

# ***Fusarium* toxins in unprocessed cereals and cereal-based feed – some data from Austria**

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**5th *Fusarium* toxin forum, Brussels, 10/11-1-2008**

# ***Fusarium* toxins in Austrian cereals**



## **Content**

- **Methods of mycotoxin analysis**
- ***Fusarium* toxins in unprocessed cereals (2004-2007)**
- ***Fusarium* toxins in cereal-based feed**

# Methods

<b>parameter</b>	<b>extraction</b>	<b>clean up</b>	<b>derivative</b>	<b>separation</b>	<b>detection</b>
A-Trichothecenes <b>T-2 toxin, HT-2 toxin</b>	Acetonitrile/water	Mycosep, IAC	MSTFA	GC	MS
B-Trichothecenes <b>Deoxynivalenol (DON), Nivalenol, Fusarenone X, 3-AcetylDON, 15- AcetylDON</b>	Acetonitrile/water	Mycosep	TMS	GC (2 columns)	EC
Zearalenone (ZON)	Acetonitrile/water	IAC	-	RP-HPLC	FL
Fumonisin B1, B2	Acetonitrile/methanol/ water	IAC	OPA	RP-HPLC	FL

# *Fusarium* toxins in unprocessed cereals - *Fusarium* toxin monitoring

- Austrian *Fusarium* toxin monitoring since 2005
- Cereals: wheat, durum, triticale, barley, oats, rye and maize
- Sampling: cereals (excl. maize): immediately after harvest; maize: after drying
- Aggregate sample weights: 2 – 6 kg (lot weights: 1 – 8 t)
- Cleaning (sieving) of the cereal grains before analyses

# ***Fusarium* toxins in unprocessed cereals other than maize (2004-2007) - DON**

cereals:

wheat: 60-73%, Rye: 6-10%

barley: 6-12%, triticale: 6-8%

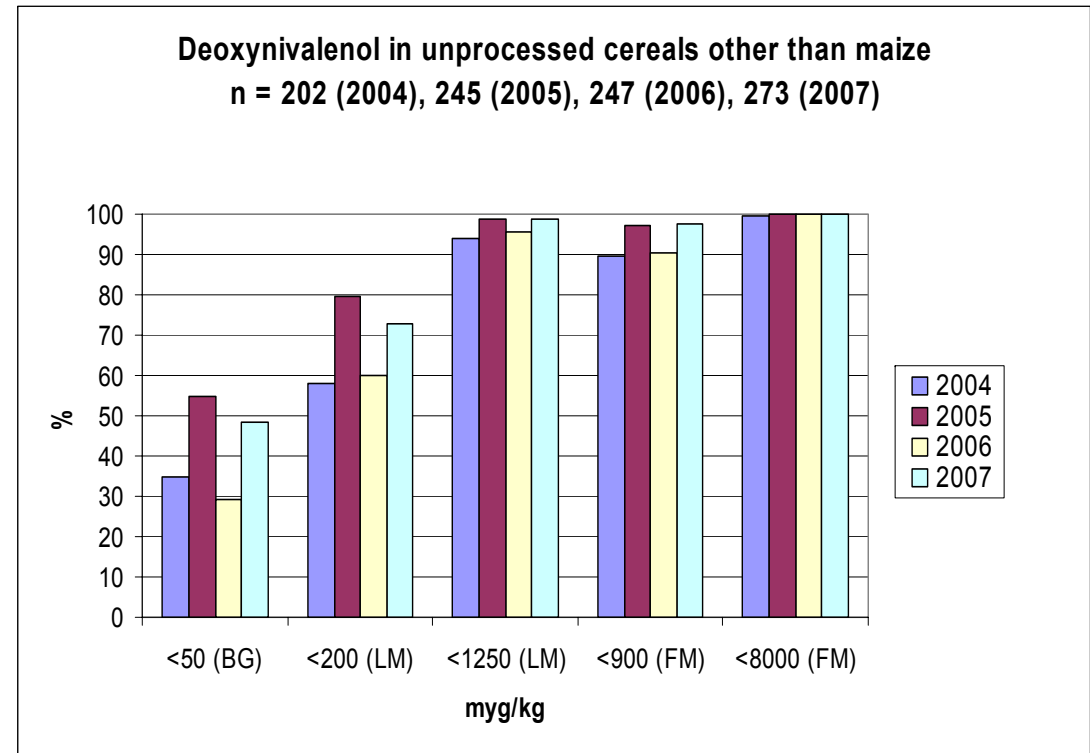
oats: 4-5%, durum: 4-7%

**1250 µg/kg EU maximum level for unprocessed cereals other than maize, durum and oats**

**8000 µg/kg EU guidance value for feed materials (cereals and cereal products)**

200 µg/kg EU maximum level for cereal-based foods for infants and young children

900 µg/kg EU guidance value for complete feedingstuffs for pigs



BG = LOQ, LM=food, FM=feed

# ***Fusarium* toxins in unprocessed maize (2004-2007) - DON**

**Range: <LOQ – 6000 ppb**

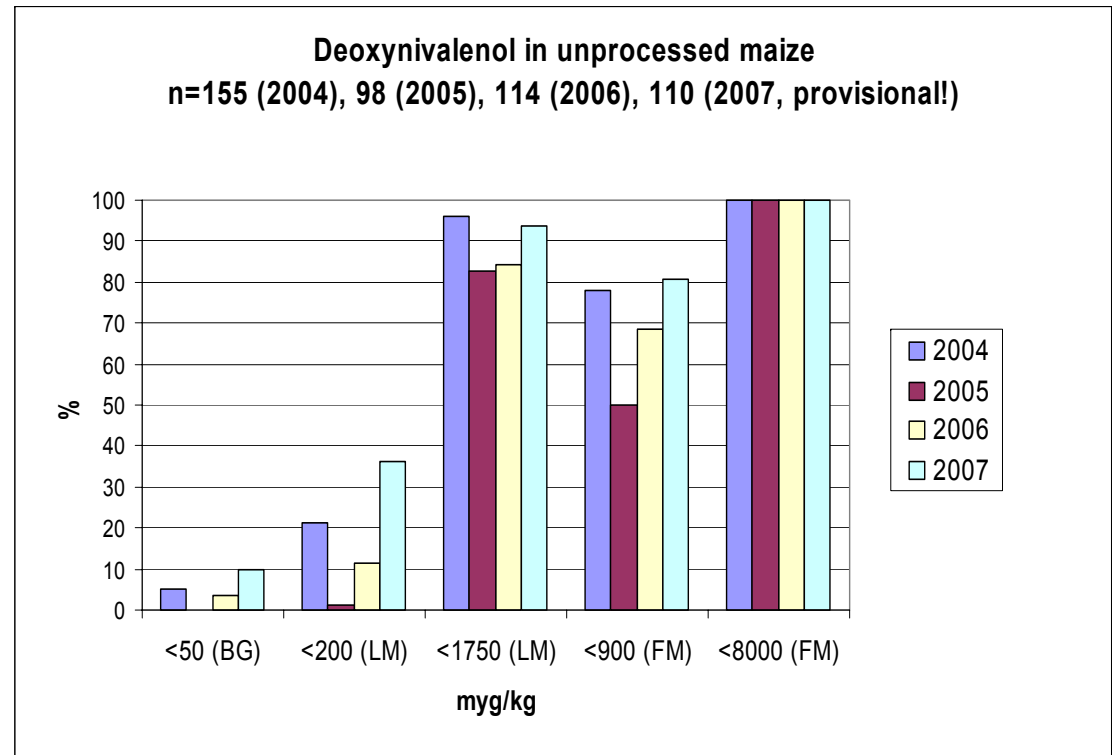
**1750 µg/kg EU maximum level for  
unprocessed maize**

**8000 µg/kg EU guidance value for  
feed materials (cereals and cereal  
products)**

200 µg/kg EU maximum level for cereal-  
based foods for infants and young children

900 µg/kg EU guidance value for complete  
feedingstuffs for pigs

BG = LOQ, LM=food, FM=feed



# ***Fusarium* toxins in unprocessed cereals (2004-2007) - ZON**

**cereals:**

**wheat: 60-73%, rye: 6-10%**

**barley: 6-12%, triticale: 6-8%**

**oats: 4-5%, durum: 4-7%**

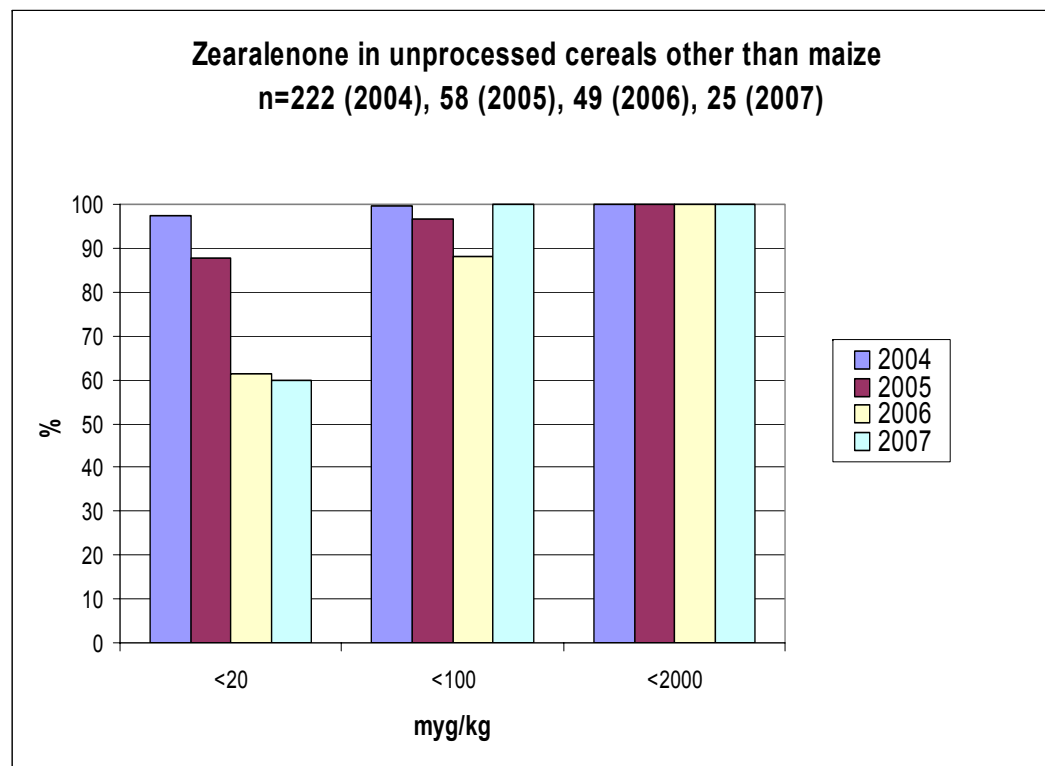
**100 µg/kg EU maximum level for unprocessed cereals other than maize**

