



# Mycotoxins in feed

## Key findings of the FEFAC data collection

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# FEFAC in a nutshell

- Created in 1959
- Industrial compound feed and premixtures manufacturers
- 25 Members:
  - 21 Member Associations from 20 EU Member States
  - 2 Observer members (Turkey, Switzerland)
  - 2 Associate Members (FHL, EMFEMA)
- Represents 60% of the EU compound feed production
- 6 Technical committees to assist the FEFAC Council
  - Animal Nutrition
  - Industrial Compound Feed Production
  - Premix & Mineral Feed
  - European Feed Manufacturers Guide (EFMC)
  - Fish Feed
  - Milk Replacers

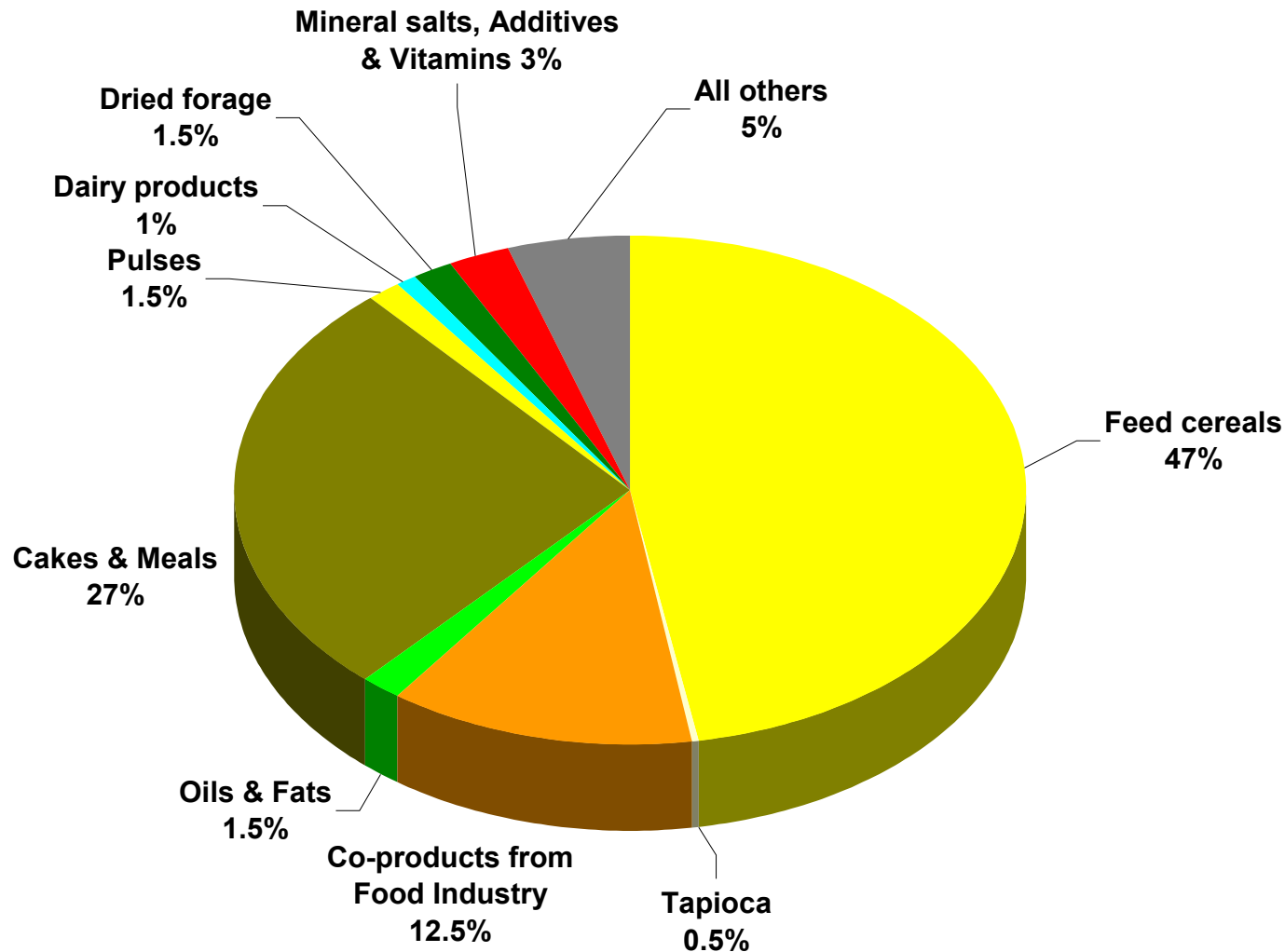
# FEFAC database

- Source: 9 FEFAC Member Associations + 1 pan European company
  - Collective monitoring plan: UK, FR, IT, DE, BE, FI
  - Company auto-controls: EU company, SK, ES, SE data
- Mycotoxins: DON, ZEN, FUM, OTA, T2, HT2 but rarely all of them
- Feed: cereals, (60%) cereals by-products (17%), other feed materials (7%), compound feed (14%)
- Sampling stage: feed companies for the vast majority
- Sampling method: Not harmonised – information on sampling method sometimes provided
- Analytical method: Not harmonised – information on analytical method sometimes provided (ELISA, HPLC, GCMS)
- Period: 2004-2007 (some data for 2001-2003 as well)

# Overview on origin of data

	Total samples	DON	ZEA	FUM B1+B2	T2	HT2	T2+HT2	OTA
UE company	2.108	970	1.903	16	0	0	0	399
Belgium	829	829	829	749	0	0	14	492
France	3.476	2.703	1.043	797	490	31	16	413
Spain	362	230	292	138	17	0	64	262
UK	140	101	105	0	101	101	101	35
Germany	3.120	3.008	1.381	2	9	9	9	38
Finland	1.004	999	617	0	272	217	202	22
Sweden	125	125	99	0	41	18	0	0
Slovakia	334	319	174	13	24	0	0	18
Italy	896	557	359	654	0	0	102	133
Total	12.394	9.841	6.802	2.369	954	376	508	1.812

# Feed material consumption by the EU-25 feed industry in 2006



# Values as from which some precautions must be taken

- A feed is made at 60% of cereals and cereals by-products
- Complying with guidance values from finished feed does not pose problems when using feed materials contaminated up to lowest guidance value for compound feed / 0.6
- Example for DON:
  - Lowest guidance value is 0.9 ppm for pigs
  - No problem with feed materials contaminated up to  $0.9/0.6 = 1.5$  ppm

# Guidance values for DON

- Cereals and cereal products: 8 ppm
- Except maize products: 12 ppm
  
- Pig feed: 0.9 ppm
- Young ruminants: 2 ppm
- Other animals: 5 ppm

# Presentation of the results for DON

## Class of contaminations (ppm)

- <0.25: below the highest LOQ
- 0.25 – 0.9: up to lowest guidance value on compound feed (pigs)
- 0.9 – 1.5: up to guidance value for pig feed / 0.6 (\*)
- 1.5 – 4: up to half the guidance value for feed materials \*\*
- 4 – 8: up to guidance value for the feed material at stake\*\*
- >8: above guidance value for the feed materials at stake: \*\*\*

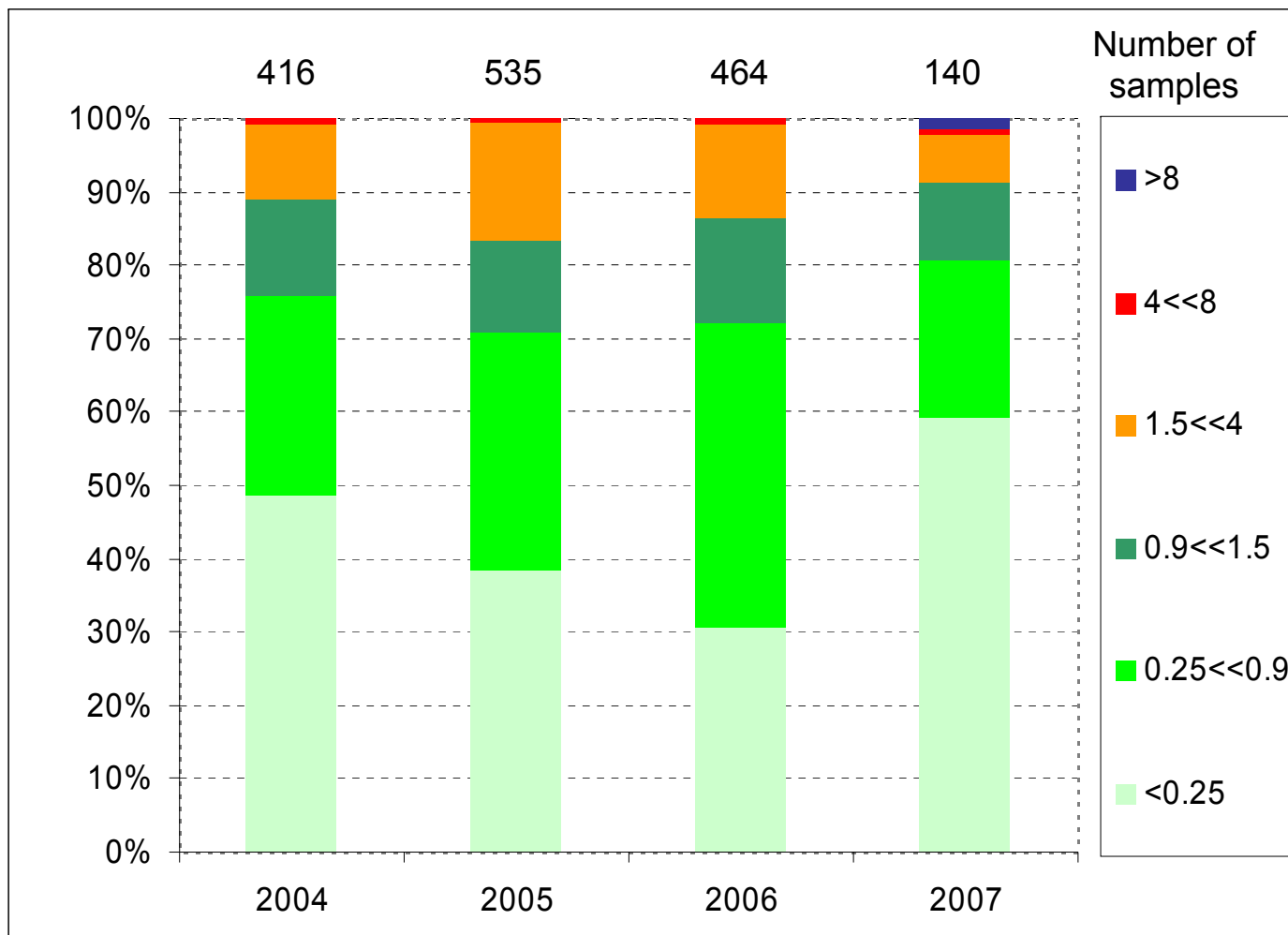
\*: the guidance value for a compound feed for pig containing 60% or more of cereals and cereals products with DON above 1.5 ppm cannot be met

