

*The value has been adjusted to 80% of the population to reflect only sausage consumers.¹

**According to official data from the National Institute of Statistics and Censuses of Costa Rica (INEC), the projection of the Costa Rican population as of June 30, 2022 is 5,213,362 inhabitants.

On the other hand, a study published by the School of Chemistry of the National University of Costa Rica (UNA) investigated the long-term residual sodium nitrite content in processed meat products in Costa Rica to provide the first estimates of daily nitrite intake. A widely validated analytical procedure was applied for the long-term analysis of 1350 samples from 2014 to 2018. The mean residual sodium nitrite concentration was 76.5 mg kg⁻¹, ranging from < 11 to 278.0 mg kg⁻¹. Significant differences were found between products and meat types, but no temporary differences were observed. Daily nitrite intake was estimated at 0.0122 ± 0.0039 mg kg⁻¹ bw⁻¹ d⁻¹, representing 17.4% of the acceptable daily intake (ADI).²

ANNEX I

Historical record of the results of sampling of nitrites in processed meat products (Sausage) of the Costa Rican market conducted by the competent authority for surveillance purposes, period 2019-2021.

Sample	Report Date:	NaNO ₂	NO ₂ ⁻¹
		<3 mg/kg : DL >11 mg/kg: QL	<3 mg/kg : DL >11 mg/kg: QL
2019			
Sausage (Salchicha)	4/2/2019	21.7± 1.2	14.5± 1.2
Sausage (Salchicha)	4/2/2019	91.5± 2.2	61.0± 2.2
Sausage (Mortadella)	13/2/2019	68.4± 2.23	45.6± 2.3
Sausage (Salchicha)	13/2/2019	<11	<11
Sausage (Ham)	13/2/2019	58.9± 2.4	39.3± 2.4

¹ Araya-Quesada, Y., Jiménez-Robles, A., Ivankovich-Guillén, C., & García-Barquero, M. (2014). Sausage consumption habits in two different geographical areas in Costa Rica. *Revista Tecnología En Marcha*, 27(4), 113–124. <https://doi.org/10.18845/tm.v27i4.2091>.

² Kimberly Ledezma-Zamora, Rolando Sánchez-Gutiérrez, Ailyn Ramírez-Leiva, Leonardo Mena-Rivera, Residual nitrite in processed meat products in Costa Rica: Method validation, long-term survey and intake estimations, *Food Chemistry*, Volume 361, 2021, 130082, ISSN 0308-8146, <https://doi.org/10.1016/j.foodchem.2021.130082>.

Sausage (Salchichón)	18/2/2019	110.6± 2.6	73.8± 2.6
Sausage (Mortadella)	5/3/2019	130.3± 3.2	86.9± 3.2
Sausage (Peperoni)	07/3/2019	<11	<11
Sausage (Chorizo)	07/3/2019	192± 12	128± 12
Sausage (Salchichón)	8/3/2019	119.6± 3.0	79.7± 3.0
Sausage (Chorizo)	15/3/2019	59.3± 2.3	39.6± 2.3
Sausage (Ham)	22/3/2019	79.0 ± 2.4	52.7 ± 2.4
Sausage (Salchicha)	30/4/2019	82.8 ± 2.8	55.2 ± 2.8
Sausage (Ham)	3/5/2019	35.1 ± 2.4	23.4 ± 2.4
Sausage (Salchicha)	6/5/2019	159.6 ± 5.7	106.4 ± 5.7
Sausage (Salchichón)	6/5/2019	51.3 ± 2.3	34.2 ± 2.3
Sausage (Salchicha)	6/4/2019	<11	<11
Sausage (Ham)	8/5/2019	58.2 ± 3.11	38.8 ± 3.1
Sausage (Salchichón)	08/052019	14.3 ± 2.3	<11
Sausage (Salchichón)	3/5/2019	57.9 ± 2.4	38.6 ± 2.4
Sausage (Bacon)	9/5/2019	50.3 ± 3.1	33.6 ± 3.1
Sausage (Ham)	9/5/2019	47.7 ± 7.6	31.8 ± 7.6
Sausage (Salchichón)	13/5/2019	109.2 ± 2.4	72.8 ± 2.4
Sausage (Ham)	13/5/2019	41.0 ± 2.3	27.3 ± 2.3
Sausage (Salchichón)	21/5/2019	78.6 ± 3.2	52.4 ± 3.2
Sausage (Salchichón)	23/5/2019	189.2 ± 9.2	126.1 ± 9.2
Sausage (Salchichón)	23/5/2019	47.2 ± 2.3	31.5 ± 2.3
Sausage (Salchichón)	23/5/2019	119.2 ± 4.3	79.5 ± 4.3
Sausage (Salchichón)	24/5/2019	116.2 ± 7.1	77.5 ± 7.1
Sausage (Salchichón)	28/5/2019	78.7 ± 2.8	52.5 ± 2.8
Sausage (Smoked Chop)	28/5/2019	134.4 ± 5.3	89.7 ± 5.3
Sausage (Mortadella)	28/5/2019	72.5 ± 2.4	48.3 ± 2.4
Sausage (Combo chorizo)	28/5/2019	99.8 ± 2.7	66.5 ± 2.7
Sausage (Salchichón)	3/6/2019	82.0 ± 2.5	54.7 ± 2.5
Sausage (Salchichón)	3/6/2019	<11	< 7.3
Sausage (Peperoni)	4/6/2019	87.1 ± 2.6	58.1 ± 2.6
Sausage (Salchichón)	13/6/2019	79.5 ± 2.3	53.0 ± 2.3
Sausage (Mortadella)	13/6/2019	71.1 ± 2.3	47.4 ± 2.3
Sausage (Salchichón)	14/6/2019	186 ± 17	124 ± 17
Sausage (Salchicha)	19/6/2019	97.9 ± 3.8	65.3 ± 3.8
Sausage (Mortadella)	19/6/2019	128.2 ± 2.3	85.5 ± 2.3
Chunks of Ham Chicken	21/6/2019	45.0 ± 4.7	30.0 ± 4.7
Sausage (Mortadella)	21/6/2019	35.1 ± 2.3	23.4 ± 2.3
Sausage (Turkey Ham)	21/6/2019	30.3 ± 2.4	20.2 ± 2.4
Sausage (Salchichón)	27/6/2019	248.8 ± 6.5	165.9 ± 6.5
Sausage (Chorizo)	27/6/2019	98.0 ± 7.6	65.3 7.6
Sausage (Peperoni)	2/7/2019	< 11	< 7.3
Sausage (Salchichón)	2/7/2019	109.9 ± 5.2	73.3 ± 5.2
Sausage (Ham)	30/7/2019	57.1 ± 4.4	38.1 ± 4.4
Sausage (Salchichón)	7/8/2019	54.2 ± 3.3	36.2 ± 3.8
Sausage (Salchichón)	7/8/2019	10.18 ± 2.5	67.9 ± 2.5
Sausage (Salchichón)	7/8/2019	124.0 ± 3.8	82.7 ± 3.8
Sausage (Ham)	13/6/2019	75.9 ± 4.1	50.6 ± 4.1