**2000 µg/kg EU guidance value for feed materials (cereals and cereal products)**

20 µg/kg EU maximum level for cereal-based foods for infants and young children

100 µg/kg EU guidance value for complete feedingstuffs for piglets and young sows

**N.B.: data of 2005, 2006 and 2007: „a posteriori“ selection due to high DON values; not representative**



# ***Fusarium* toxins in unprocessed maize (2004-2006) - ZON**

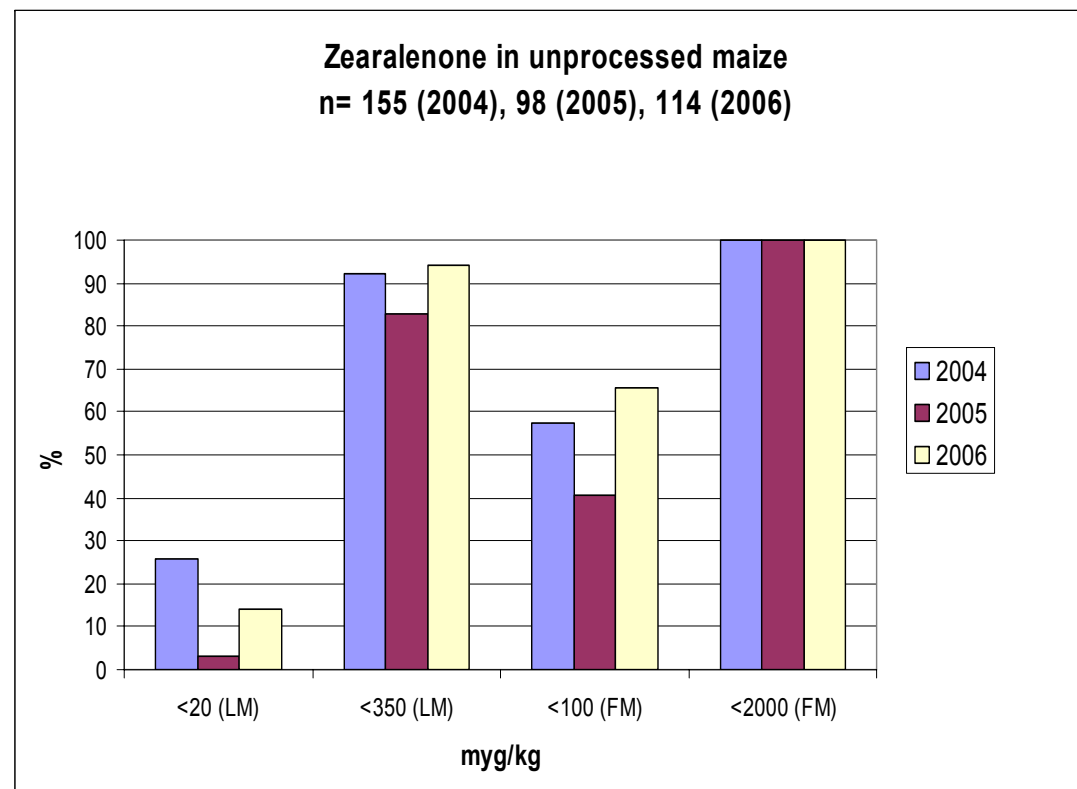
**350 µg/kg EU maximum level for unprocessed maize**

**2000 µg/kg EU guidance value for feed materials (cereals and cereal products)**

20 µg/kg EU maximum level for foods for infants and young children

100 µg/kg EU guidance value for complete feedingstuffs for piglets and young sows