\*\* : except maize by-products

\*\*\*: 12 for maize by-products



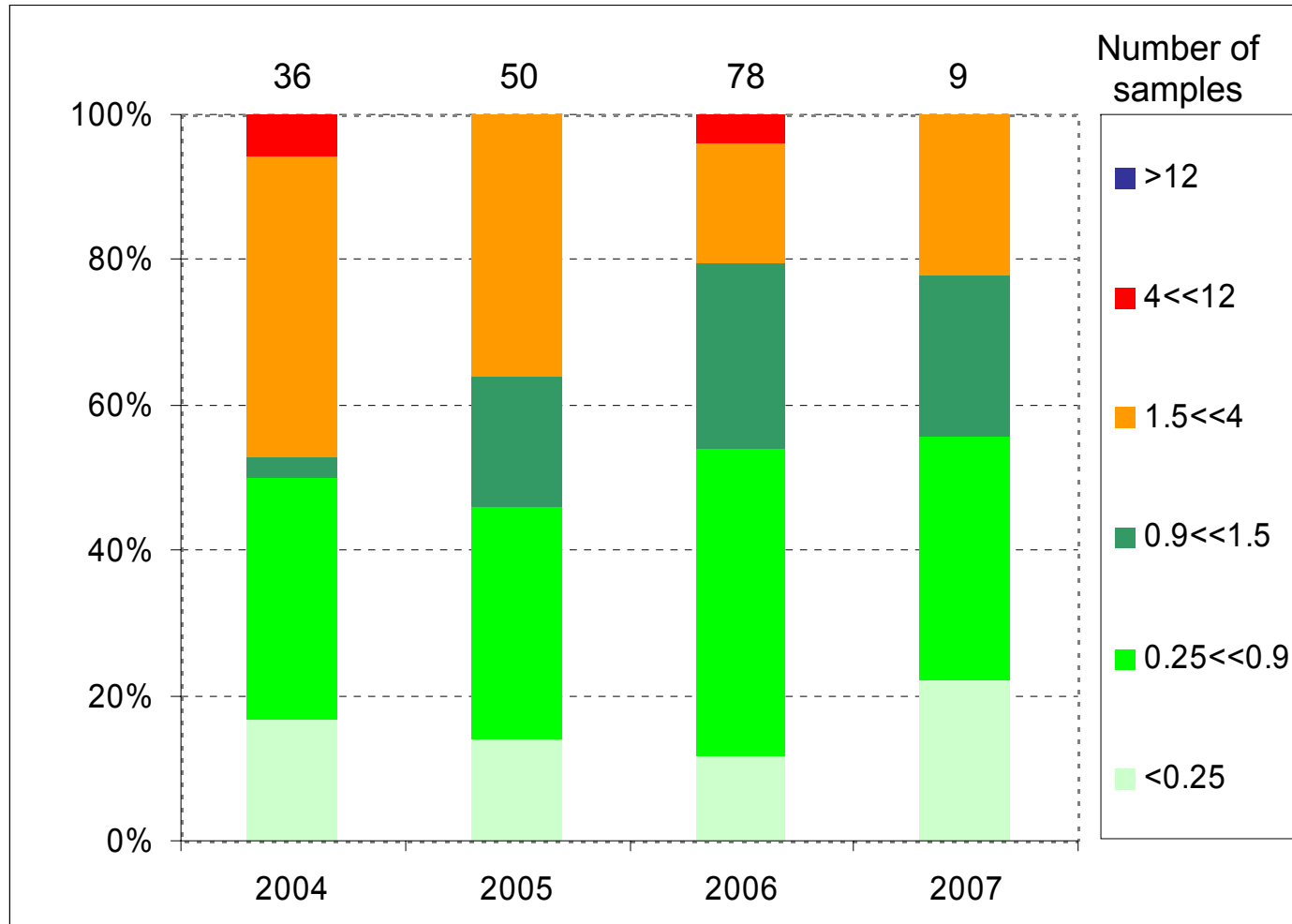
# DON in maize: Percentages of samples by class of contamination (ppm)



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# DON in maize gluten feed: Percentages of samples by class of contamination (ppm)



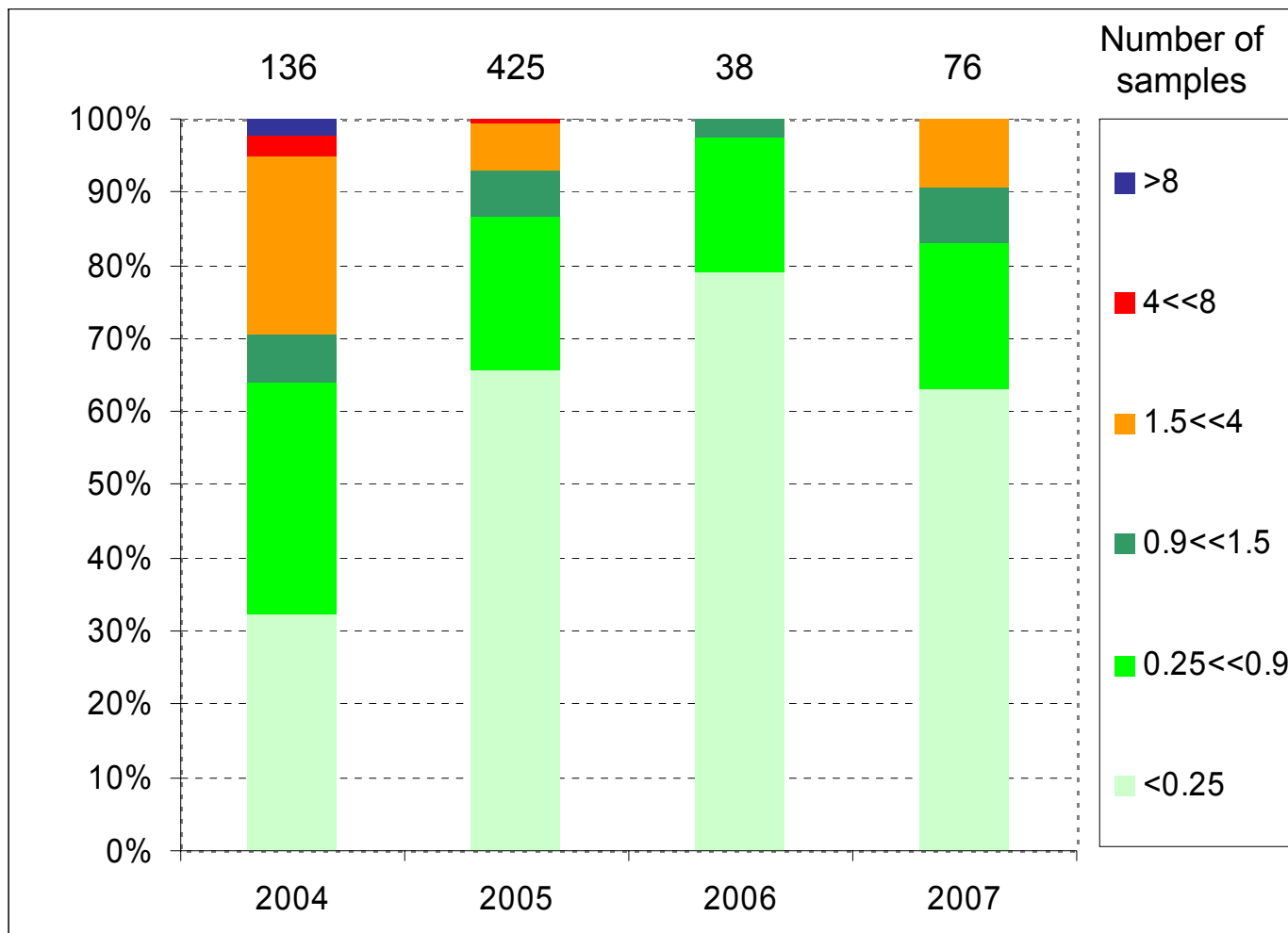
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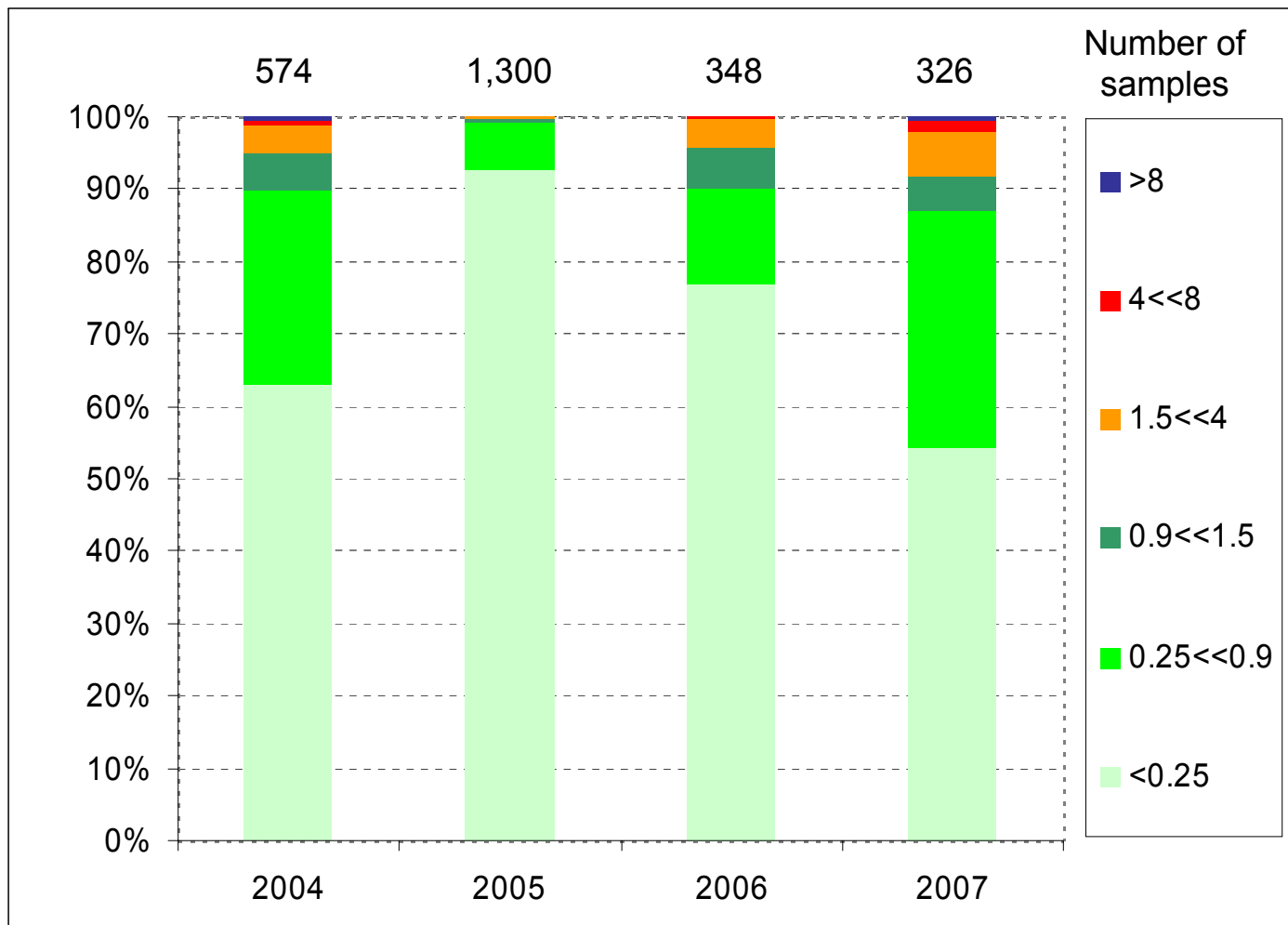
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# DON in triticale: Percentages of samples by class of contamination (ppm)