Sausage (Ham)	13/6/2019	120.3 ± 4.0	80.2 ± 4.0
Sausage (Salchichón)	12/8/2019	92.0 ± 2.4	61.4 ± 2.4
Sausage (Ham)	12/8/2019	60.3 ± 2.3	40.2 ± 2.3
Sausage (Mortadella)	20/8/2019	197.6 ± 5.1	131.8 ± 5.1
Sausage (Mortadella)	20/8/2019	206.5 ± 9.8	137.7 ± 9.8
Sausage (Salchicha)	20/8/2019	66.3 ± 2.8	44.2 ± 2.8
Sausage (Mortadella)	3/9/2019	<11	<7.3
Sausage (Salchichón)	5/9/2019	102.9 ± 3.5	68.6 ± 3.5
Sausage (Salami)	5/9/2019	26.7 ± 3.0	17.8 ± 3.0
Sausage (Ham)	5/9/2019	72.7 ± 2.6	48.5 ± 2.6
Sausage (Salchichón)	5/9/2019	67.6 ± 4.3	45.1 ± 4.3
Sausage (Mortadella)	10/9/2019	79.0 ± 2.4	40.7 ± 2.4
Sausage (Ham)	17/9/2019	110.5 ± 2.5	73.7 ± 2.5
Sausage (Salchichón)	17/9/2019	99.0 ± 3.6	66.0 ± 3.6
Sausage (Ham)	30/9/2019	21.1 ± 3.1	14.1 ± 3.1
Sausage (Salchichón)	7/10/2019	33.5 ± 3.9	22.4 ± 3.9
Sausage (Mortadella)	7/10/2019	40.9 ± 2.3	27.3 ± 2.3
Sausage (Chorizo)	15/10/2019	92.3 ± 2.8	61.5 ± 2.8
Sausage (Mortadella)	11/10/2019	127.8 ± 6.8	85.2 ± 6.8
Sausage (Salchichón)	11/10/2019	74.5 ± 3.0	49.7 ± 3.0
Sausage (Salchicha)	11/10/2019	144.4 ± 5.5	96.3 ± 5.5
Sausage (Pork Ham))	24/10/2019	63.4 ± 2.8	42.3 ± 2.8
Sausage (Mortadella)	24/10/2019	70.3 ± 2.7	46.9 ± 2.7
Sausage (Salchichón)	24/10/2019	78.5 ± 2.3	52.3 ± 2.3
Sausage (Salchichón)	24/10/2019	68.6 ± 5.5	45.8 ± 5.5
Sausage (Salchichón)	7/11/2019	< 11	< 7.3
Sausage (Salchichón)	7/11/2019	92.5 ± 4.2	61.7 ± 4.2
Sausage (Salchicha)	15/11/2019	107.3 ± 7.9	71.5 ± 7.9
Sausage (Pâté)	15/11/2019	76.4 ± 5.4	50.9 ± 5.4
Sausage (Salchichón)	12/11/2019	89.8 ± 4.9	59.9 ± 4.9
Sausage (Salchicha)	15/11/2019	120.2 ± 2.5	80.1 ± 2.5
Sausage (Salchichón)	15/11/2019	116.5 ± 3.5	77.7 ± 3.5
Sausage (Ham)	26/11/2019	74.2 ± 2.3	49.5 ± 2.3
Sausage (Salami)	6/12/2019	25.9 ± 2.5	17.3 ± 2.5
Sausage (Salchichón)	6/12/2019	133.2 ± 5.1	88.8 ± 5.1
Sausage (Chorizo)	9/12/2019	147.7 ± 9.7	98.5 ± 9.7
Sausage (Salchicha)	9/12/2019	353 ± 43	236 ± 43
Sausage (Salchicha)	9/12/2019	128.6 ± 2.8	85.8 ± 2.8
Sausage (Cooked Ham)	6/12/2019	45.9 ± 3.0	30.6 ± 3.0
2020			
Sausage (Salchicha)	15/1/2020	114.8 ± 2.5	76.5 ± 2.5
Sausage (Salchicha)	15/1/2020	124.9 ± 2.3	83.3 ± 2.3
Sausage (Chorizo)	17/2/2020	113.7 ± 2.6	75.8 ± 2.6
Sausage (Peperoni)	17/2/2020	12.4 ± 2.3	8.3 ± 2.3
Sausage (Salchicha)	27/2/2020	27.1 ± 2.0	18.1 ± 2.0
Sausage (Salchicha)	27/2/2020	66.0 ± 1.9	44.0 ± 1.9
Sausage (Salchicha)	9/3/2020	47.5 ± 1.8	31.7 ± 1.8
Sausage (Salami)	19/03/2020	58.5 ± 2.8	39.0 ± 2.8

Sausage (Chop)	19/03/2020	82.8 ± 3.6	55.2 ± 3.6
Sausage (Mortadella)	19/3/2020	98.5 ± 9.3	65.7 ± 9.3
Sausage (Salchichón)	10/3/2020	152.6 ± 4.2	101.7 ± 4.2
Sausage (Salchichón)	19/3/2020	< 11	< 7.3
Sausage (Mortadella)	19/3/2020	60.9 ± 5.2	40.6 ± 5.2
Sausage (Salchichón)	19/3/2020	126.7 ± 6.4	84.5 ± 6.4
Sausage (Salchichón)	19/3/2020	49.6 ± 6.6	33.1 ± 6.6
Sausage (Salchichón)	19/3/2020	90.1 ± 3.9	60.1 ± 3.9
Sausage (Mortadella)	19/3/2020	51.0 ± 6.5	34.0 ± 6.5
Sausage (Mortadella)	23/4/2020	59.5 ± 1.5	39.7 ± 1.5
Sausage (Ham)	24/3/2020	29.6 ± 2.1	19.7 ± 2.1
Sausage (Salchicha)	24/4/2020	105.7 ± 2.6	70.5 ± 2.6
Sausage (Salchicha)	8/5/2020	18.3 ± 3.3	12.2 ± 3.3
Sausage (Ham)	8/5/2020	120.0 ± 8.0	80.0 ± 8.0
Sausage (Mortadella)	8/5/2020	96.7 ± 5.6	64.5 ± 5.6
Sausage (Salchicha)	25/5/2020	42.5 ± 3.6	28.4 ± 3.6
Sausage (Ham)	25/5/2020	< 11.0	< 7.3
Sausage (Salchichón)	25/5/2020	83.9 ± 3.5	55.9 ± 3.5
Sausage (Ham)	25/5/2020	84.9 ± 2.8	56.6 ± 2.8
Sausage (Chorizo)	25/5/2020	68.8 ± 3.4	45.9 ± 3.4
Sausage (Salchichón)	5/6/2020	150 ± 15	100 ± 15
Sausage (Chop)	5/6/2020	91.6 ± 2.3	61.1 ± 2.3
Sausage (Salchichón)	5/6/2020	131.8 ± 2.8	87.9 ± 2.8
Sausage (Ham)	19/6/2020	35.0 ± 2.8	23.4 ± 2.8
Sausage (Salchichón)	19/6/2020	67.8 ± 2.3	45.2 ± 2.3
Sausage (Mortadella)	19/6/2020	70.7 ± 2.9	47.2 ± 2.9
Sausage (Salchichón)	19/6/2020	132.2 ± 4.1	88.1 ± 4.1
Sausage (Salchichón)	26/6/2020	138.5 ± 7.2	92.4 ± 7.2
Sausage (Salchichón)	9/7/2020	179.2 ± 7.4	119.5 ± 7.4
Sausage (Salchichón)	9/7/2020	118.1 ± 8.6	78.8 ± 8.6
Sausage (Mortadella)	31/7/2020	138.2 ± 2.3	92.2 ± 2.3
Sausage (Salchichón)	13/8/2020	66.7 ± 3.4	44.5 ± 3.4
Sausage (Salchichón)	13/8/2020	107.5 ± 2.3	71.7 ± 2.3
Sausage (Drumstick)	23/9/2020	80.8 ± 2.9	53.9 ± 2.9
Sausage (Salchichón)	5/10/2020	21.1 ± 2.7	14.1 ± 2.7
Sausage (Salchichón)	5/10/2020	57.5 ± 2.3	38.3 ± 2.3
Sausage (Salchichón)	5/10/2020	12.0 ± 2.7	8.0 ± 2.7
Sausage (Salchichón)	5/10/2020	45.1 ± 2.5	30.1 ± 2.5
Sausage (Salchichón)	5/10/2020	19.7 ± 2.6	13.1 ± 2.6
Sausage (Salchichón)	5/10/2020	50.8 ± 2.5	33.8 ± 2.5
Sausage (Salchichón)	5/10/2020	< 11.0	< 7.3
Sausage (Salchichón)	5/10/2020	< 11.0	< 7.3
Sausage (Salchichón)	5/10/2020	< 11.0	< 7.3
Sausage (Salchichón)	5/10/2020	38.9 ± 5.8	25.9 ± 5.8
Sausage (Mortadella)	12/10/2020	93.9 ± 5.5	62.6 ± 5.5
Sausage (Salchichón)	12/10/2020	76.0 ± 4.3	50.7 ± 4.3
Sausage (Mortadella)	9/10/2020	47.2 ± 3.9	31.5 ± 3.9
Sausage (Salchichón)	9/10/2020	78.6 ± 2.2	52.4 ± 2.2