LM=food, FM=feed





# DON in unprocessed cereals (2005-2007)

**LOQ = 50 ppb**

**ML (maximum limit): 1750 ppb (maize, durum, oats);**

**1250 ppb (wheat, barley, rye, triticale)**

**N and DON maxima:**

**wheat (n=524): 6700 ppb**

**durum (n=41): 1300 ppb**

**triticale (n=54): 2600 ppb**

**barley (n=70): 1100 ppb**

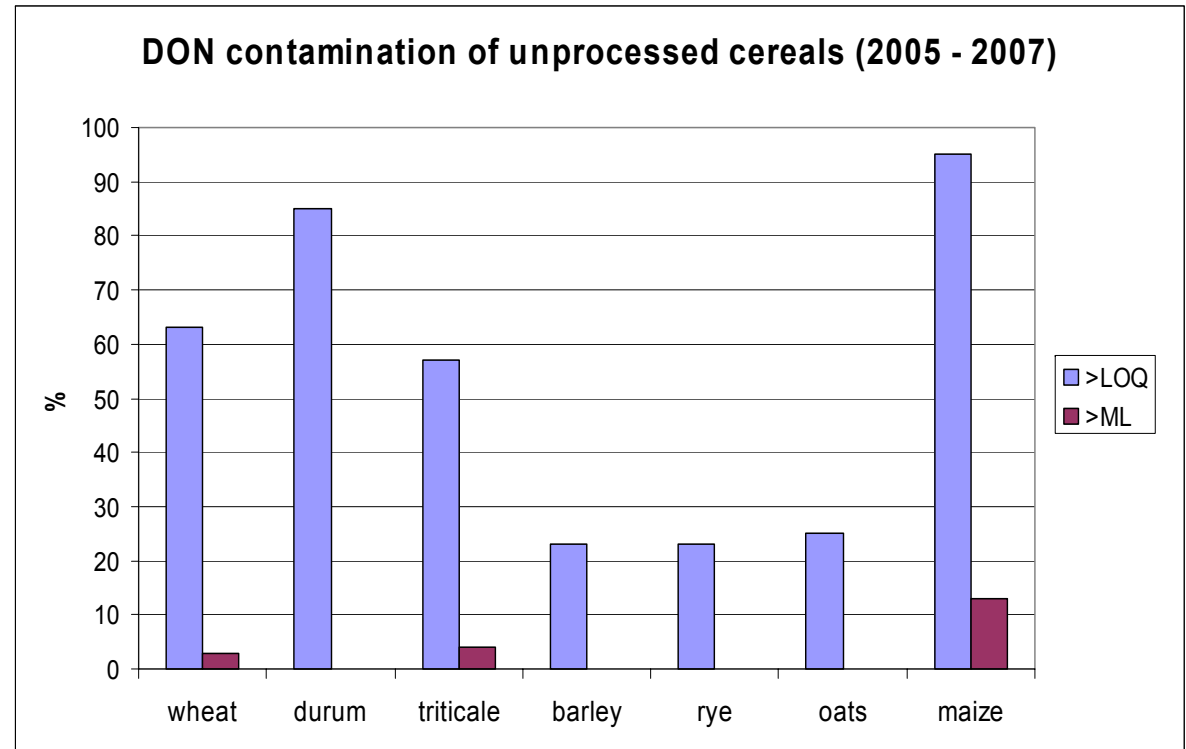
**rye (n=44): 770 ppb**

**oats (n=32): 700 ppb**

**maize (n=322): 6000 ppb**

**Ranking of DON contamination:**

**Maize > durum > wheat, triticale > barley, rye, oats**



# T-2+HT-2 toxin in unprocessed cereals (2007; provisional data)

## Cereals (N):

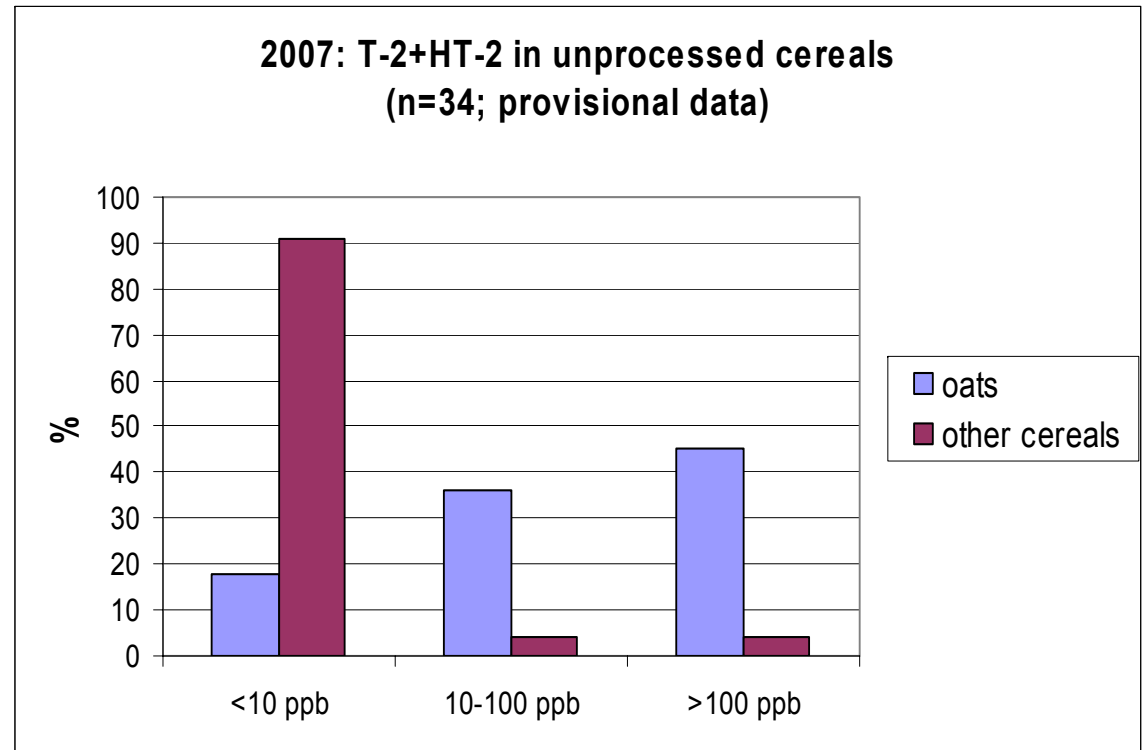
wheat (9), rye (2),

barley (3), triticale (5)

oats (11), durum (2), maize (2)