# DON in wheat: Percentages of samples by class of contamination (ppm)



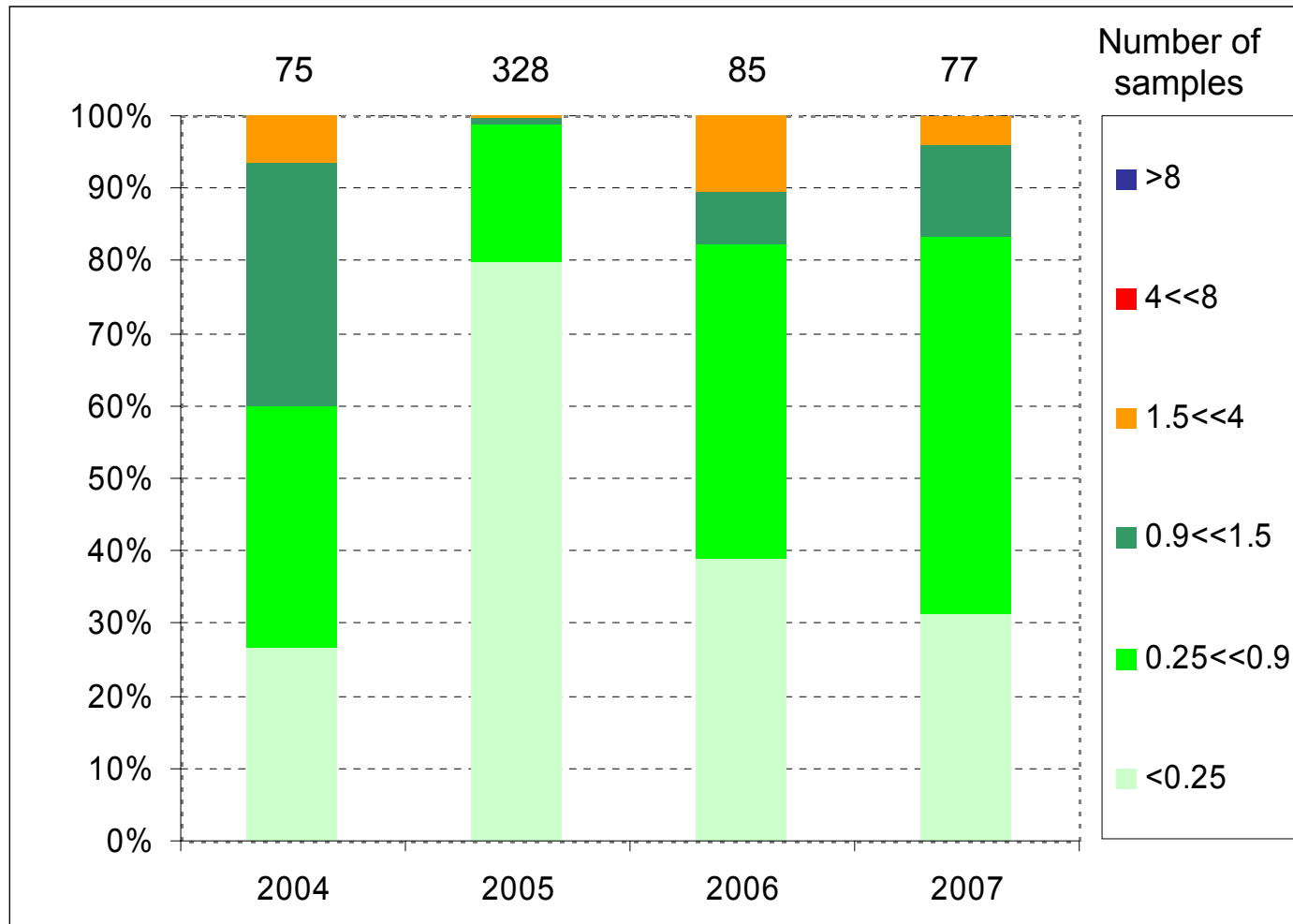
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# DON in wheat bran: Percentages of samples by class of contamination (ppm)



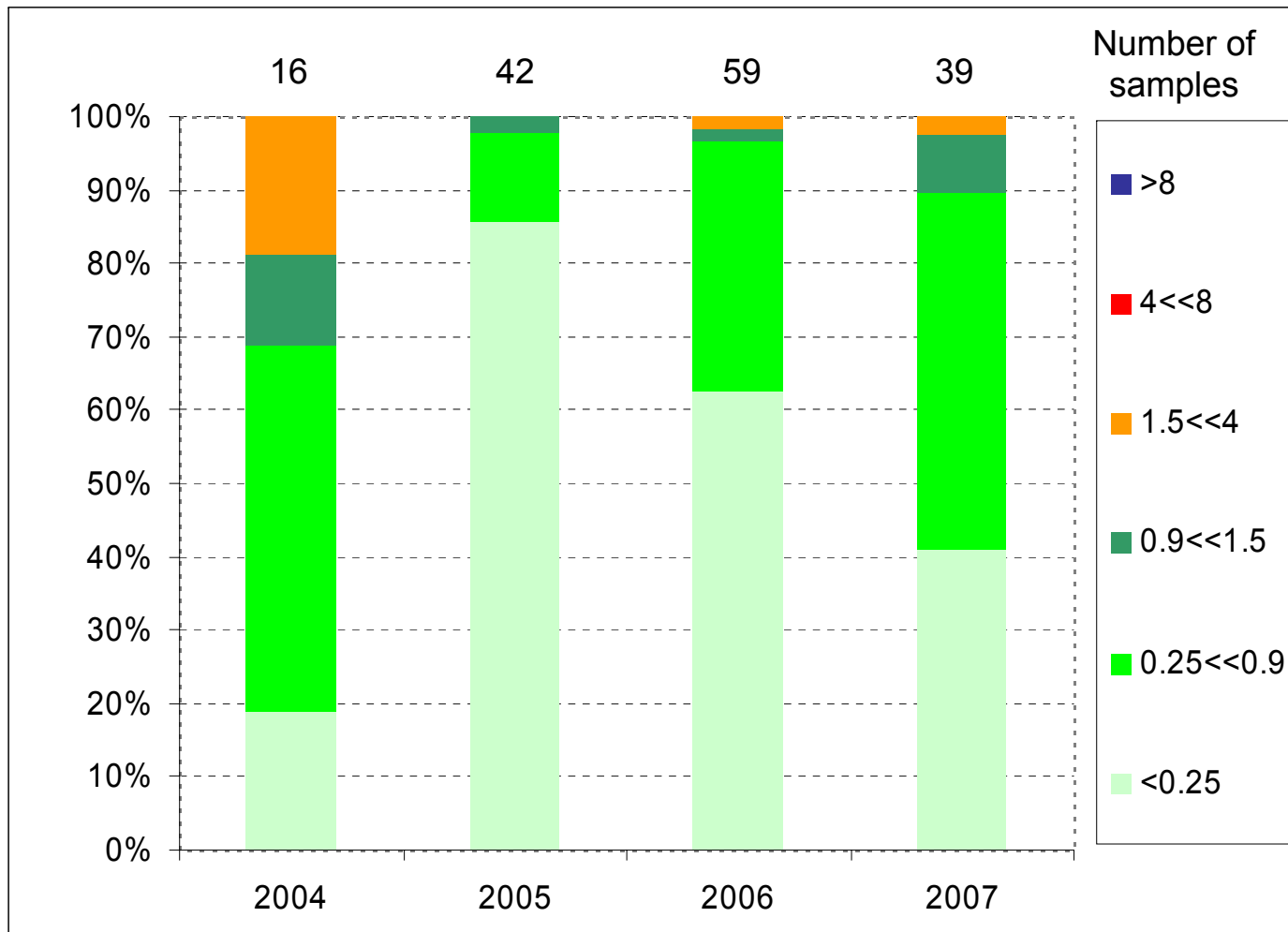
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# DON in wheat feed: Percentages of samples by class of contamination (ppm)