Sausage (Pâté)	9/10/2020	17.4 ± 2.8	11.6 ± 2.8
Sausage (Mortadella)	9/10/2020	91.8 ± 2.5	61.2 ± 2.5
Sausage (Salchichón)	26/10/2020	82.1 ± 4.2	54.7 ± 4.2
Sausage (Salchichón)	29/10/2020	91.3 ± 6.2	60.9 ± 6.2
Sausage (Bacon)	29/10/2020	57.8 ± 12.0	38.6 ± 12.1
Sausage (Salchichón)	26/10/2020	77.7 ± 5.7	51.8 ± 5.7
Sausage (Salchicha)	26/10/2020	66.5 ± 2.4	44.3 ± 2.4
Sausage (Salchichón)	06/ 11/ 02020	134.4 ± 5.2	89.6 ± 5.2
Sausage (Salchichón)	06/ 11/ 02020	120.9 ± 8.8	80.6 ± 8.8
Sausage (Salchicha)	06/ 11/ 02020	25.4 ± 2.4	16.9 ± 2.4
Sausage (Salchichón)	06/ 11/ 02020	119.1 ± 2.3	79.4 ± 2.3
Sausage (Pâté)	10/11/2020	23.7 ± 2.4	15.8 ± 2.4
Sausage (Mortadella)	10/11/2020	13.1 ± 2.7	8.8 ± 2.7
Sausage (Salchichón)	19/11/2020	104.8 ± 2.3	69.9 ± 2.3
Sausage (Salchichón)	19/11/2020	115.4 ± 2.6	77.0 ± 2.3
Sausage (Salchichón)	19/11/2020	100.3 ± 2.3	66.9 ± 2.3
Sausage (Salchichón)	19/11/2020	111.2 ± 2.3	74.2 ± 2.3
Sausage (Salchichón)	20/11/2020	64.9 ± 2.9	43.3 ± 2.8
Sausage (Mortadella)	20/11/2020	73.6 ± 2.9	49.1 ± 2.9
Sausage (Ham)	20/11/2020	< 11.0	< 7.3
Sausage (Mortadella)	20/11/2020	72.1 ± 2.3	48.1 ± 2.3
Sausage (Mortadella)	20/11/2020	67.9 ± 3.6	45.3 ± 3.6
Sausage (Ham)	20/11/2020	12.2 ± 2.3	8.2 ± 2.3
Sausage (Salchicha)	3/12/2020	21.7 ± 2.7	14.5 ± 2.7
Sausage (Breakfast Salchicha)	3/12/2020	106.7 ± 2.3	71.2 ± 2.3
Sausage (Salchichón)	3/12/2020	114.1 ± 2.5	76.1 ± 2.5
Sausage (Salchichón)	3/12/2020	45.9 ± 2.9	30.6 ± 2.9
Sausage (Salchichón)	14/12/2020	130.2 ± 5.7	86.8 ± 5.7
Sausage (Pâté)	14/12/2020	72.8 ± 2.6	48.5 ± 2.6
Sausage (Chorizo)	14/12/2020	198.7 ± 4.5	132.5 ± 4.5
Sausage (Pâté)	9/12/2020	13.4 ± 2.6	9.0 ± 2.6
Sausage (Salchicha)	9/12/2020	89.3 ± 5.3	59.5 ± 5.3
Sausage (Ham)	14/12/2020	81.7 ± 3.5	54.5 ± 3.5
2021			
Sausage (Salchichón)	8/1/2021	74.6 ± 2.3	49.8 ± 2.3
Sausage (Salchichón)	8/1/2021	108.5 ± 2.5	72.4 ± 2.5
Sausage (Salchichón)	8/1/2021	91.0 ± 2.2	60.7 ± 2.2
Sausage (Salchichón)	8/1/2021	114.2 ± 4.0	76.2 ± 4.0
Sausage (Chorizo)	18/1/2021	92.4 ± 2.4	61.6 ± 2.4
Sausage (Salchichón)	18/1/2021	116.9 ± 2.3	78.0 ± 2.3
Sausage (Salchichón)	18/1/2021	146.5 ± 2.8	97.7 ± 2.8
Sausage (Mortadella)	18/1/2021	107.7 ± 2.3	71.8 ± 2.3
Sausage (Pâté)	22/1/2021	31.4 ± 2.7	21.0 ± 2.7
Sausage (Salchichón)	4/2/2021	30.6 ± 2.3	20.4 ± 2.3
Sausage (Salchichón)	3/2/2021	85.5 ± 2.7	57.0 ± 2.7
Sausage (Drumstick)	3/2/2021	51.6 ± 2.7	34.4 ± 2.7
Sausage (Chorizo)	4/2/2021	71.9 ± 2.3	48.0 ± 2.3
Sausage (Salchicha)	4/2/2021	119.0 ± 4.4	79.4 ± 4.4