range: LOD – 615 ppb

LOQ = 5 ppb, respectively



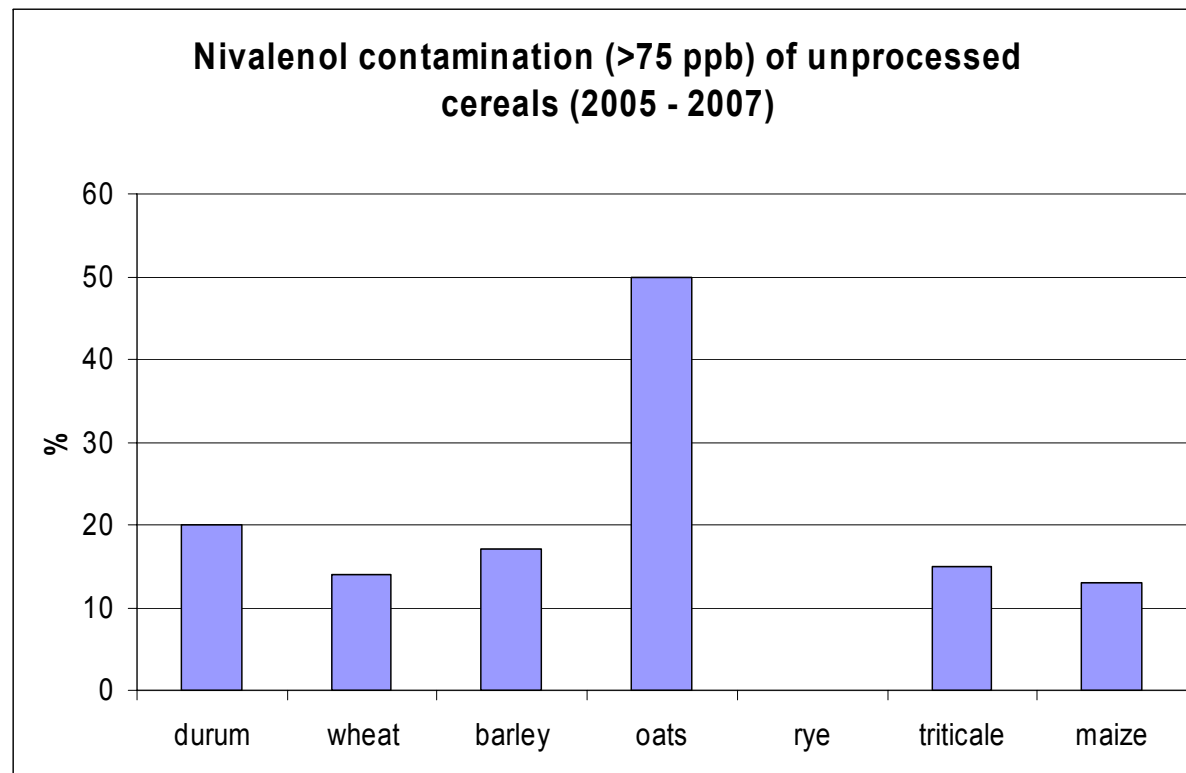
# Nivalenol in unprocessed cereals

**N:**

**Durum=41, wheat=524,  
barley=70, oats=32, rye=44,  
triticale=54, maize = 322**

**LOQ = 75 ppb**

**Range: <LOD – 890 ppb**



# ***Fusarium* toxins in unprocessed maize - Fumonisin**

**4000 µg/kg EU maximum level for  
unprocessed maize**

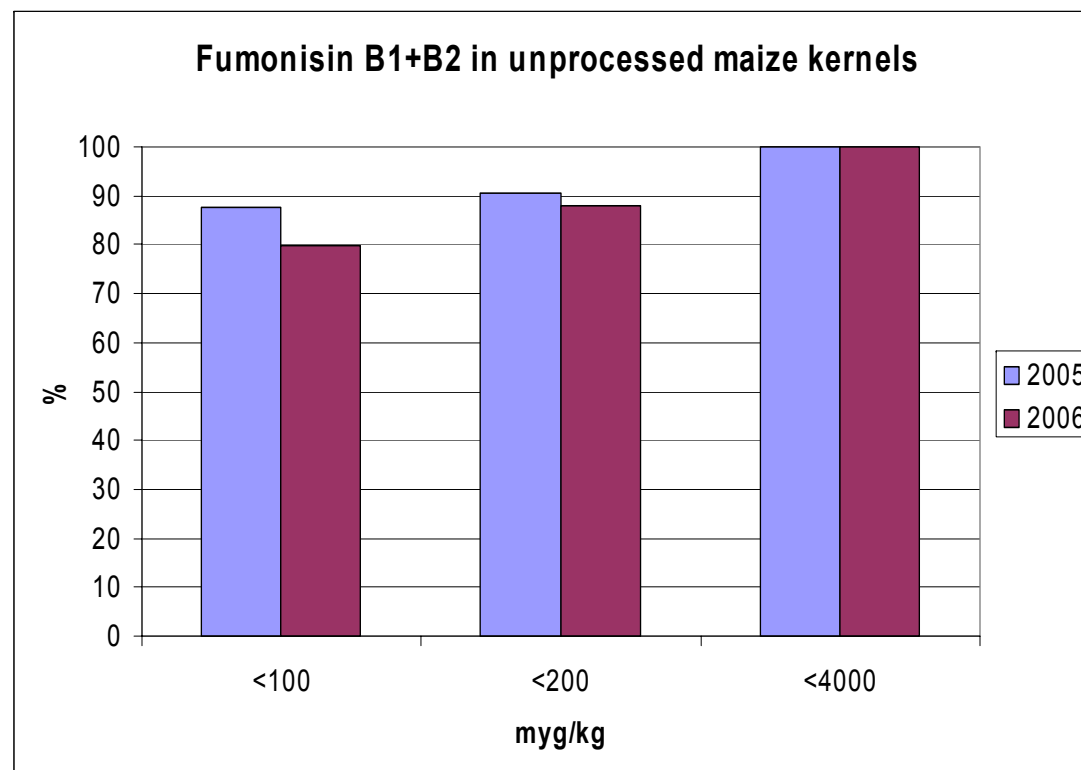
200 µg/kg EU maximum level for  
processed maize-based foods and baby  
foods for infants and young children

**2005: N = 96**

**Range: <100 – 3620 ppb**

**2006: N = 109**

**Range: <100 – 1700 ppb**



# *Fusarium* toxins