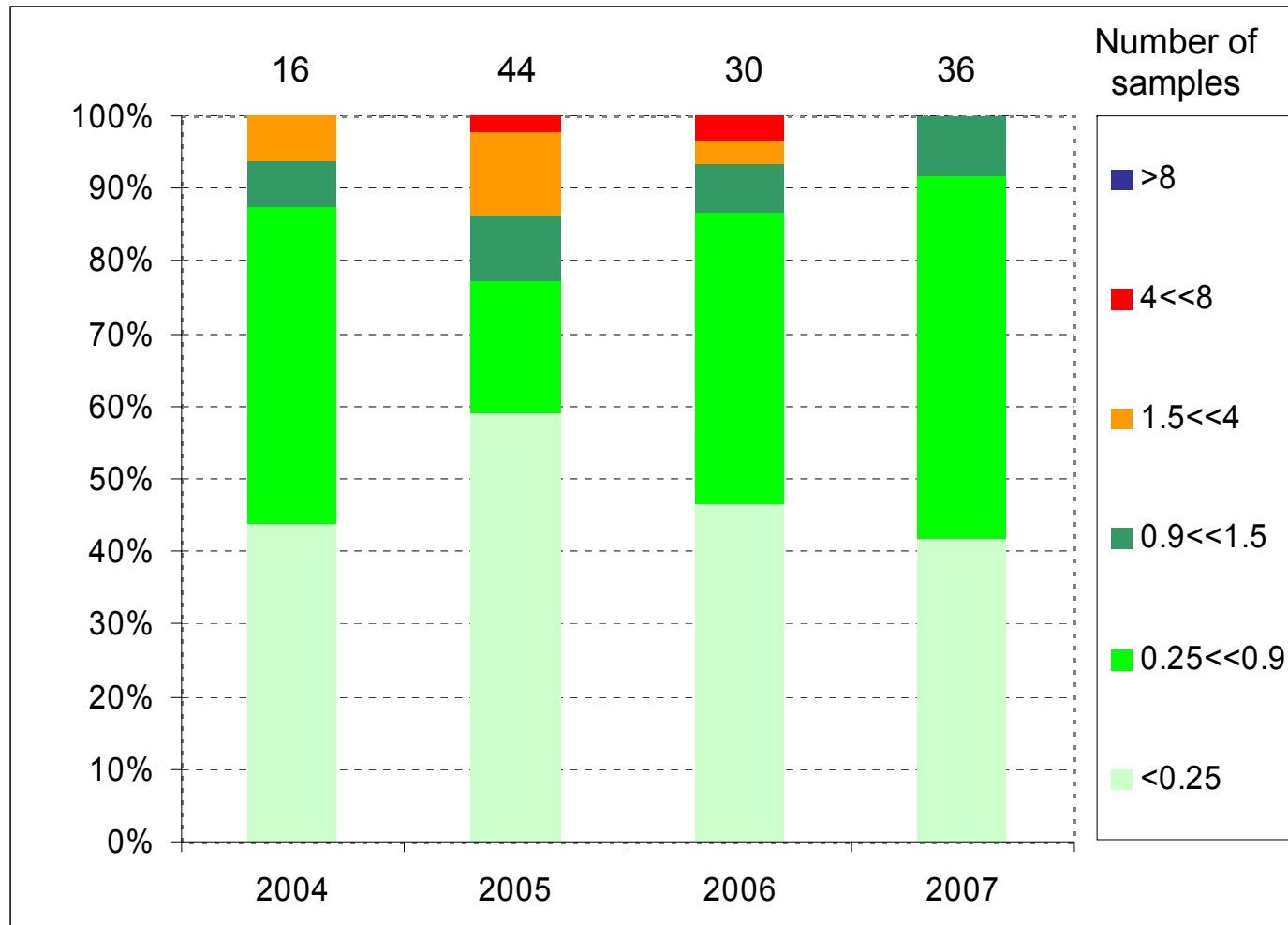
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# DON in wheat middlings: Percentages of samples by class of contamination (ppm)



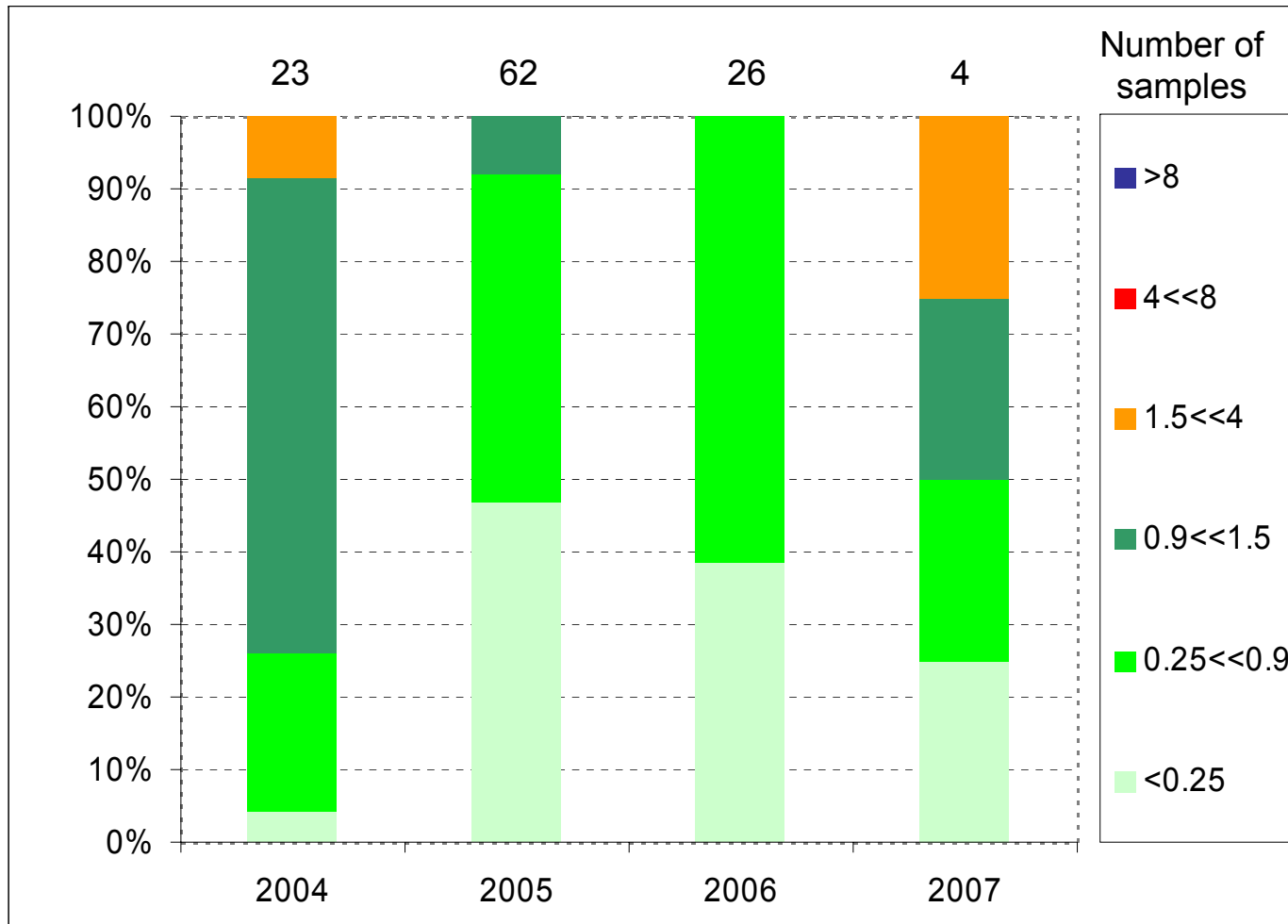
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# DON in wheat gluten feed: Percentages of samples by class of contamination (ppm)





# Conclusions

- The guidance values set for DON in feed materials are respected
- Significant differences in occurrence of DON over time
- Difficult to meet the guidance value for DON in pig feed with the contamination levels observed in wheat, triticale, maize and maize gluten feed:
  - Up to **8%** of samples of wheat beyond 1.5 ppm and up to **2%** beyond 4 ppm
  - Up to **30%** of samples of triticale beyond 1.5 ppm and up to **5%** beyond 4 ppm
  - Up to **17%** of samples of maize beyond 1.5 ppm and up to **3%** beyond 4 ppm
  - Up to **50%** of samples of maize gluten feed beyond 1.5 ppm and up to **8%** beyond 4 ppm
- Some problems with DON in wheat by-products, with large variation in time.

# Guidance values for ZEN

- Cereals and cereal products: 2 ppm
- Except maize products: 3 ppm
  
- Piglet feed: 0.1 ppm
- Other pig feed: 0.25 ppm
- Ruminants: 5 ppm

# Presentation of the results for ZEN

## Class of contaminations (ppm)

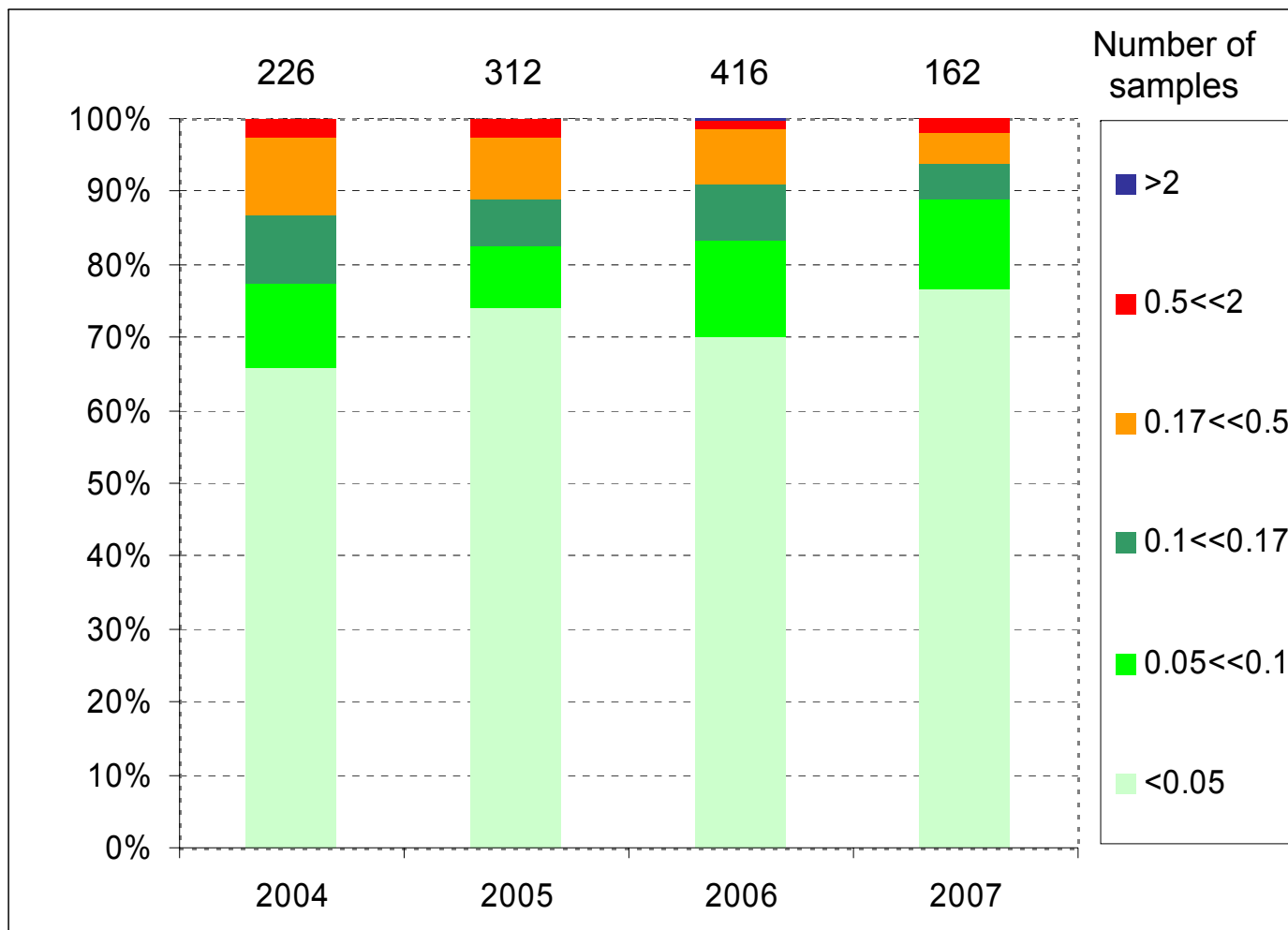
- <0.05: below the highest LOQ
- 0.05 – 0.1: up to lowest guidance value on compound feed (piglets)
- 0.1 – 0.17: up to guidance value for piglet feed / 0.6 (\*)
- 0.17 – 0.5: up to guidance value for ruminant feed
- 0.5 – 2: up to guidance value for the feed material at stake\*\*
- >8: above guidance value for the feed material at stake \*\*\*