Sausage (Salchichón)	4/2/2021	121.5 ± 2.3	81.0 ± 2.3
Sausage (Salchichón)	3/2/2021	< 11.0	< 7.3
Sausage (Salchichón)	4/2/2021	70.9 ± 2.8	47.3 ± 2.8
Sausage (Chorizo)	4/2/2021	111.3 ± 3.7	74.2 ± 3.7
Sausage (Salchicha)	16/2/2021	99.9 ± 2.9	66.6 ± 2.9
Sausage (Salchichón)	15/2/2021	104.4 ± 6.4	69.6 ± 6.4
Sausage (Mortadella)	22/2/2021	126 ± 15	84 ± 15
Sausage (Ham)	22/2/2021	85.8 ± 3.6	57.2 ± 3.6
Sausage (Ham)	1/3/2021	48.9 ± 2.3	32.6 ± 2.3
Chunks of Ham Chicken	5/3/2021	31.9 ± 2.2	21.2 ± 2.2
Sausage (Salchichón)	1/3/2021	91.3 ± 2.3	60.9 ± 2.3
Sausage (Salchichón)	1/3/2021	113.0 ± 2.3	75.3 ± 2.3
Sausage (Salchichón)	5/3/2021	82.2 ± 2.4	54.8 ± 2.4
Sausage (Salchichón)	5/3/2021	131.8 ± 2.6	87.9 ± 2.6
Sausage (Mortadella)	9/3/2021	104.4 ± 2.2	69.6 ± 2.2
Sausage (Mortadella)	9/3/2021	75.7 ± 2.9	50.5 ± 2.9
Sausage (Mortadella)	9/3/2021	65.3 ± 2.3	43.5 ± 2.3
Sausage (Pâté)	9/3/2021	< 11.0	< 7.3
Sausage (Salchichón)	9/3/2021	182.7 ± 4.9	121.9 ± 4.9
Sausage (Salchichón)	9/3/2021	160.4 ± 2.7	107.0 ± 2.7
Sausage (Salchichón)	15/3/2021	< 11.0	< 7.3
Sausage (Salchichón)	15/3/2021	61.8 ± 2.6	41.2 ± 2.6
Sausage (Chop)	15/3/2021	117.0 ± 2.3	78.0 ± 2.3
Sausage (Salchichón)	15/3/2021	73.7 ± 3.0	49.1 ± 3.0
Sausage (Salchichón)	15/3/2021	23.9 ± 2.8	16.0 ± 2.8
Sausage (Salchichón)	19/3/2021	166.9 ± 4.8	111.3 ± 4.8
Sausage (Salchichón)	19/3/2021	169.4 ± 5.2	112.9 ± 5.2
Sausage (Salchichón)	19/3/2021	131.2 ± 2.6	87.5 ± 2.6
Sausage (Salchichón)	24/3/2021	144.0 ± 4.5	96.0 ± 4.5
Sausage (Chop)	24/3/2021	64 ± 11	42 ± 11
Sausage (Salchichón)	26/3/2021	97.9 ± 3.0	65.3 ± 3.0
Sausage (Pâté)	26/3/2021	36.6 ± 2.2	24.4 ± 2.2
Sausage (Salchichón)	24/3/2021	85.5 ± 3.0	57.0 ± 3.0
Sausage (Mortadella)	26/3/2021	89.8 ± 6.2	59.9 ± 6.2
Sausage (Chop)	26/3/2021	16.7 ± 2.2	11.1 ± 2.2
Sausage (Salchichón)	6/4/2021	193.4 ± 4.5	129.0 ± 4.5
Sausage (Salchichón)	13/4/2021	128.0 ± 5.0	85.3 ± 5.0
Sausage (Salchichón)	13/4/2021	119.9 ± 6.1	80.0 ± 6.1
Sausage (Ham)	15/4/2021	20.8 ± 2.2	13.9 ± 2.2
Sausage (Mortadella)	19/4/2021	120.7 ± 6.6	80.5 ± 6.6
Sausage (Salchicha)	19/4/2021	100.7 ± 2.5	67.1 ± 2.5
Sausage (Salchichón)	19/4/2021	100.0 ± 2.2	66.7 ± 2.2
Sausage (Salchichón)	19/4/2021	151.5 ± 2.7	101.0 ± 2.7
Sausage (Salchichón)	21/4/2021	124.1 ± 2.3	82.7 ± 2.3
Sausage (Salchichón)	19/4/2021	146.3 ± 2.6	97.6 ± 2.6
Sausage (Salchichón)	19/4/2021	131.0 ± 3.1	87.3 ± 3.1
Sausage (Salchichón)	19/4/2021	51.8 ± 2.3	34.5 ± 2.3
Sausage (Salchicha)	23/4/2021	60.0 ± 2.6	40.0 ± 2.6

Sausage (Salchichón)	23/4/2021	37.8 ± 2.2	25.2 ± 2.2
Sausage (Pâté)	23/4/2021	< 11.0	< 7.3
Sausage (Pâté)	23/4/2021	62.7 ± 3.2	41.8 ± 3.2
Sausage (Chop)	26/4/2021	120.3 ± 7.1	80.2 ± 7.1
Sausage (Salchichón)	26/4/2021	< 11.0	< 7.3
Sausage (Salchichón)	26/4/2021	80.1 ± 3.7	53.4 ± 3.7
Sausage (Salchichón)	26/4/2021	39.5 ± 3.2	26.4 ± 3.2
Sausage (Salchichón)	26/4/2021	118.9 ± 3.8	79.1 ± 3.8
Sausage (Salchichón)	29/4/2021	110.2 ± 2.2	73.5 ± 2.2
Sausage (Salchichón)	29/4/2021	117.9 ± 3.3	78.6 ± 3.3
Sausage (Salchichón)	29/4/2021	132.8 ± 2.7	88.5 ± 2.7
Sausage (Meatloaf)	5/5/2021	122.6 ± 2.4	81.4 ± 2.4
Sausage (Mortadella)	5/5/2021	37.0 ± 2.3	24.7 ± 2.3
Sausage (Salchichón)	5/5/2021	118.1 ± 3.4	78.7 ± 3.4
Sausage (Salchichón)	5/5/2021	117.0 ± 2.4	78.0 ± 2.4
Sausage (Salchichón)	5/5/2021	115.7 ± 5.1	77.2 ± 5.1
Sausage (Salchichón)	5/5/2021	52.2 ± 3.3	34.8 ± 3.3
Sausage (Mortadella)	5/5/2021	90.9 ± 4.5	60.6 ± 4.5
Sausage (Mortadella)	5/5/2021	119.1 ± 2.3	79.4 ± 2.3
Sausage (Salchichón)	5/5/2021	93.7 ± 2.2	62.5 ± 2.2
Sausage (Salchichón)	10/5/2021	92.9 ± 2.3	61.9 ± 2.3
Sausage (Salchichón)	10/5/2021	82.7 ± 2.5	55.1 ± 2.5
Sausage (Chop)	10/5/2021	< 11.0	< 7.3
Meatloaf	17/5/2021	28.1 ± 1.7	18.8 ± 1.7
Sausage (Salchicha)	17/5/2021	126.8 ± 1.4	84.6 ± 1.4
Sausage (Salchichón)	17/5/2021	136.4 ± 1.5	90.9 ± 1.5
Sausage (Salchichón)	17/5/2021	157.2 ± 1.6	104.8 ± 1.6
Sausage (Salchichón)	17/5/2021	148.9 ± 5.2	99.3 ± 5.2
Sausage (Salchichón)	17/5/2021	105.6 ± 1.6	70.4 ± 1.6
Sausage (Salchichón)	17/5/2021	84.8 ± 1.5	56.6 ± 1.5
Sausage (Salchichón)	17/5/2021	79.3 ± 1.9	52.9 ± 1.9
Sausage (Mortadella)	17/5/2021	105.3 ± 2.5	70.2 ± 2.5
Sausage (Mortadella)	17/5/2021	62.3 ± 2.9	41.5 ± 2.9
Sausage (Salchichón)	17/5/2021	74.7 ± 2.3	49.8 ± 2.3
Sausage (Salchichón)	17/5/2021	98.8 ± 3.4	65.9 ± 3.4
Sausage (Salchichón)	17/5/2021	68.8 ± 1.8	45.9 ± 1.8
Sausage (Salchichón)	20/5/2021	110.7 ± 5.1	73.8 ± 5.1
Sausage (Salchichón)	20/5/2021	98.5 ± 1.5	65.7 ± 1.5
Sausage (Salchichón)	24/5/2021	256 ± 10	171 ± 10
Sausage (Mortadella)	24/5/2021	38.0 ± 1.5	25.3 ± 1.5
Sausage (Salchichón)	31/5/2021	111.0 ± 1.4	74.0 ± 1.4
Sausage (Salchichón)	31/5/2021	127.9 ± 7.1	85.3 ± 7.1
Sausage (Salchichón)	31/5/2021	113.0 ± 1.6	75.3 ± 1.6
Sausage (Salchichón)	31/5/2021	160.6 ± 3.4	107.1 ± 3.4
Sausage (Salchichón)	31/5/2021	106.0 ± 3.2	70.7 ± 3.2
Chunks of Ham Chicken	11/6/2021	29.6 ± 1.5	19.8 ± 1.5
Sausage (Salchichón)	11/6/2021	184.7 ± 3.0	123.1 ± 3.0
Sausage (Chorizo)	18/6/2021	55.5 ± 1.4	37.0 ± 1.4