in unprocessed cereals

## Frequencies (%) of quantification (values > LOQs)

### Fusarenon X (FUS):

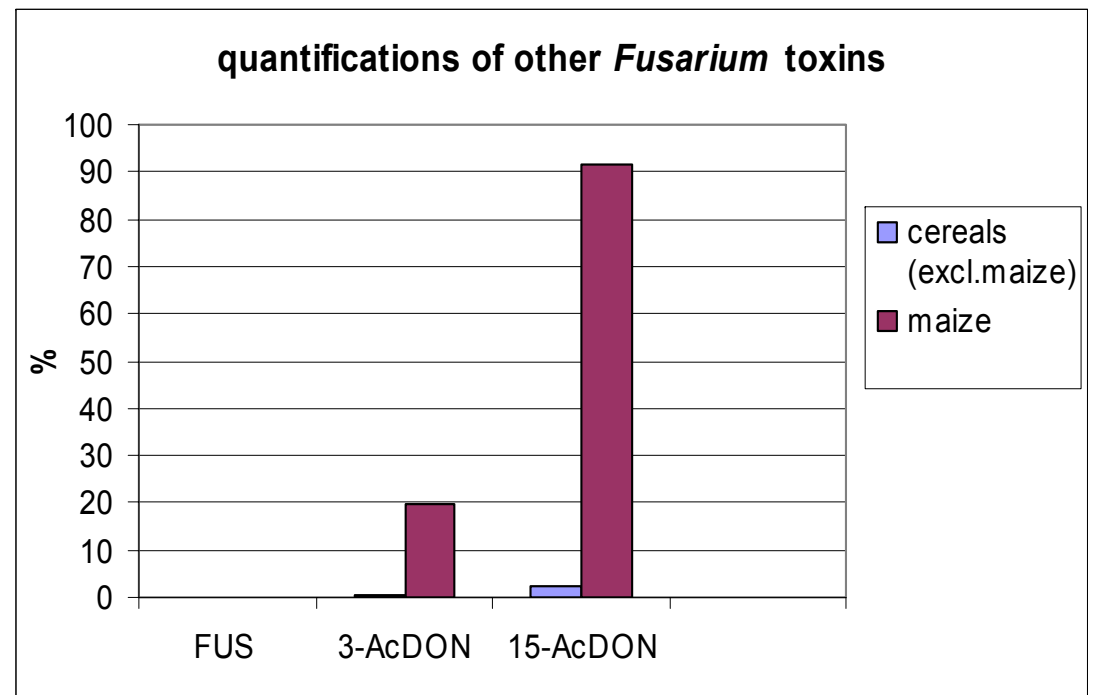
n=1064; range: <LOD; LOD=30 ppb

### 3-AcetylDON:

n=912; range: <LOD-190 ppb; LOQ=50 ppb

### 15-AcetylDON:

n=912; range: <LOD- 1600 ppb; LOQ=50 ppb



Results mainly from the last two years

# *Fusarium* toxins in cereal-based feed

- Includes Data from official controls and from private samples
- Official : private  $\approx$  3 : 1
- Feed samples for mycotoxin analyses (2007): about 550
- *Fusarium* toxin determinations (DON, NIV, ZON, FUM, T-2/HT-2) in feed samples (2007): about 1500