\*: the guidance value for a compound feed for piglets containing 60% or more of cereals and cereals products with ZEN above 0.17 ppm cannot be met

\*\* : except maize by-products

\*\*\*: 3 for maize by-products

# ZEN in maize: Percentages of samples by class of contamination (ppm)



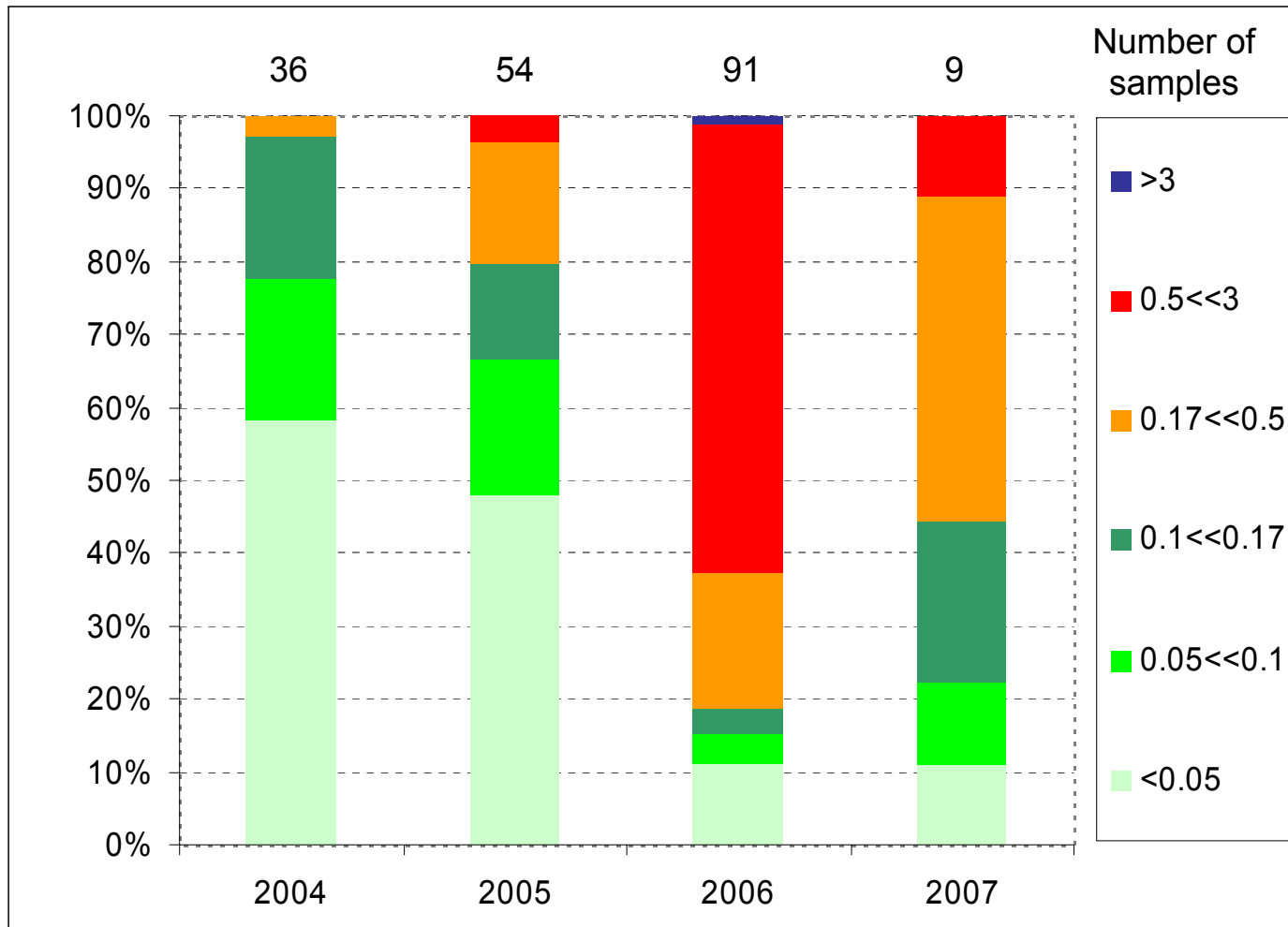
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# ZEN in maize gluten feed: Percentages of samples by class of contamination (ppm)



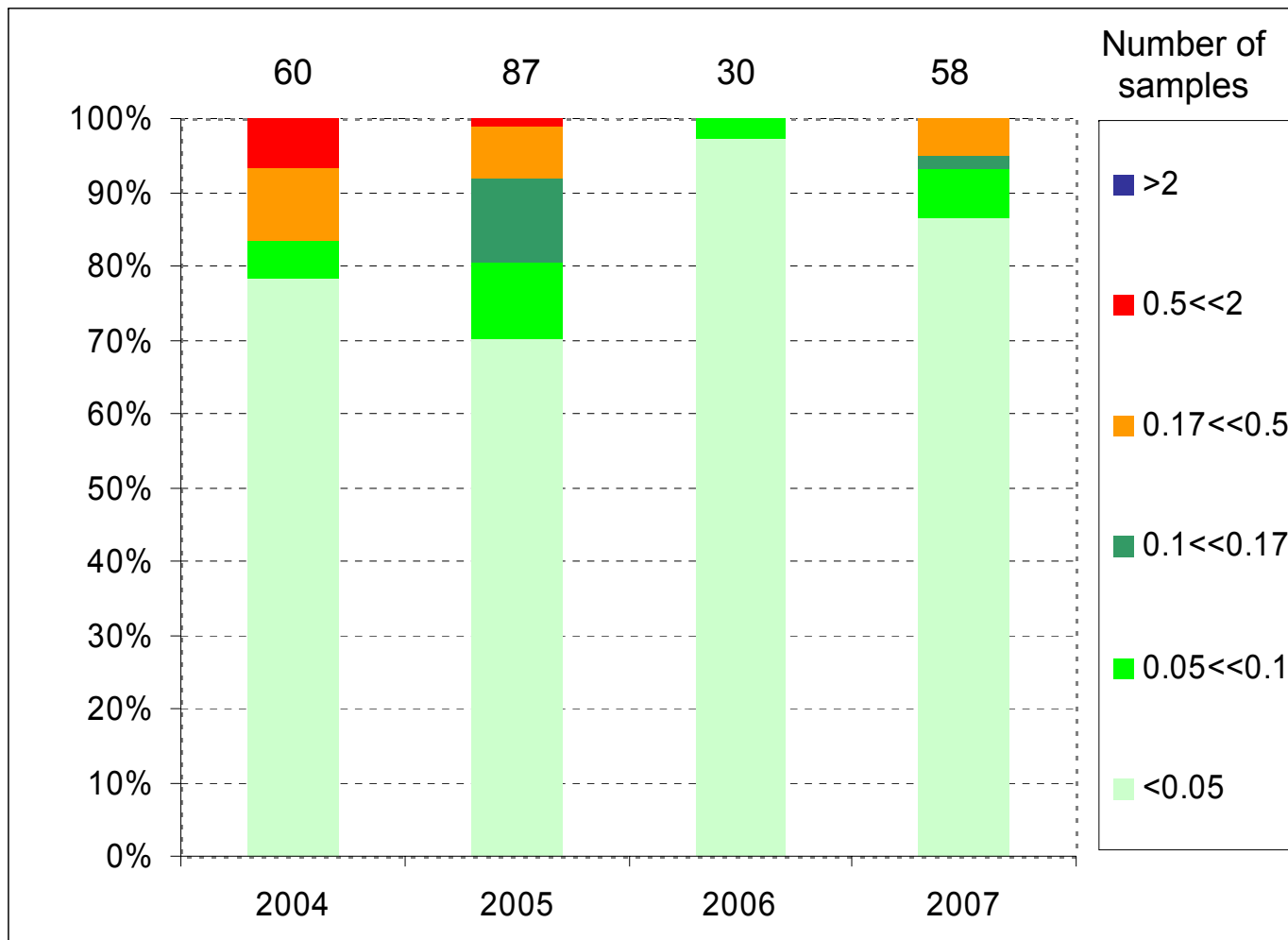
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# ZEN in triticale: Percentages of samples by class of contamination (ppm)