Sausage (Ham)	18/6/2021	13.7 ± 1.4	9.2 ± 1.4
Sausage (Salchicha)	18/6/2021	143.8 ± 4.3	95.9 ± 4.3
Sausage (Salchichón)	22/6/2021	87.0 ± 2.6	58.0 ± 2.6
Sausage (Salchichón)	22/6/2021	73.9 ± 1.4	49.3 ± 1.4
Sausage (Salchichón)	22/6/2021	89.0 ± 2.4	59.4 ± 2.4
Sausage (Salchichón)	25/6/2021	100.1 ± 1.4	66.7 ± 1.4
Sausage (Salchichón)	25/6/2021	123.1 ± 2.3	82.1 ± 2.3
Sausage (Chorizo)	1/7/2021	81.0 ± 1.8	54.0 ± 1.8
Sausage (Salchicha)	1/7/2021	135.2 ± 1.6	90.1 ± 1.6
Sausage (Salchicha)	1/7/2021	98.4 ± 2.0	65.6 ± 2.0
Sausage (Mortadella)	1/7/2021	30.7 ± 1.4	20.5 ± 1.4
Sausage (Salchichón)	12/7/2021	127.1 ± 3.3	84.8 ± 3.3
Sausage (Mortadella)	12/7/2021	97.3 ± 2.0	64.9 ± 2.0
Sausage (Salchichón)	12/7/2021	110.1 ± 2.3	73.4 ± 2.3
Sausage (Salchichón)	12/7/2021	34.6 ± 1.5	23.1 ± 1.5
Sausage (Salchichón)	12/7/2021	26.6 ± 1.4	17.8 ± 1.4
Sausage (Salchichón)	12/7/2021	27.5 ± 3.6	18.4 ± 3.6
Sausage (Salchichón)	12/7/2021	36.1 ± 2.3	24.1 ± 2.3
Sausage (Salchichón)	12/7/2021	19.0 ± 3.1	12.6 ± 3.1
Sausage (Salchichón)	16/7/2021	53.5 ± 5.7	35.7 ± 5.7
Sausage (Salchicha)	16/7/2021	72.0 ± 6.9	48.0 ± 6.9
Sausage (Salchichón)	16/7/2021	104.8 ± 1.5	69.9 ± 1.5
Sausage (Mortadella)	23/7/2021	77.8 ± 1.6	51.9 ± 1.6
Sausage (Salchichón)	23/7/2021	92.5 ± 1.4	61.7 ± 1.4
Sausage (Peperoni)	23/7/2021	101.5 ± 1.9	67.7 ± 1.9
Sausage (Salchichón)	23/7/2021	78.1 ± 4.9	52.1 ± 4.9
Sausage (Chop)	23/7/2021	< 11.0	< 7.3
Sausage (Breakfast Salchicha)	23/7/2021	76.1 ± 2.9	50.8 ± 2.9
Sausage (Salchichón)	23/7/2021	46.1 ± 1.4	30.8 ± 1.4
Sausage (Bacon)	13/8/2021	< 11.0	< 7.3
Sausage (Salchichón)	13/8/2021	81.2 ± 1.5	54.1 ± 1.5
Sausage (Pressed Ham)	20/8/2021	22.1 ± 1.5	14.7 ± 1.5
Sausage (Mortadella)	23/8/2021	66.7 ± 2.3	44.5 ± 2.3
Sausage (Mortadella)	23/8/2021	50.2 ± 3.1	33.5 ± 3.1
Sausage (Salchichón)	3/9/2021	109.2 ± 3.1	72.8 ± 3.1
Sausage (Ham)	6/9/2021	36.4 ± 1.6	24.2 ± 1.6
Sausage (Salchichón)	6/9/2021	96.0 ± 5.1	64.0 ± 5.1
Sausage (Salchichón)	14/9/2021	111.7 ± 2.0	74.5 ± 2.0
Sausage (Mortadella)	22/9/2021	67.5 ± 1.5	45.0 ± 1.5
Sausage (Mortadella)	29/9/2021	88.7 ± 2.5	59.2 ± 2.5
Sausage (Chicken Breast)	28/9/2021	< 11.0	< 7.3
Sausage (Chunks of Ham Chicken)	18/10/2021	51.6 ± 1.8	34.4 ± 1.8
Sausage (Salchichón)	18/10/2021	99.3 ± 3.4	66.2 ± 3.4
Sausage (Salchicha)	18/10/2021	122.7 ± 1.5	81.8 ± 1.5
Sausage (Salchicha)	18/10/2021	104.1 ± 1.7	69.4 ± 4.7
Sausage (Turkey Ham)	22/10/2021	42.2 ± 1.4	28.1 ± 1.4
Sausage (Salchicha)	22/10/2021	114.0 ± 2.3	76.0 ± 2.3
Sausage (Salchicha)	22/10/2021	108.4 ± 1.6	72.3 ± 1.6

Sausage (Salchicha)	1/11/2021	88.9 ± 1.6	59.3 ± 1.6
Sausage (Chop)	1/11/2021	46.8 ± 1.5	31.2 ± 1.5
Sausage (Salchichón)	1/11/2021	104.3 ± 1.8	156.4 ± 1.8
Sausage (Salchichón)	1/11/2021	141.9 ± 4.1	94.6 ± 4.1
Sausage (Ham)	1/11/2021	38.4 ± 1.6	25.6 ± 1.6
Sausage (Chorizo)	1/11/2021	142.3 ± 4.1	94.9 ± 4.1
Sausage (Ham)	1/11/2021	132.3 ± 4.7	88.2 ± 4.7
Sausage (Salchichón)	8/11/2021	45.2 ± 1.4	30.2 ± 1.4
Sausage (Salchicha)	8/11/2021	77.9 ± 2.1	52.0 ± 2.1
Sausage (Salchicha)	8/11/2021	32.4 ± 2.7	21.6 ± 2.7
Sausage (Salchichón)	8/11/2021	67.6 ± 2.9	45.1 ± 2.9
Sausage (Chorizo)	8/11/2021	91.1 ± 5.4	60.7 ± 5.4
Sausage (Chorizo)	8/11/2021	94.1 ± 5.1	62.8 ± 5.1
Sausage (Ham)	15/11/2021	12.8 ± 2.0	8.5 ± 2.0
Sausage (Ham)	15/11/2021	111.9 ± 1.5	74.6 ± 1.5
Sausage (Salchichón)	15/11/2021	76.7 ± 2.4	51.2 ± 2.4
Sausage (Salchichón)	22/11/2021	92.4 ± 4.2	61.6 ± 4.2
Sausage (Mortadella)	22/11/2021	< 11.0	< 7.3
Sausage (Salchichón)	22/11/2021	79.0 ± 3.2	52.7 ± 3.2
Beef (pizza meat)	22/11/2021	59.7 ± 2.7	39.8 ± 2.7
Sausage (Salchicha)	22/11/2021	29.0 ± 3.3	19.3 ± 3.3
Sausage (Ham)	22/11/2021	101.6 ± 1.4	67.8 ± 1.4
Sausage (Bacon)	30/11/2021	< 11.0	< 7.3
Sausage (Ham)	30/11/2021	130.2 ± 5.9	86.8 ± 5.9
Sausage (Ham)	30/11/2021	59.0 ± 2.9	39.3 ± 2.9
Sausage (Mortadella)	30/11/2021	33.7 ± 2.1	22.5 ± 2.1
Sausage (Ham)	30/11/2021	100.0 ± 6.6	66.7 ± 6.6
Sausage (Salchichón)	30/11/2021	69.3 ± 3.1	46.2 ± 3.1
Sausage (Salchichón)	30/11/2021	25.0 ± 1.1	16.7 ± 1.1
Sausage (Salchichón)	30/11/2021	163.3 ± 1.6	108.9 ± 1.6
Sausage (Salchicha)	30/11/2021	114.0 ± 2.1	76.0 ± 2.1
Sausage (Chorizo)	30/11/2021	94.8 ± 4.9	63.2 ± 4.9
Sausage (Salchichón)	30/11/2021	83.0 ± 1.4	55.4 ± 1.4
Sausage (Ham)	6/12/2021	34.8 ± 1.7	23.2 ± 1.7
Sausage (Salchichón)	6/12/2021	94.3 ± 4.2	62.9 ± 4.2
Sausage (Mortadella)	6/12/2021	67.8 ± 2.0	45.2 ± 2.0
Sausage (Salchichón)	9/12/2021	123.7 ± 3.5	82.5 ± 3.5
Sausage (Chop)	15/12/2021	85.1 ± 6.0	56.7 ± 6.0
Sausage (Salchichón)	15/12/2021	62.6 ± 3.2	41.7 ± 3.2
Sausage (Chop)	15/12/2021	39.7 ± 1.7	26.5 ± 1.7
Sausage (Salchicha)	15/12/2021	102 ± 11	68 ± 11
Sausage (Salchicha)	15/12/2021	81.9 ± 1.5	54.6 ± 1.5
Sausage (Chop)	15/12/2021	176 ± 18	118 ± 18
Sausage (Salchichón)	15/12/2021	171 ± 11	114 ± 11
Sausage (Salami)	15/12/2021	16.0 ± 1.5	10.7 ± 1.5

