

MONITORING OF MORTALITY IN BELGIAN HONEYBEE COLONIES 2021-2022

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FASFC GT Varroa, 14/12/2022

Object

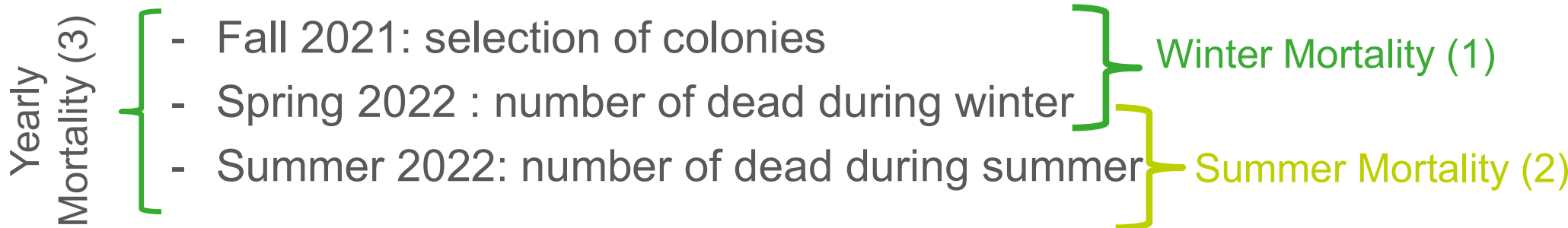
- Continuation of the program of surveillance of honeybee colonies health launched by FASFC in 2016.
- Monitoring mortality in honeybee colony in Belgium, across the country and over time.

Method : Sampling

- Population frame:
 - 9056 registered beekeepers in Belgium at the time of sampling:
 - ~5400 in Flanders
 - ~3500 in Wallonia
 - ~ 200 in Brussels
- Sampling :
 - 2 stage sampling :
 - ~ 25 apiaries per LCU
 - 1 to 6 colonies per apiary (only strong colonies)

Method: Data collection

- 3 visits :



- Data collected:

- Number of colonies alive, dead, sold, potential reason of death, feeding strategy, treatment(s), years of experience, affiliation to a beekeeping federation.
- Merged or weak colonies considered as dead.

Method : Statistical analysis

- Winter mortality

- Colony mortality (Pi_{v2}):

$$Pi_{v2} = \frac{dead_{v2}}{mi_{v1}}$$

- Weighed Colony Sample Mortality (WCSM) :

$$WCSM = \frac{\sum(Mi_{v1} * Pi_{v2})}{\sum Mi_{v1}}$$

- Summer mortality

- $Pi_{v3} = \frac{dead_{v3}}{mi_{v2}}$

- Year mortality

- $Pi_{vy} = \frac{dead_{v2} + dead_{v3}}{mi_{v1}}$

Method: Data 'cleaning'

Raw sample : 803 colonies selected in 194 apiaries.

For winter :

- 6 suppressions for lack of data
 - 1 in Liège
 - 1 in Flandre Occidentale
 - 4 in Hainaut
- 1 in Hainaut for non-valid data
 - > final dataset of 772 colonies in 187 apiaries.

For summer:

- 15 apiaries with 100% winter mortality + 1 lost of sight.
 - > dataset of 586 colonies in 171 apiaries

For year:

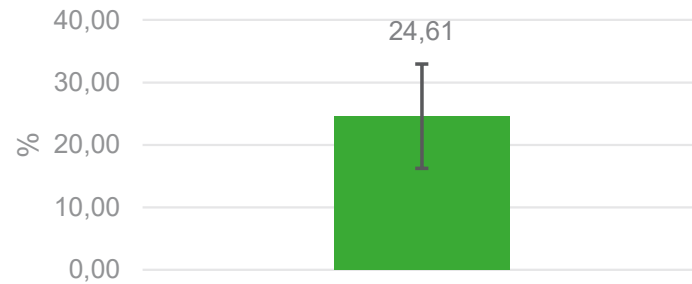
-> 171 apiaries and 724 colonies

Result : Sample description

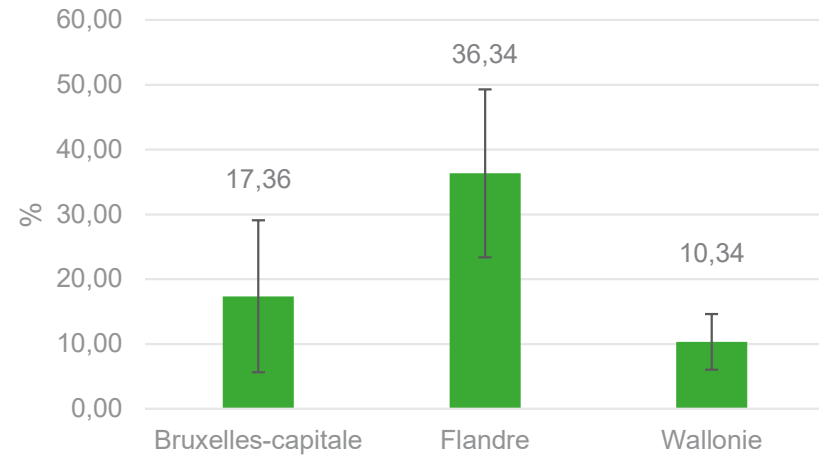
Geographical Entity	Beekeepers in population	Selected apiaries	Total colonies within selected apiaries	Selected colonies
Belgium	9056	187	1435	772
Flanders	5368	94	781	385
Wallonia	3481	85	630	365
Brussels	207	8	24	22
Antwerp	1460	24	179	100
East-Flanders	1175	24	139	90
Limburg	984	14	205	63
FI Brabant	960	10	90	52
West Flanders	789	22	168	80
Hainaut	873	13	101	53
Liege	743	23	152	80
Luxembourg	627	22	158	102
Namur	796	14	108	63
Wal Brabant	442	13	111	67