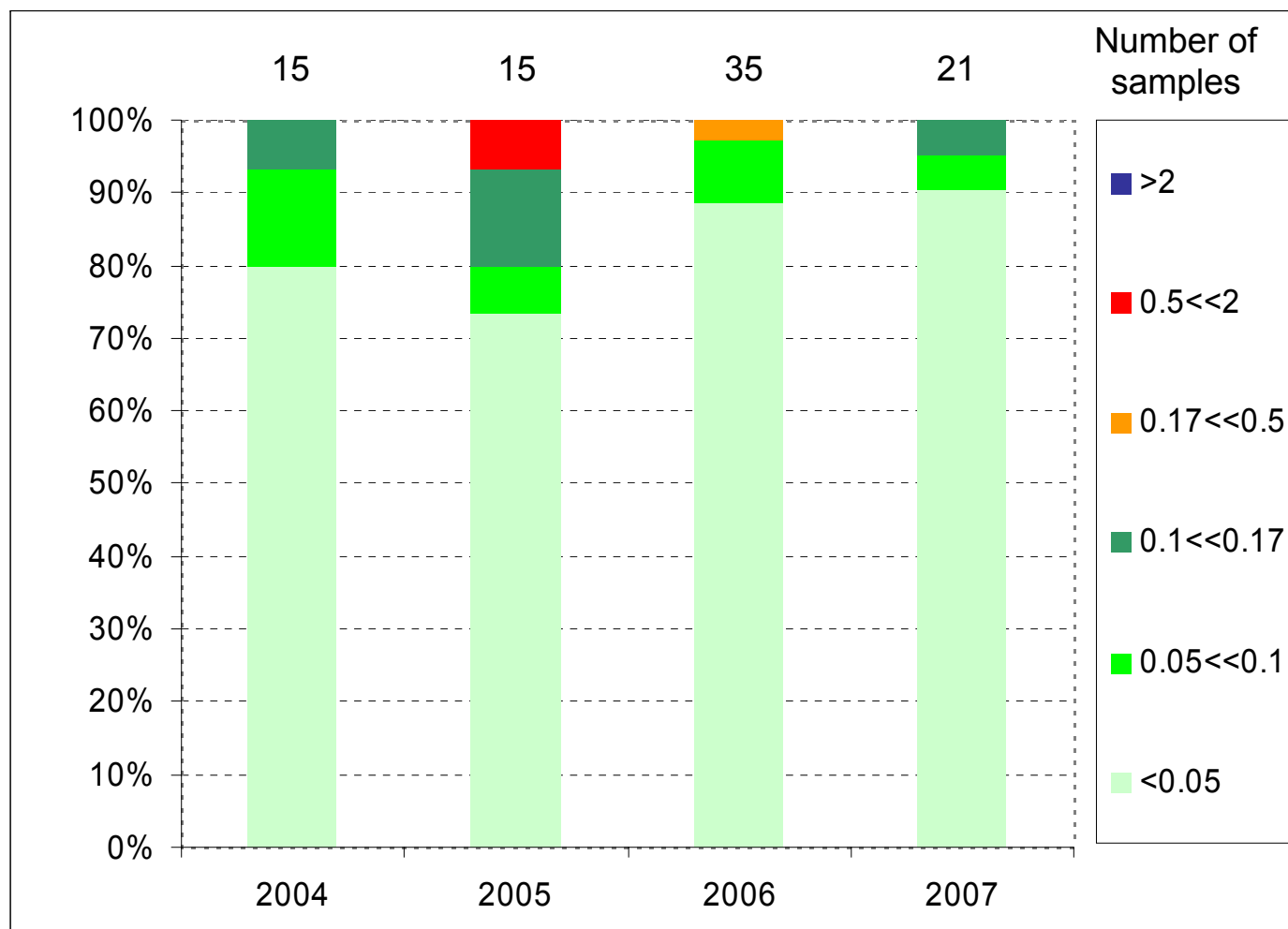
# ZEN in wheat: Percentages of samples by class of contamination (ppm)



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# ZEN in wheat feed: Percentages of samples by class of contamination (ppm)



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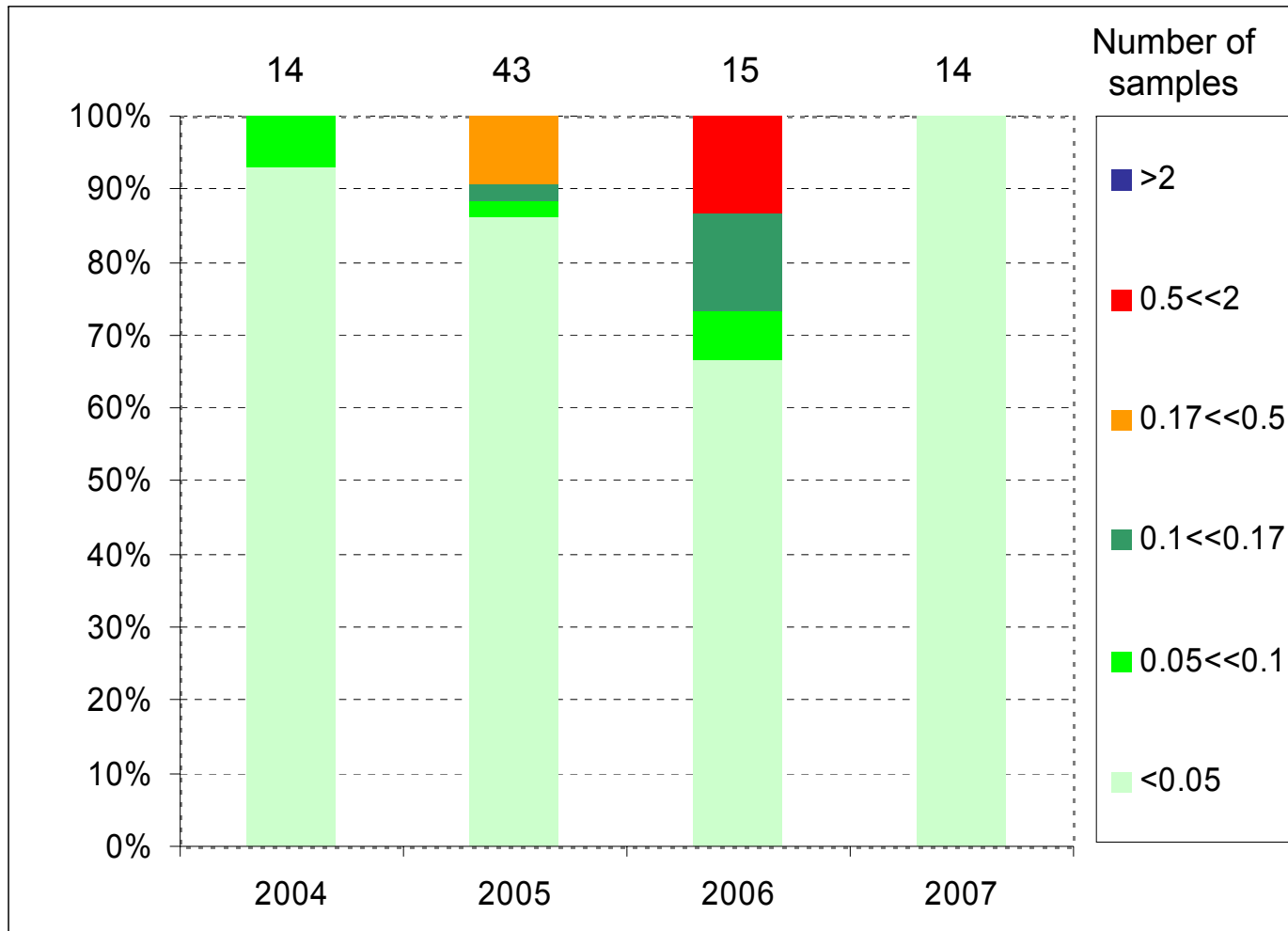
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# ZEN in wheat middlings: Percentages of samples by class of contamination (ppm)



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# Conclusions

- Good level of compliance with guidance values
- Difference of contamination pattern between maize and maize gluten feed
- Difficult to meet the guidance value for ZEN in pig feed with the contamination levels observed in triticale, maize and maize gluten feed (guidance value of 0.1ppm for piglets and 0.25 for other pigs):
  - Up to **7%** of samples of maize beyond 0.17 ppm and up to **2%** of samples of maize beyond 0.5 ppm
  - Up to **80%** of samples of maize gluten feed beyond 0.17 ppm and up to **60%** of samples of maize gluten feed beyond 0.5 ppm
  - **5%** of samples beyond 0.17 ppm for triticale in 2007
- However, maize gluten feed not that much used in pigfeed and value for other compound feed high enough

# Guidance values for FUM B1+B2

- Maize and maize products: 60 ppm
- Pig, rabbit, horse feed: 5 ppm
- Fish feed: 10 ppm
- Poultry, young ruminants: 20 ppm
- Adult ruminants: 50 ppm