SOURCE: National Service of Animal Health (SENASA, MAG-CR).

European Union

The European Union (EU) would like to provide the following comments:

The EU's reply to the previous Circular Letter (CL 2019/49-FA) is captured in CX/FA 21/52/10³. This reply remains valid.

In addition, since the previous reply some new relevant data has become available including the new opinion of the French Agency for Food, Environmental and Occupational Health & Safety on the risks associated with the consumption of nitrites and nitrates. This opinion notably covers exposure levels of French population on nitrates/nitrites used as food additives and the exposure from drinking water and plant consumption.

The opinion is available in English⁴ and the detailed report in French⁵. The section covering population exposure can be found in the report, on pages 141-146.

Indonesia

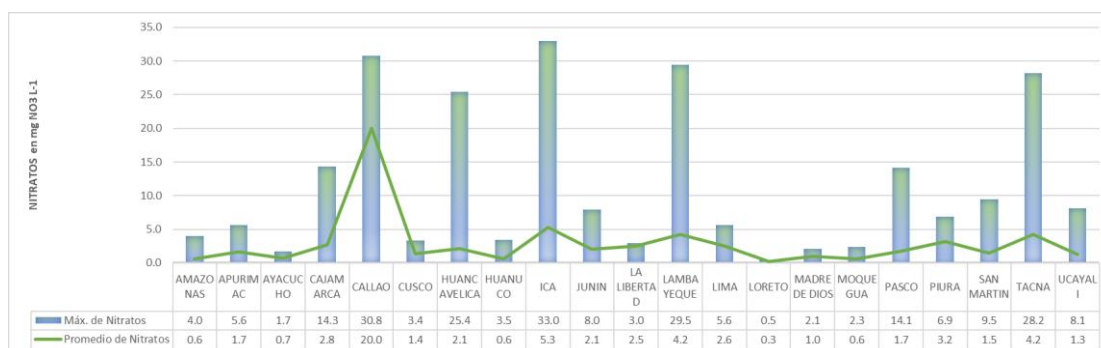
Indonesia has submitted comments on this issue as included in the document CX/FA 21/52/10 on General Standard for Food Additives (GSFA) - General Information on the availability of data related to Nitrates and Nitrites.

Peru

Peru has the Regulation on Water Quality for Human Consumption approved by Supreme Decree No.031-2010-SA which establishes the maximum permissible limits for inorganic and organic parameters in Annex III of the regulation with as maximum permissible limit of 50 mg of Nitrate per litre of water and 3 mg of Nitrite per litre of water in short exposure and 0.2 mg of Nitrite per litre of water in prolonged exposure.

The General Office of Control and Surveillance of the General Directorate of Environmental Health and Food Safety (DIGESA) carries out surveillance and supervision, in accordance with current regulations, in order to identify and control the physical, chemical and biological risk factors external to the person in terms of environmental health and food safety; in that sense it has carried out the sampling and analysis of 1136 water samples taken at different points in different departments of the country during the years 2020, 2021 and so far in 2022. The samples were taken in populated areas, reservoirs, treatment plants, basins and homes. The results show that the levels of nitrates and nitrites in water for human consumption are within the maximum permissible limits established in national regulations, as we can see in figure No.1 whose minimum level of nitrate per litre of water obtained in the department of Loreto was 0.5 and the maximum level of nitrate per litre of water in the city of Ica was 33. We should remember that the maximum limit is fifty, and as it can be seen the other results are in that range; on the other hand, it can be seen that the average is well below the maximum limit.

Figure 1: Maximum and average nitrates per department during the years 2020, 2021 and 2022



Source: DIGESA-DCOVI

In figure 2 it can be seen that the minimum level of Nitrites in short exposure per litre of water obtained in Lima was 0.01 and the maximum level of Nitrites in short exposure per litre of water in Pasco was 1.8. We should remember that the maximum limit is three; it can be seen that the other results are in that range therefore they

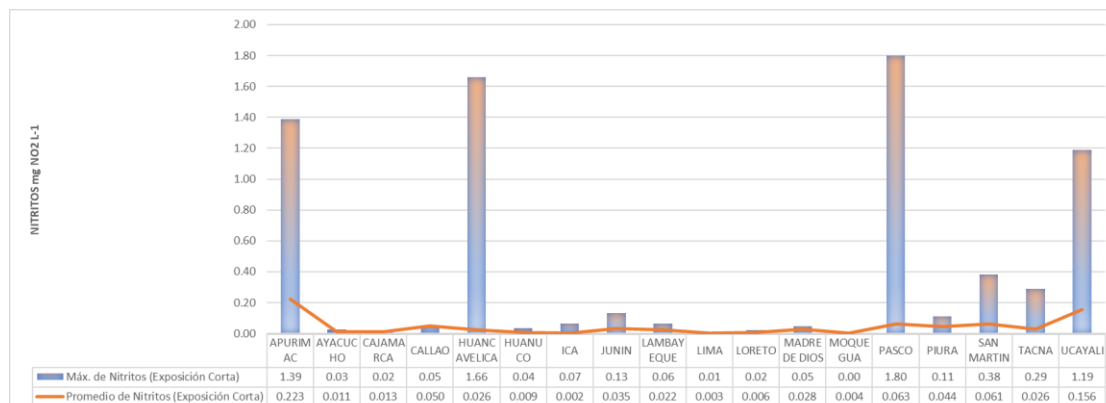
³ https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-711-52%252F2021SepWD%252Ffa52_10e.pdf

⁴ <https://www.anses.fr/en/system/files/ERCA2020SA0106EN.pdf>

⁵ <https://www.anses.fr/fr/system/files/ERCA2020SA0106Ra.pdf>

are within the maximum permissible limits; on the other hand, it can be seen that the average is well below the maximum limit.