Results : Winter mortality 2021-2022

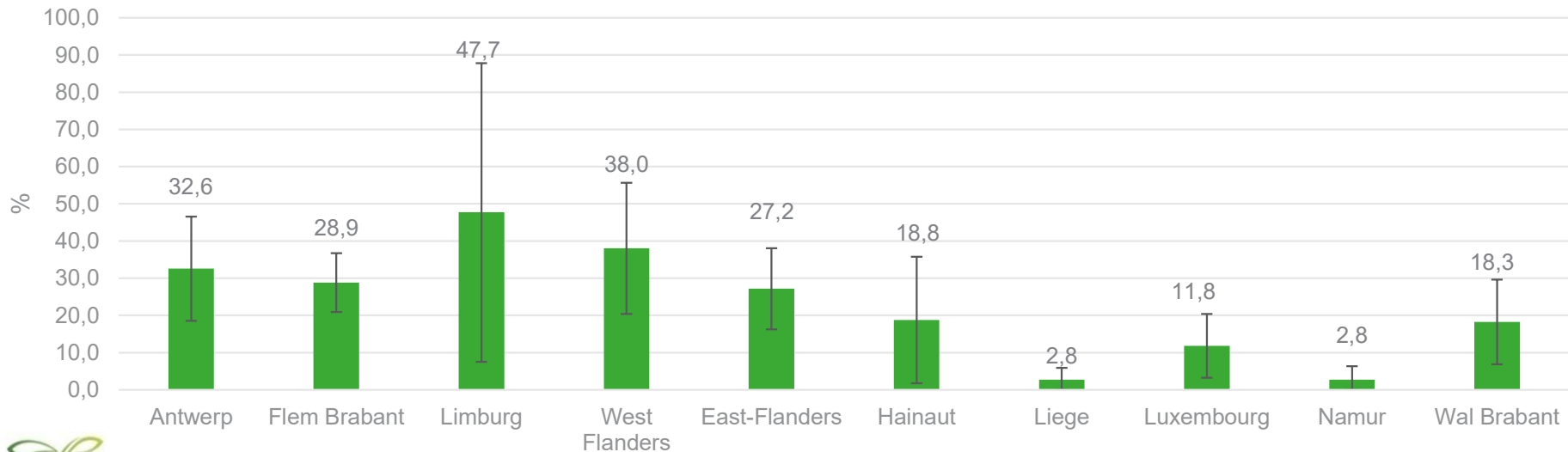
Belgium Winter Mortality



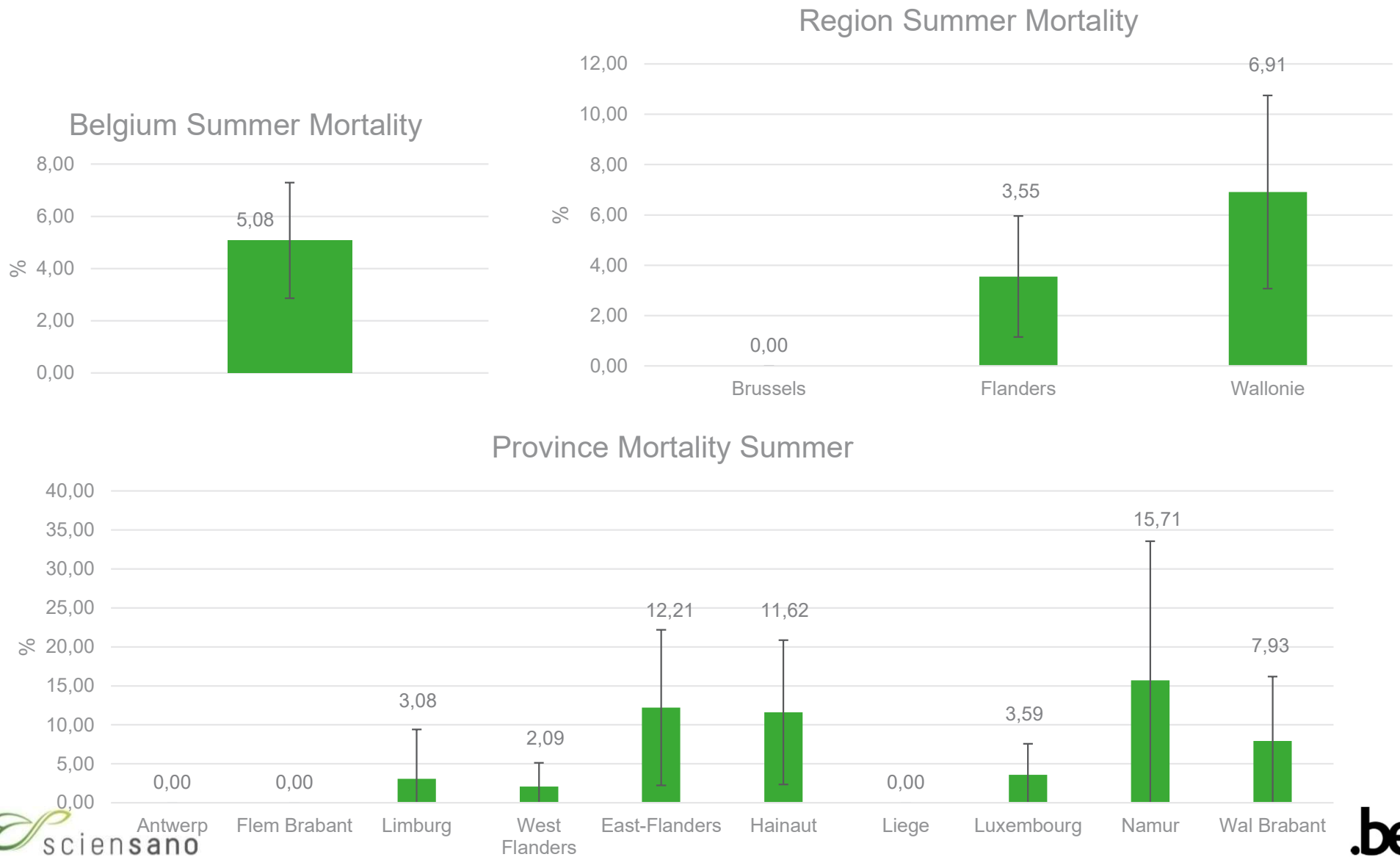
Region Winter Mortality



Province Winter Mortality

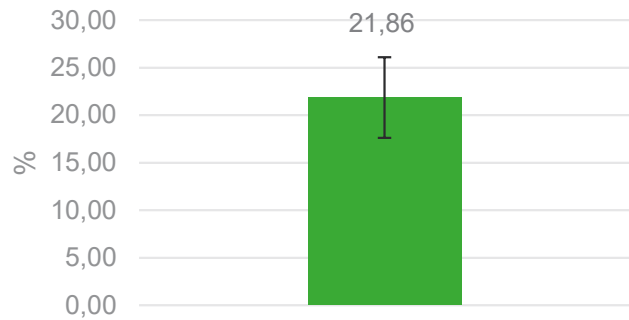


Result: Summer mortality 2022