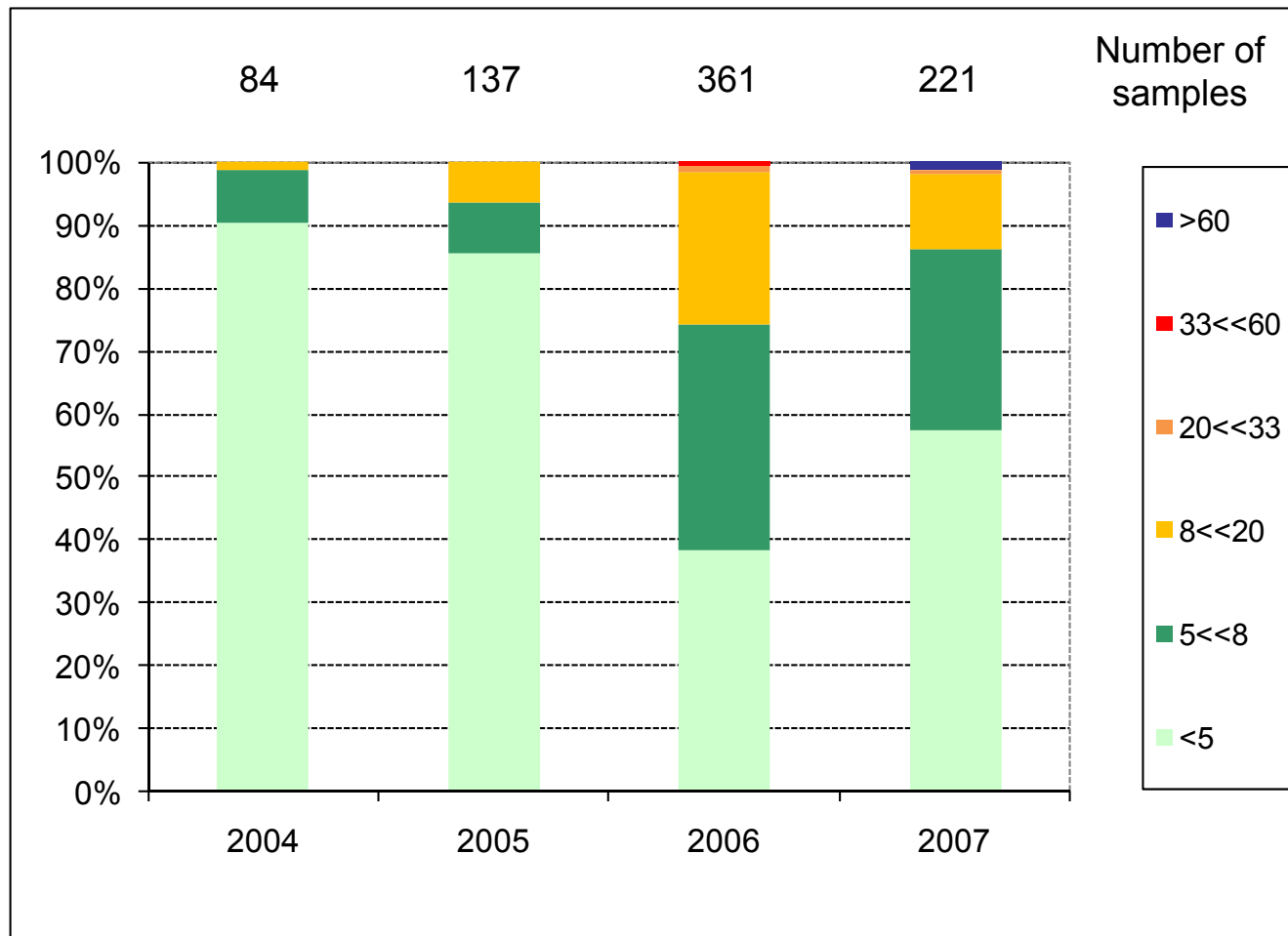
# Presentation of the results for FUM

## Class of contaminations (ppm)

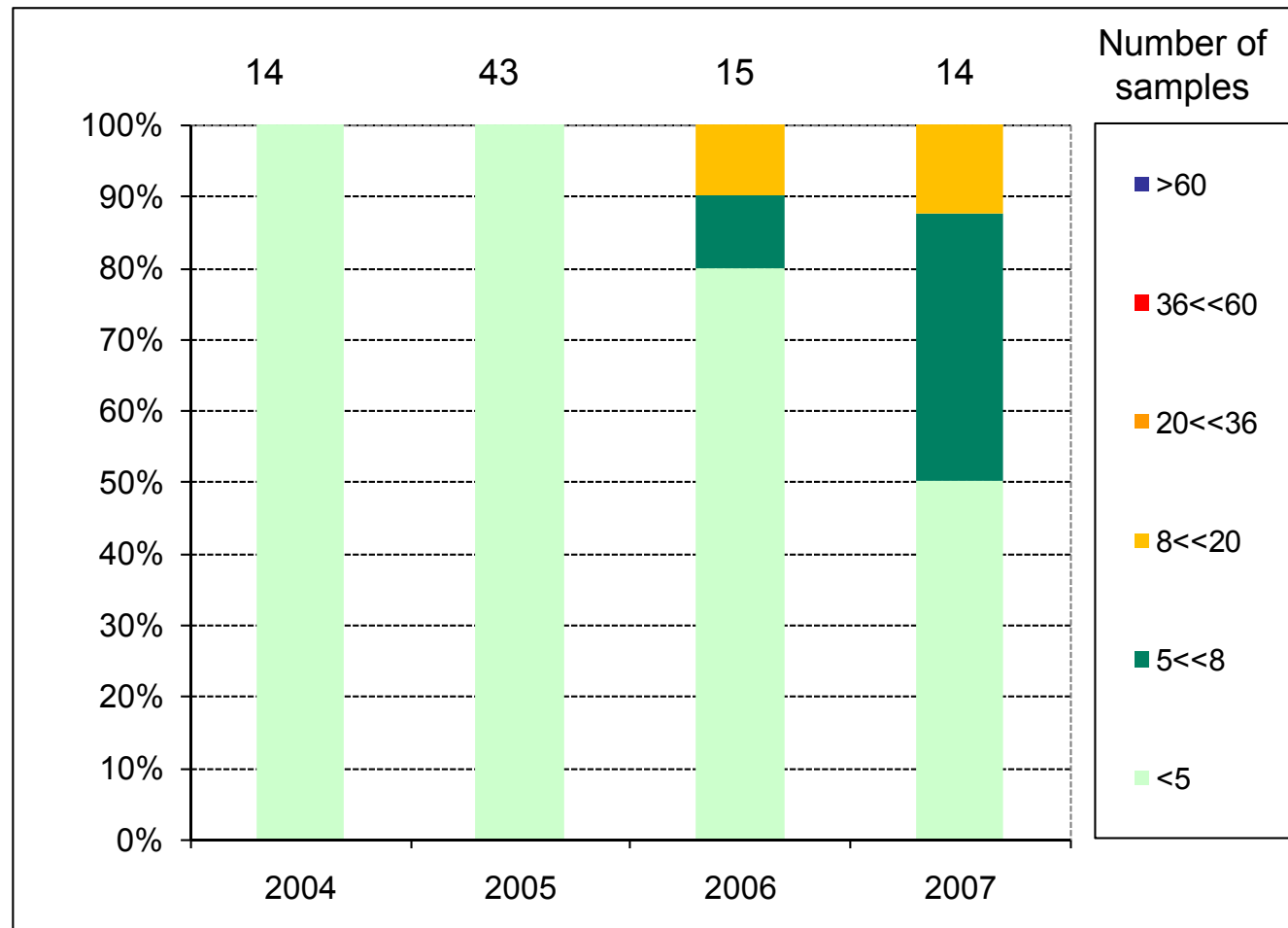
- <5: below the highest LOQ = lowest guidance value for compound feed (pigs, horses, rabbits and pets)
- 5 – 8: up to guidance value on pigfeed / 0.6 (\*)
- 8 – 20: up to guidance value for poultry feed
- 20 – 33: up to guidance value for poultry feed / 0.6
- 33 – 60: up to guidance value for the feed material at stake
- >60: above guidance value for the feed material at stake

\*: the guidance value for a compound feed for pigs containing 60% or more of cereals and cereals products with FUM above 8 ppm cannot be met

# FUM B1+B2 in maize: Percentages of samples by class of contamination (ppm)



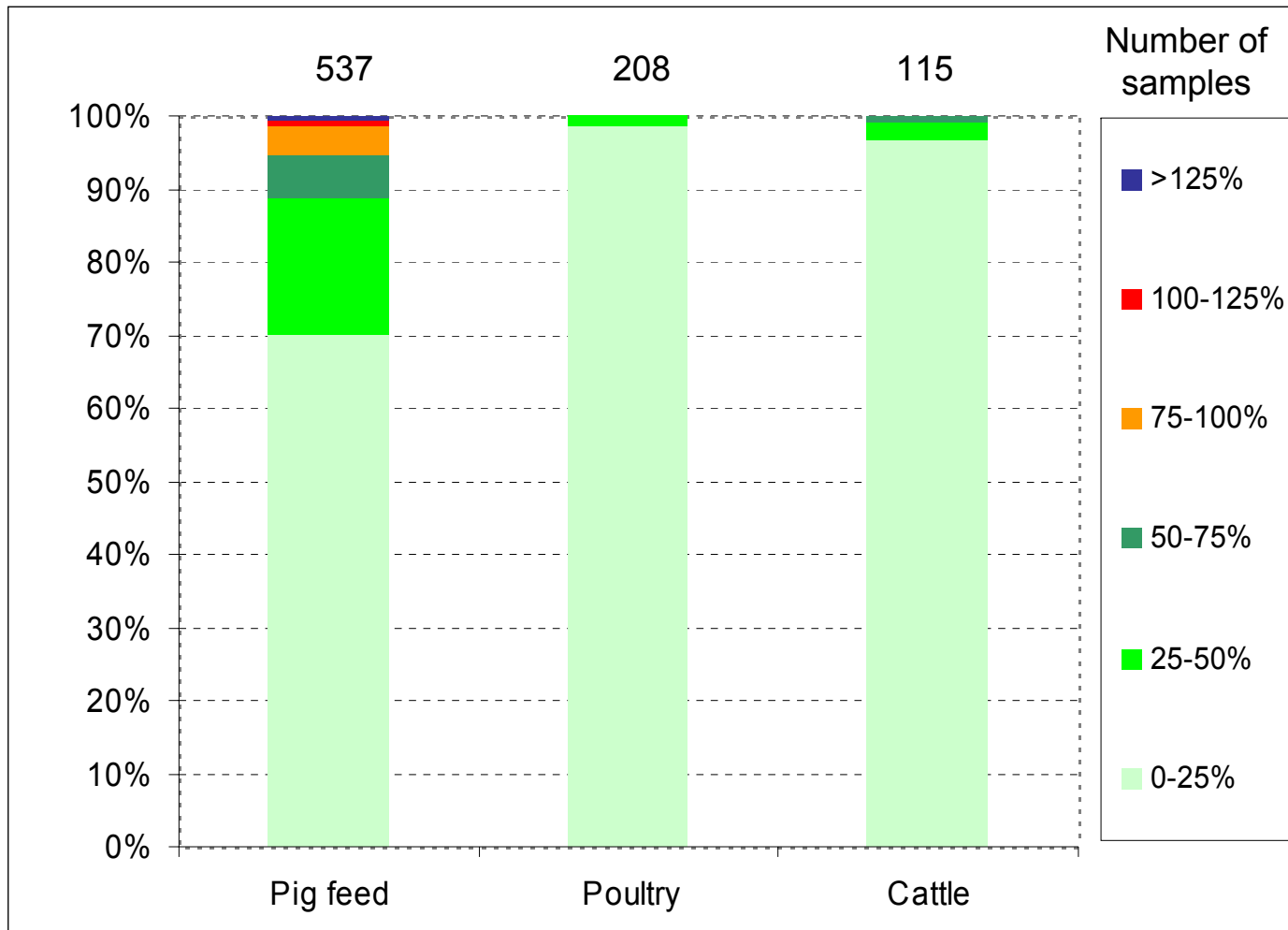
# FUM B1+B2 in maize gluten feed: Percentages of samples by class of contamination (ppm)



# Conclusions

- Levels of fumonisins in maize may be a problem when producing pig feed (guidance value of 5 ppm):
  - Up to 28% of samples beyond 8 ppm in 2006
  - Up to 14% of samples beyond 8 ppm in 2007
- Maize gluten feed not that much used in pigfeed