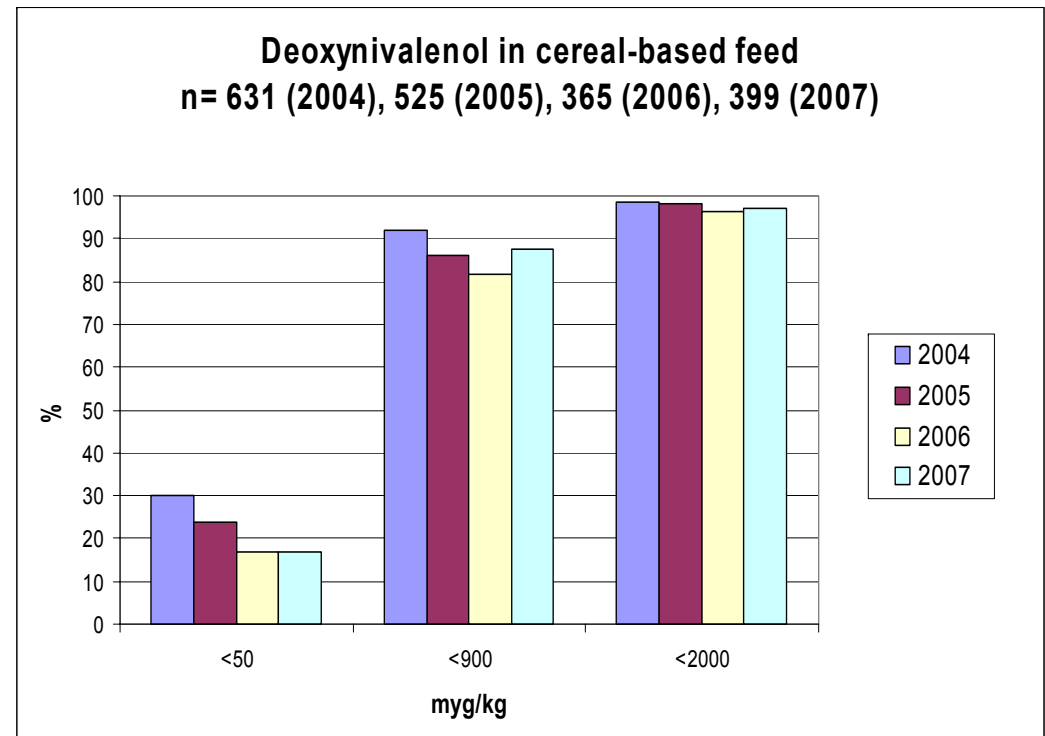
# Deoxynivalenol (DON) in feedingstuffs (overview)

Range: LOD – 5680 ppb

50 µg/kg: LOQ

900 µg/kg EU guidance value for complementary and complete feedingstuffs for pigs

2000 µg/kg EU guidance value for complementary and complete feedingstuffs for calves (<4 months), lambs and kids