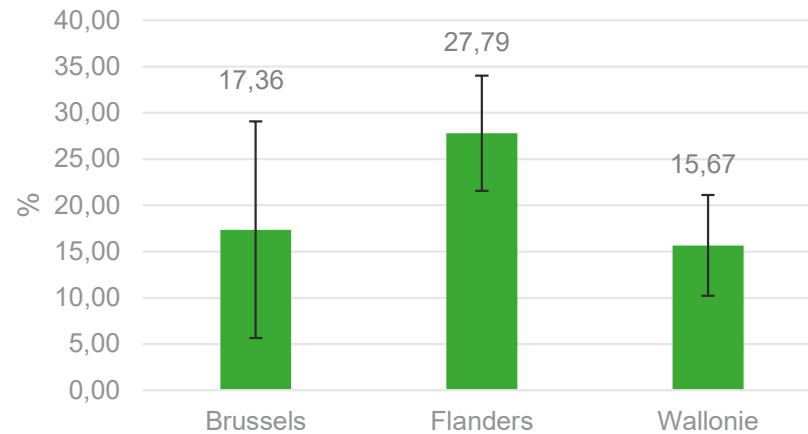


Results: Year mortality 2021-2022

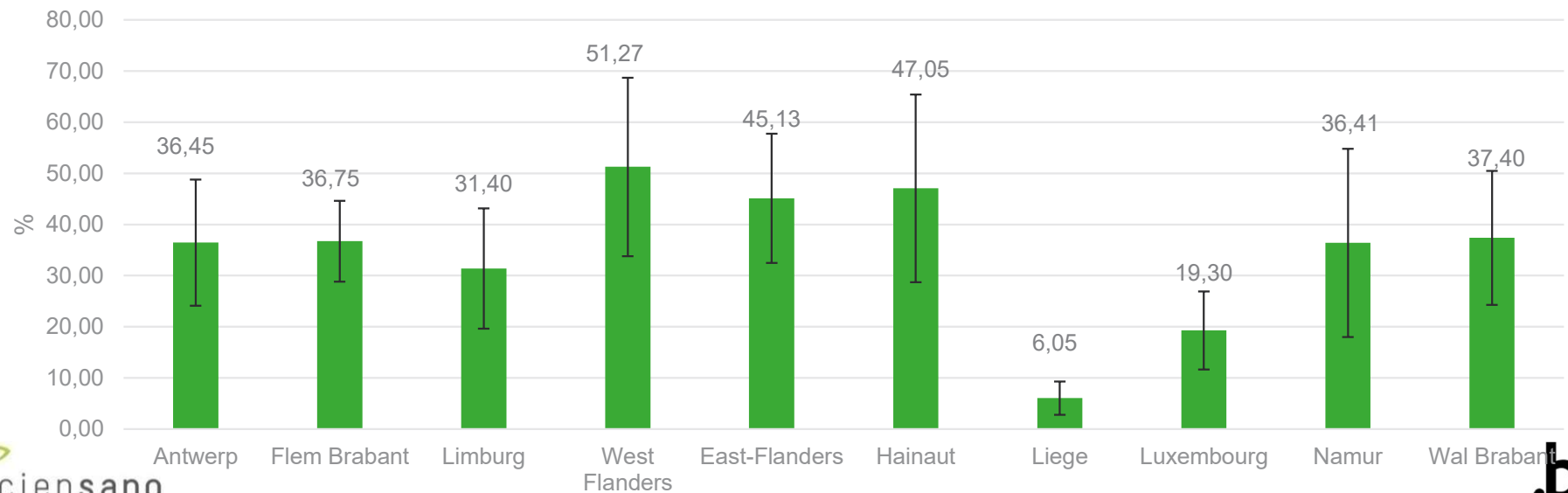
Belgium Mortality Year



Region Year Mortality

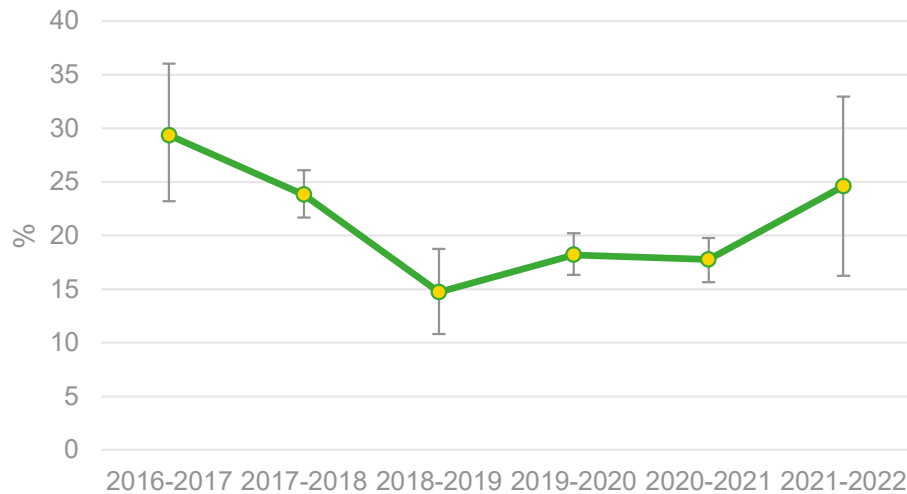


Province Year Mortality