# DON in compound feed: Percentages of samples by class of percentage of the guidance value (ppm)

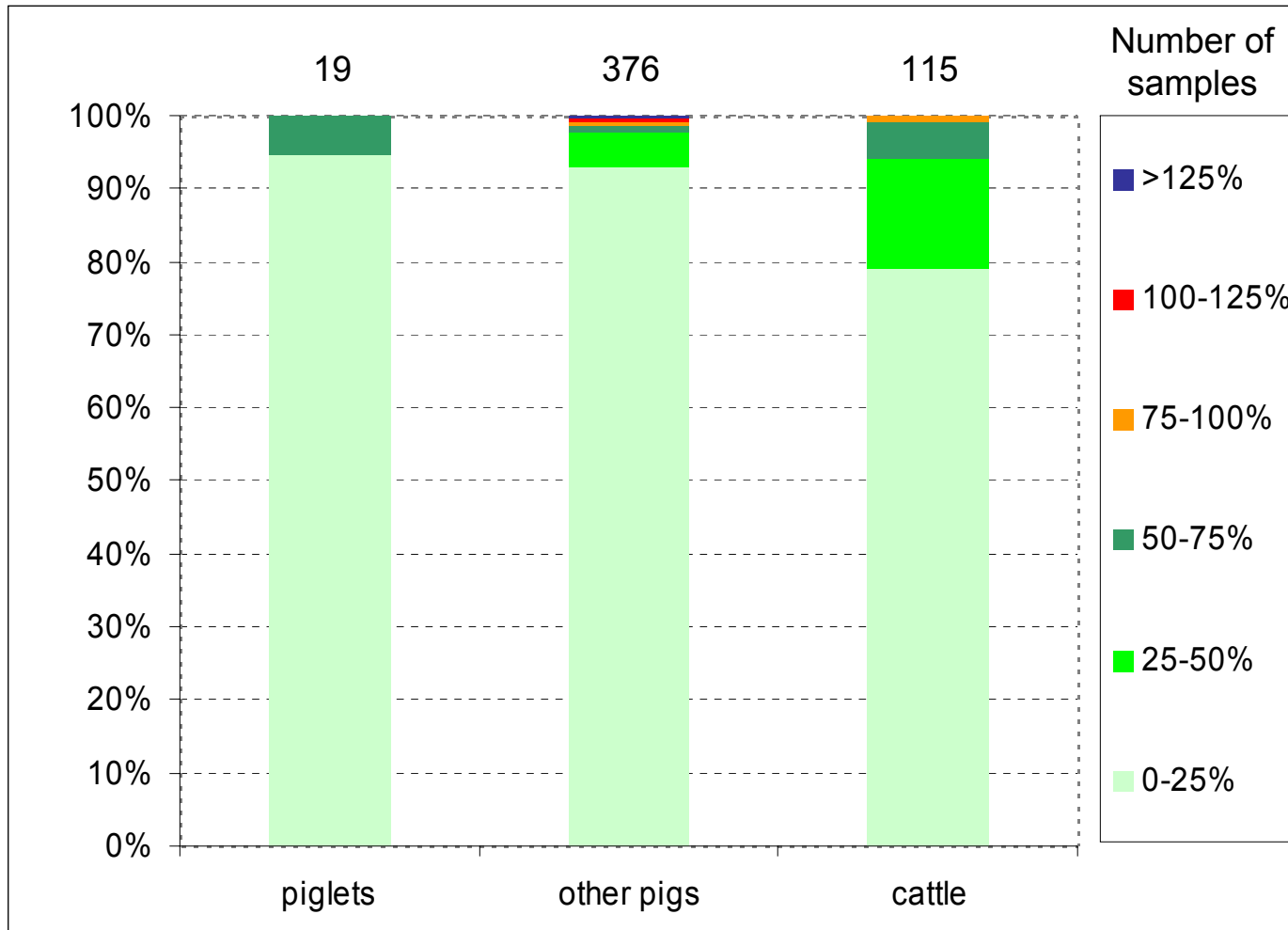


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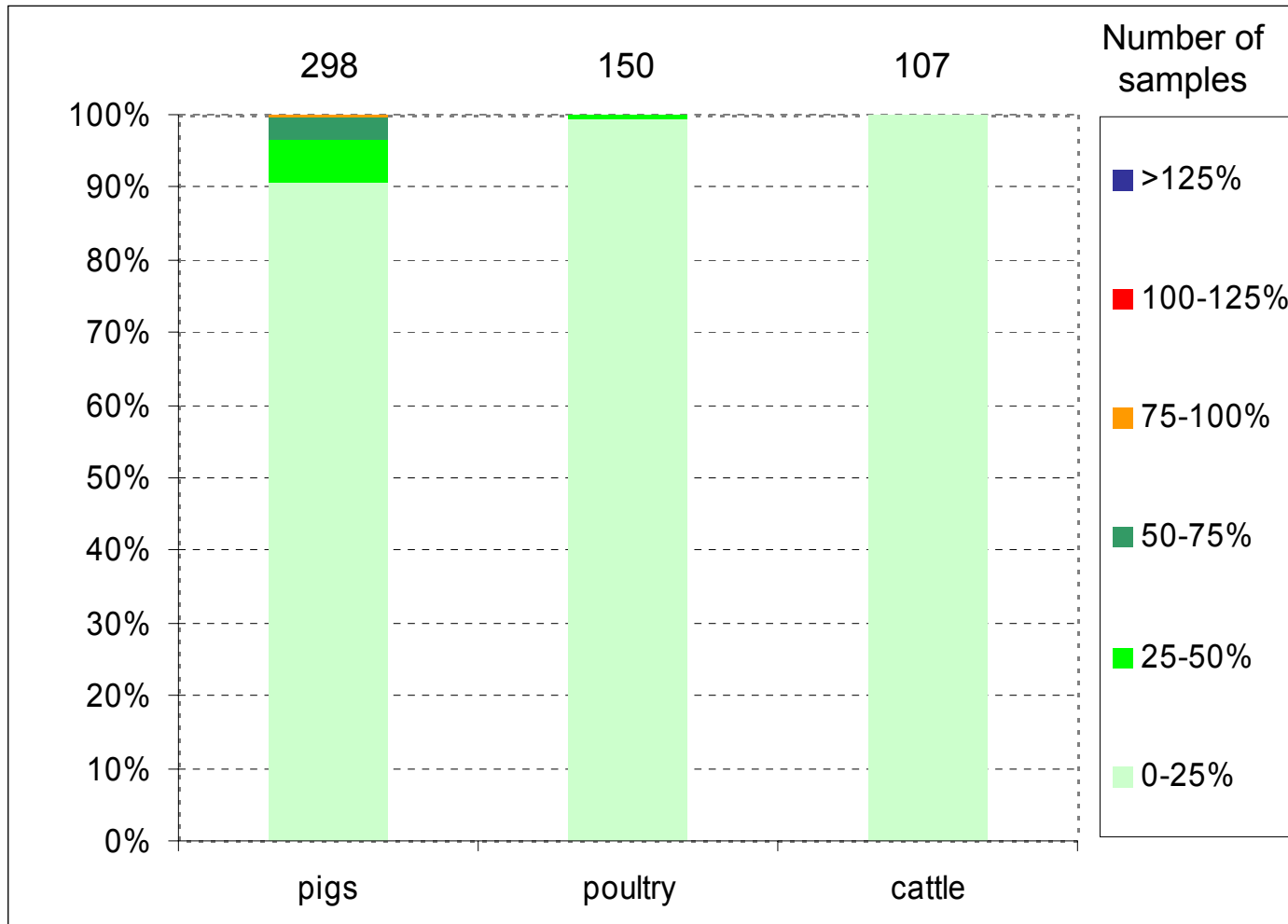
# ZEN in compound feed: Percentages of samples by class of percentage of the guidance value (ppm)



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# FUM B1+B2 in compound feed: Percentages of samples by class of percentage of the guidance value (ppm)



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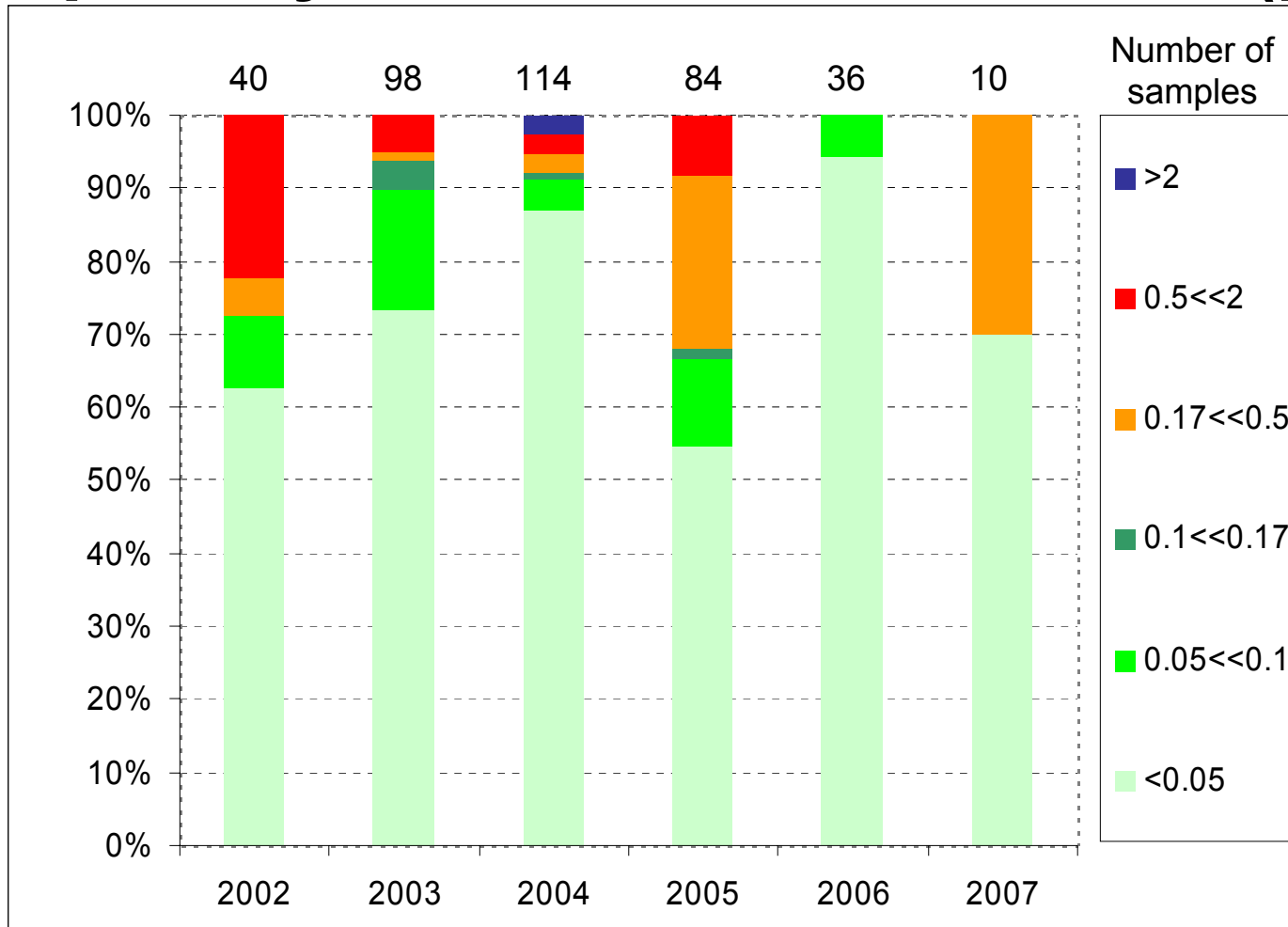
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# Conclusions

- Guidance value for DON in pigfeed difficult to match → may have an impact on pigfeed cost if restrictions in formulation
- Same observation for ZEN in pigfeed (other than piglets) but still workable
- Sufficient margin for fumonisins to avoid extra-costs

# ZEN in soya hulls: Percentages of samples by class of contamination (ppm)



# Conclusions

- Soya hulls may be an important source of ZEN with sometimes levels exceeding the guidance values for cereals and cereals by-products
- Some data on other feed materials show some prevalence of ZEN but at much lower levels

# General conclusions

- Monitoring shows:
  - Very few samples beyond guidance values
  - Low margin of manoeuvre for DON in pigfeed
  - Other feed materials (soya hulls) may carry ZEN
- Guidance value for DON in pig feed **could be reviewed upward**, considering that high turnover of feed materials in feed mills means **limited risk of chronic exposure** of pigs fed on industrial feed
- Would need to be completed by figures for home mixers