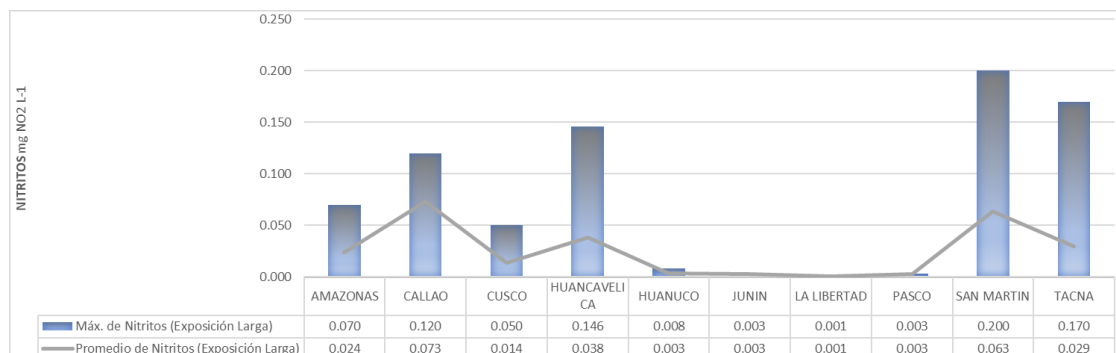
Figure 2: Maximum and average Nitrites in short exposure per department during the years 2020, 2021 and 2022



Source: DIGESA-DCOVI

In figure 3 it can be seen that the minimum level of Nitrites in prolonged exposure per litre of water obtained in La Libertad was 0.001 and the maximum level of Nitrites in prolonged exposure per litre of water in San Martin was 0.20. We should remember that the maximum limit is 0.20; it can be seen that the other results are in that range therefore they are within the maximum permissible limits; on the other hand, it can be seen that the average is well below the maximum limit.

Figure 3: Maximum and average Nitrites in prolonged exposure per department during the years 2020, 2021 and 2022



Source: DIGESA-DCOVI

IN RELATION TO FOOD

In Peru, the Regulation on Health Surveillance and Control of Food and Beverages approved by Supreme Decree No. 007-98/SA establishes that additives intended for the manufacture of food and beverages must meet the health quality requirements established by the Ministry of Health, and points out that the use of food additives that are not included in the list of additives allowed by the Codex Alimentarius is prohibited; in this sense the Health Authority at national level on Food Safety for industrialized foods DIGESA⁶ grants certification for marketing to those industrialized foods that comply with the aforementioned regulation; according to the information provided by the Directorate of Certifications and Authorizations to date there are 582 registered products (in force) to which nitrates (INS 251, INS 252) and nitrites (INS 249, INS 250) have been added for their preparation, observing a higher percentage (85.05%) in the use of Sodium Nitrite (INS 250) followed by a long numerical distance from the use of Potassium Nitrate (INS 252) with 7.73% and Sodium Nitrate (INS 251) with 4.30% as shown in Table No.1.

⁶ General Directorate of Environmental Health and Food Safety of the Ministry of Health

TABLE No 1: PERCENTAGE OF REGISTERED INDUSTRIALIZED FOODS TO WHICH NITRATES (INS 251, INS 252) AND NITRITES (INS 249, INS 250) HAVE BEEN ADDED

ADDITIVES (INS NUMBER)	PRODUCTS WITH CURRENT SANITARY REGISTRATION (%)
Potassium nitrite 249	1,03%
Sodium nitrite 250	85,05%
Sodium nitrate 251	4,30%
Potassium nitrate 252	7,73%
Sodium Nitrite/Potassium Nitrate 250/252	1,89%
Overall Total	100,00%

Source: VUCE Database⁷

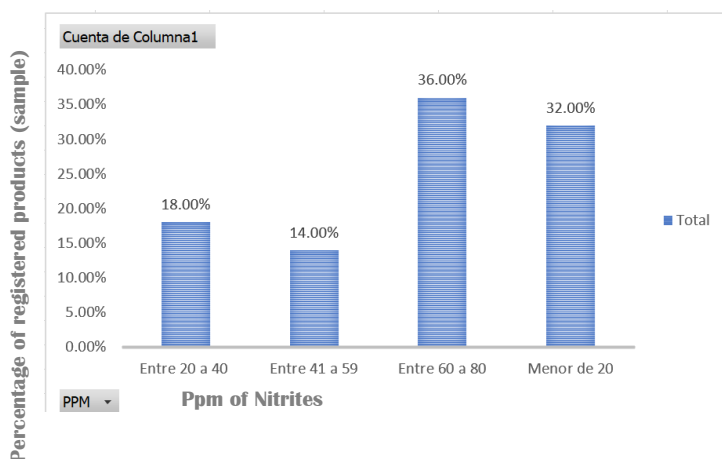
Regarding the amount of added additive⁸ for the preparation of these registered products, a higher percentage (36.08%) is observed in which less than 20 ppm was added and 26.63% to which between 20 ppm and 40 ppm was added; to which between 60 ppm and 80 ppm of these additives were added represent 23.54% and to which between 41 ppm and 59 ppm were added represent 13.75% as we can see in Table No.2, observing that all are in accordance with the General Standard for Food Additives, CODEX STAN 192-1995 adopted in 2019.

TABLE 2: PERCENTAGE OF INDUSTRIALIZED FOODS BY ADDED AMOUNT OF NITRATES (INS 251, INS 252) AND NITRITES (INS 249, INS 250)

ADDED AMOUNT OF NITRATES AND NITRITES (PPM)	PRODUCTS WITH CURRENT SANITARY REGISTRATION (%)
Between 20 and 40	26,63%
Between 41 and 59	13,75%
Between 60 and 80	23,54%
Less than 20	36,08%
Overall total	100,0%

Source: VUCE Database

FROM THE ANALYSIS OF RESIDUAL NITRITE IN REGISTERED FOODS



⁷ VUCE: acronym of the Single Window of Foreign Trade, that is an integrated system that through electronic means allows the parties involved in foreign trade and international transport, to exchange the information required or relevant for the entry, exit or transit of goods and means of transport to or from the national territory, as well as allows users to manage documentation and information regarding the procedures and services related to foreign trade that are processed by the system.

⁸ In accordance with the provisions of the National Sanitary Registration procedure which is stipulated in the current regulations

In addition, in the registered products, the residual nitrite level was reviewed, for which a sample from 86% confidence level and estimation error of 0.1 was obtained, whose results indicate that there is a higher percentage (36.00%) in the samples that have a level of 60 to 80 ppm of nitrites, followed by 32.00% in the samples with a content of less than 20 ppm and with 18% whose samples contain between 20 and 40 ppm of nitrites as we can see in Table 2, observing that all comply with the provisions of the General Standard for Food Additives, CODEX STAN 192-1995 adopted in 2019.

It should be noted that the information provided is based on the certifications granted by the National Health Authority on Food Safety for industrialized foods (DIGESA), which were issued during the years 2016 to 2022 (the Food Health Registration Certificate has a validity of 5 years), in addition it contemplates the Certificates issued in 2016 in force until 2021 (with extended validity for one additional year by the state of emergency according to national legislation).

Republic of Korea

(i) Contents and dietary exposure of nitrites from processed foods (MFDS 2019)

Sodium nitrite (INS 250), sodium nitrate (INS 251) and potassium nitrate (INS 252) except potassium nitrite (INS 249) are authorized as food additives in Korea.

The **Table 1** below shows the results of analyzing the nitrite contents from processed foods (136 cases) labeled as using nitrates and nitrites (sodium nitrite(INS 250), sodium nitrate(INS 251), potassium nitrate(INS 252)).

The levels of nitrite in various food products are shown in column of 'Average of detected samples' in Table 1, in which the nitrite levels are in the range of 0.2 to 6.8 mg/kg. The highest level of nitrite is found in the food category of 08.3, while the lowest level in the food category of 09.3.2.