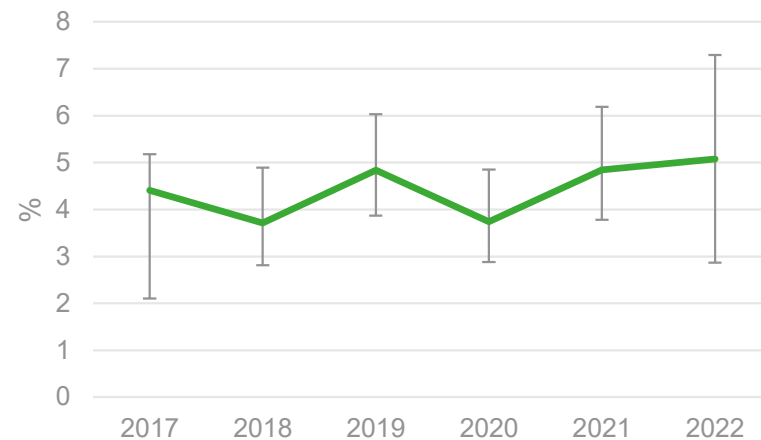


Evolution Belgium Mortality

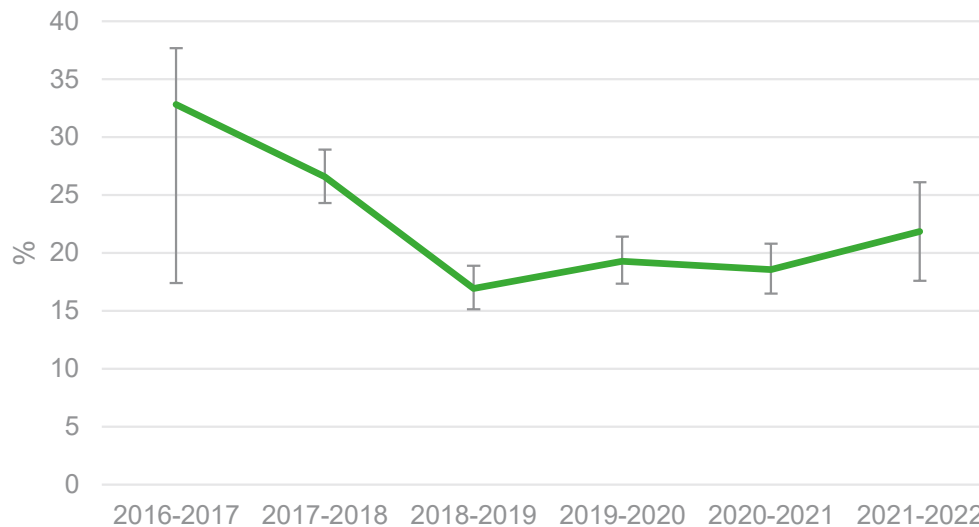
Belgium Winter Mortality



Belgium Summer mortality

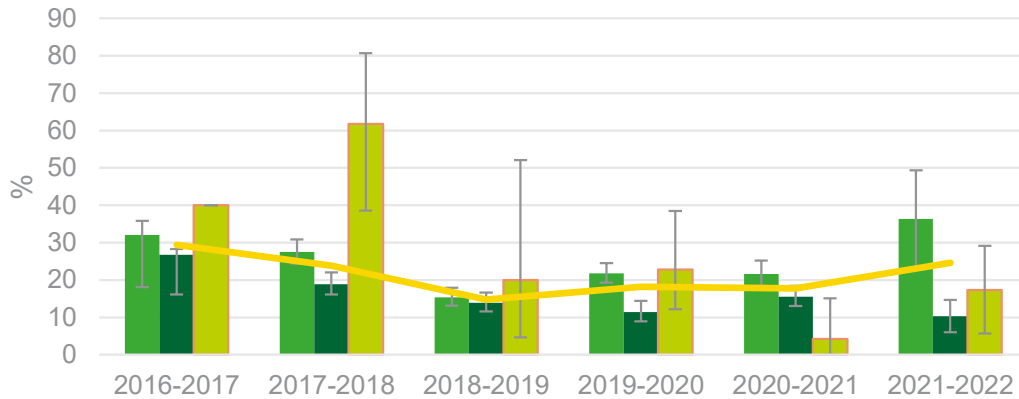


Belgium Year mortality

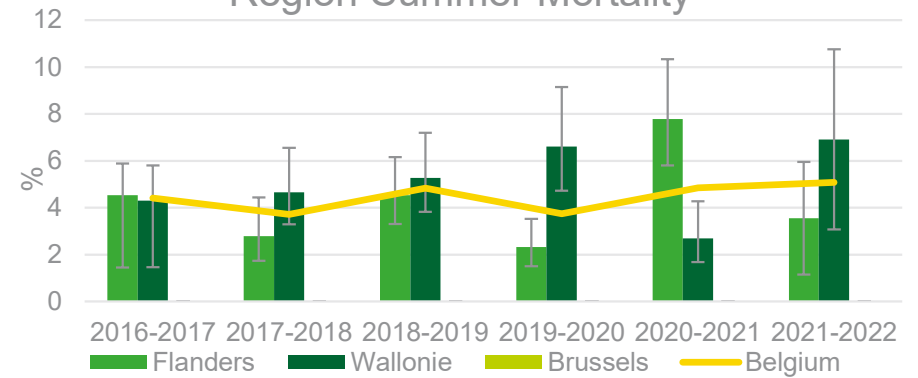