Table 1. Contents of nitrite in processed foods

Food Category	Food Type	Number of Samples	Number of detected samples	Contents of nitrite (mg/kg)			
				Min	Max	Average of samples ¹⁾	Average of detected samples ²⁾
07.0	Breads	12	8	N.D ³⁾	8.0	2.4	3.5
08.2	Bacon	14	14	0.4	17.3	4.3	4.3
	Hams	49	48	N.D	33.9	6.3	6.4
	Seasoned meats	11	4	N.D	2.2	0.3	0.8
	Dried meats	10	6	N.D	1.7	0.5	0.8
08.3	Sausages	30	30	0.4	29.9	6.8	6.8
09.3.2	Pickled fish in brine	10	5	N.D	0.6	0.1	0.2
Total		136	115	N.D	33.9	4.5	5.3

¹⁾ Average of total samples ²⁾ Average of nitrite-detected samples ³⁾ Not Detected

The **Table 2** shows the results of evaluating the dietary exposure using the nitrite content analysis results above. The current acceptable daily intake(ADI) for nitrites is 0.07 mg/kg bw/day.

Table 2. Dietary exposure to nitrite from processed foods based on analytical data

	Estimated daily intake of nitrites (mg/kg bw/day)	%ADI ¹⁾
Total	0.0012	1.652
Male	0.0013	1.814
Female	0.0011	1.494
1-2 years	0.0023	3.302
3-6 years	0.0042	6.027
7-12 years	0.0034	4.854
13-19 years	0.0022	3.076
20-64 years	0.0012	1.639
≥ 65 years	0.0002	0.240

¹⁾ $EDI/ADI \times 100$

The **Table 3 and 4** shows the results of evaluating the dietary exposure to nitrite by food category.

Table 3. Dietary exposure to nitrite (Unit: mg/kg bw/day)

Food Category	Food Type	Total	Male	Female	1-2 years	3-6 years	7-12 years	13-19 years	20-64 years	65 over
07.0	Breads	0.0001	0.0000	0.0001	0.0004	0.0003	0.0002	0.0001	0.0000	0.0000
08.2	Bacon	0.0004	0.0005	0.0004	0.0007	0.0015	0.0012	0.0008	0.0004	0.0001
	Hams	0.0000	0.0000	-	-	-	0.0000	-	0.0000	-
	Seasoned meats	0.0000	0.0000	-	-	-	-	0.0000	-	-
	Dried meats	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-	0.0000	-
08.3	Sausages	0.0007	0.0007	0.0006	0.0012	0.0024	0.0019	0.0012	0.0007	0.0001
09.3.2	Pickled fish in brine	0.0000	-	0.0000	-	-	-	-	0.0000	-

Table 4. Risk characterization of nitrite (Unit: %ADI)

Food Category	Food Type	Total	Male	Female	1-2 years	3-6 years	7-12 years	13-19 years	20-64 years	65 over
07.0	Breads	0.077	0.069	0.085	0.573	0.487	0.287	0.177	0.063	0.005
08.2	Bacon	0.610	0.674	0.547	1.059	2.150	1.753	1.123	0.611	0.091
	Hams	0.003	0.007	-	-	-	0.047	-	0.002	-
	Seasoned meats	0.001	0.001	-	-	-	-	0.008	-	-
	Dried meats	0.001	0.001	0.002	0.000	0.003	0.005	-	0.001	-
08.3	Sausages	0.961	1.063	0.861	1.669	3.387	2.763	1.769	0.963	0.144
09.3.2	Pickled fish in brine	0.000	-	0.000	-	-	-	-	0.000	-

(ii) Surveys of natural occurrence and contamination levels of nitrite in foods (MFDS 2011, 2014)

The Table 5 shows the results of analyzing naturally occurring nitrite contents from unprocessed foods frequently used in Korea.

Table 5. Naturally occurring nitrite contents in unprocessed foods

Food Category	Main category	Sub-category	Number of samples	Number of detected samples	Contents of nitrite (mg/kg)		Note ¹⁾
					Min	Max	
04.1.1.1	Fruits	Fruits	66	41	N.D	6.0	Tangerine, persimmon, jujube, lemon, fig, pear, peach, apple, apricot, orange, plum, grapefruit, cherry, grape, dried goji berry
		Tropical fruits	15	10	N.D	1.1	Mango, banana, avocado, kiwi, pineapple
04.2.1.1	Vegetables	Leafy vegetables	73	65	N.D	15.7	Pepper leaves, beet, perilla leaves, radish, goldenrod, lettuce, mung bean sprout, spinach, crown daisy, young radish, chamnamul, chamchwi, pak choi, chwinamul, kale, parsley, pumpkin leaves
		Leaf and stem vegetables	66	39	N.D	16.2	Sweet potato vines, sedum, fatsia, stem of garlic, radish sprouts, water dropwort, chives, celery, asparagus, kohlrabi, bean sprouts, green onion
		Root and tuber vegetables	58	34	N.D	9.5	Carrot, deodeok, balloon flower roots, radish, Chinese yam, garlic, beet, ginger, onion, winter cabbage, lotus root, burdock, chicory, taro
		Fruiting vegetables, Cucurbits	28	14	N.D	5.0	Melon, watermelon, cucumber, Korean melon, pumpkin
		Fruiting vegetables, other than Cucurbits	39	27	N.D	5.1	Eggplant, chili pepper, tomato, paprika, bell pepper

		Flowerhead brassica vegetables	20	17	N.D	4.6	Chinese cabbage, broccoli, cabbage, cauliflower
	Nuts and seeds	Nuts	20	17	N.D	1.8	Peanut, chestnut, almond, ginkgo nut, pine nut, walnut
	Roots and tubers	Roots and tubers	8	8	0.2	2.4	Potato, sweet potato
	Mushrooms and fungi	Mushrooms	26	11	N.D	0.7	Oyster mushroom, pine mushroom, enoki mushroom, oak mushroom
	Pulses and legumes	Pulses and legumes	20	18	N.D	3.2	Kidney bean, mung bean, soybean, pea, adzuki bean, black soybean
06.1	Cereals	Cereals	23	23	0.3	3.8	Rice, corn
08.1.1	Meat	Beef	81	7	N.D	7.2	
		Pork	77	22	N.D	1.13	
		Chicken meat	53	7	N.D	1.92	
		Duck meat	39	2	N.D	0.2	
09.1.1	Fresh fish	Fish	51	33	N.D	4.8	Flatfish, cutlass fish, mackerel, pacific saury, cod, frozen Pollack, Pollack, croaker, pomfret, Spanish mackerel, salmon, rockfish, red seabream, yellow croaker
09.1.2	Fresh molluscs, crustaceans, and echinoderms	Molluscs	3	3	0.2	0.4	Shrimp
		Crustaceans	6	5	N.D	0.9	Octopus, squid
		Clams	40	32	N.D	13.9	Scallop, oyster, clam, short-necked clam, manila clam, top shell, freshwater snail, abalone, jackknife clam, mussel
10.1	Eggs	Eggs	14	7	N.D	7.5	Egg, quail egg

¹⁾ All kinds of analysis samples

Saudi Arabia

There is shortage of data on nitrate and nitrite levels added intentionally in food. Results of around 40 food samples (processed meat) are available, all of which are below the permitted maximum level mentioned in (SFDA.FD 2500:2021" [Food Additives permitted in food](#)). Other available data are concerning nitrate and nitrite levels in bottled water. Current dietary exposure to nitrates and nitrites from their use as food additives is based on GEMS/Food cluster diets using maximum permitted level exposure assessment scenario.