Evolution Region Mortality

Region Winter Mortality

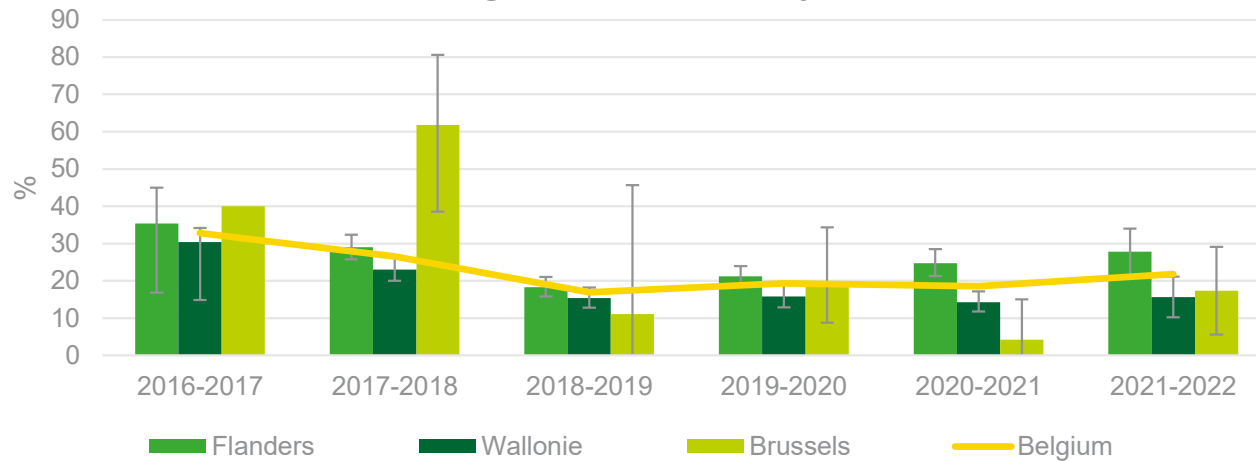


Region Summer Mortality



■ Flanders
 ■ Wallonie
 ■ Brussels
 — Belgium

Region Year Mortality

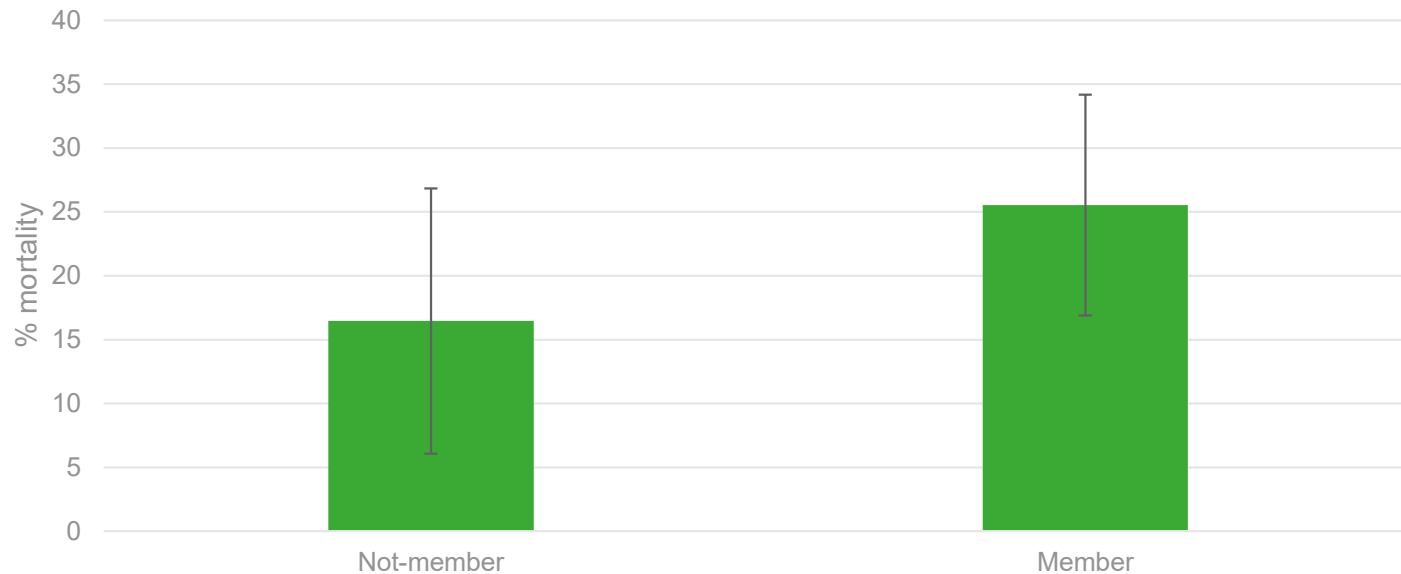


■ Flanders
 ■ Wallonie
 ■ Brussels
 — Belgium

Result :Impact of affiliation to a beekeeping federation?

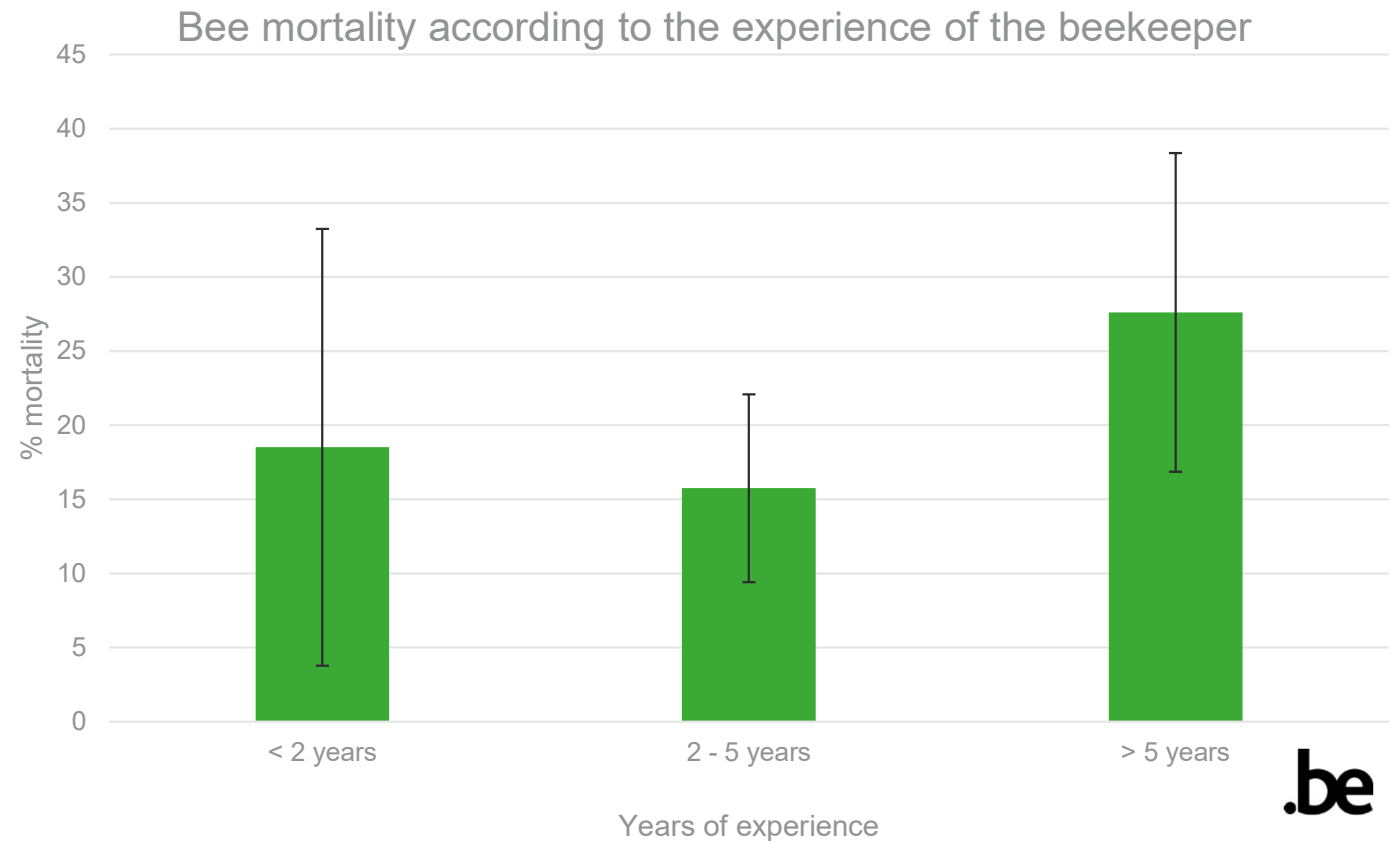
	N	Mean	95%IC	p-value
Not-member	24	16.46	6.07 26.85	NS
Member	163	25.54	16.9 34.19	

Mortality according to affiliation to a beekeeping federation.



Results : Impact of years of experience

	N	Mean	95%IC	p-value
< 2 years	15	18.51	3.78 - 33.24	ns
2 - 5 years	52	15.75	9.42 - 22.08	
> 5 years	120	27.61	16.87 - 38.35	



Winter mortality numbers for 2020-2021 and 2021-2022.

Overwintering weighted colony mortality from Fall to Spring							
Geographical entity	Sampled apiaries 2021	Sampled colonies 2021	2021-2022			2020-2021	
			%	95% CI		%	95% CI
Belgium	187	772	24.6	16.3	33.0	17.76	15.66 19.76
Brussels	8	22	17.4	5.6	29.1	4.26	0.00 15.04
Flanders	94	385	36.3	23.4	49.3	21.62	18.44 25.18
Wallonie	85	365	10.3	6.0	14.6	15.54	13.05 18.40
Antwerp	24	100	32.6	18.6	46.6	14.83	9.75 21.84
Flemish Brabant	10	52	28.9	21.0	36.7	25.82	17.89 35.72
Waals Brabant	13	67	18.3	6.9	29.6	11.93	6.69 20.13
West-Flanders	22	80	38.0	20.4	55.7	21.97	15.20 30.64
East-Flanders	24	90	27.2	16.2	38.1	22.57	16.32 30.34
Hainaut	13	53	18.8	1.8	35.8	11.07	7.10 16.76
Liege	23	80	2.8	0	5.9	16.22	11.12 23.01
Limburg	14	63	47.7	7.6	87.9	25.33	17.78 34.71
Luxembourg	22	102	11.8	3.2	20.4	21.80	16.06 28.88
Namur	14	63	2.8	0.0	6.4	15.56	10.33 22.68

Summer mortality numbers for 2020-2021 and 2021-2022.

Weighted colony mortality from Spring to Summer								
Geographical entity	Sampled apiaries	Sampled colonies	2022			2021		
			%	95% CI		%	95% CI	
Belgium	171	586	5.08	2.86	7.29	4.85	3.78	6.19
Brussels	8	18	0.00	0.00	0.00	0.00	NA	NA
Flanders	80	254	3.55	1.15	5.95	7.78	5.81	10.33
Wallonie	83	314	6.91	3.07	10.75	2.70	1.68	4.28
Antwerp	18	61	0.00	0.00	0.00	4.62	1.92	9.92
Flemish Brabant	10	37	0.00	0.00	0.00	3.08	0.60	9.35
Waals Brabant	13	54	7.93	0	16.19	4.82	1.69	11.47
West-Flanders	18	51	2.09	0.00	5.13	25.51	18.16	34.57
East-Flanders	22	62	12.21	2.23	22.19	2.96	0.00	7.63
Hainaut	13	42	11.62	2.36	20.88	1.96	0.00	5.87
Liege	22	74	0.00	0.00	0.00	0.00	NA	NA
Limburg	12	43	3.08	0.00	9.42	3.30	0.00	9.65
Luxembourg	21	84	3.59	0	7.56	5.03	2.42	9.77
Namur	14	60	15.71	0.00	33.56	1.55	0.00	5.83

Yearly mortality 2020-2021 and 2021-2022

Weighted colony mortality from Fall to Summer								
Geographical entity	Sampled apiaries	Sampled colonies	2021-2022			2020-2021		
			%	95% CI		%	95% CI	
Belgium	171	724	21.86	17.61	26.11	18.55	16.49	20.80
Brussels	8	22	17.36	5.63	29.09	4.26	0.38	15.04
Flanders	80	345	27.79	21.57	34.02	24.77	21.35	28.54
Wallonie	83	357	15.67	10.21	21.13	14.29	11.80	17.20
Antwerp	18	82	24.11	11.77	36.45	14.74	9.58	21.93
Flemish Brabant	10	52	28.85	20.96	36.75	28.39	20.11	38.42
Waals Brabant	13	67	24.29	11.19	37.40	16.49	10.25	25.33
West-Flanders	18	72	33.82	16.38	51.27	39.44	30.69	48.92
East-Flanders	22	86	32.47	19.81	45.13	23.48	17.09	31.34
Hainaut	13	53	28.71	10.37	47.05	10.26	6.29	16.18
Liege	22	77	2.82	0	6.05	6.38	2.97	12.60
Limburg	12	53	19.62	7.83	31.40	20.15	13.11	29.60
Luxembourg	21	97	11.66	4.01	19.30	23.69	17.72	30.90
Namur	14	63	18.02	0	36.41	12.92	8.09	19.89

**Thank you for your
attention.**