# DON in feed materials and feedingstuffs (2007)

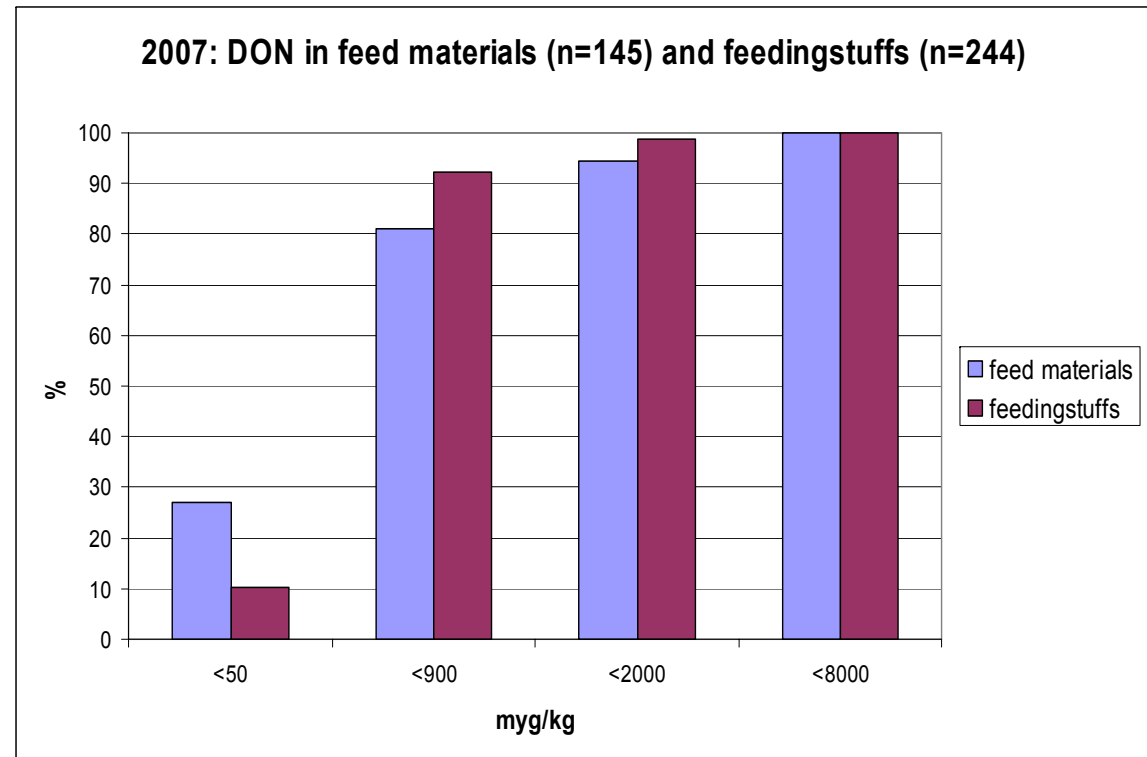
Range: LOD – 4420 ppb

50 µg/kg: LOQ

900 µg/kg EU guidance value for complementary and complete feedingstuffs for pigs

2000 µg/kg EU guidance value for complementary and complete feedingstuffs for calves (<4 months), lambs and kids

8000 µg/kg EU guidance value for feed materials (cereals and cereal products with exception of maize by-products)





# Zearalenone (ZON) in feedingstuffs (overview)

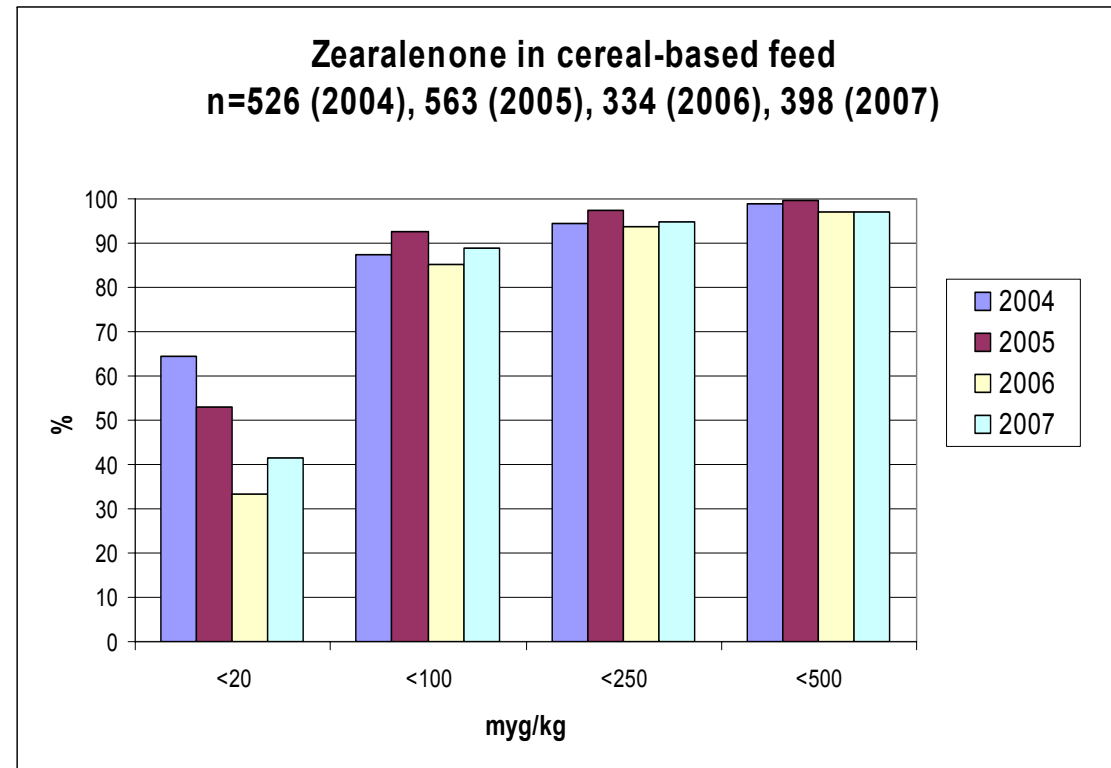
Range: LOD – 5660 ppb

20 µg/kg: LOQ

100 µg/kg EU guidance value for complementary and complete feedingstuffs for piglets and gilts (young sows)

250 µg/kg EU guidance value for complementary and complete feedingstuffs for sows and fattening pigs

500 µg/kg EU guidance value for complementary and complete feedingstuffs for calves, dairy cattle, sheep and goats



# ZON in feed materials and feedingstuffs (2007)

**Range: LOD – 1080 ppb**

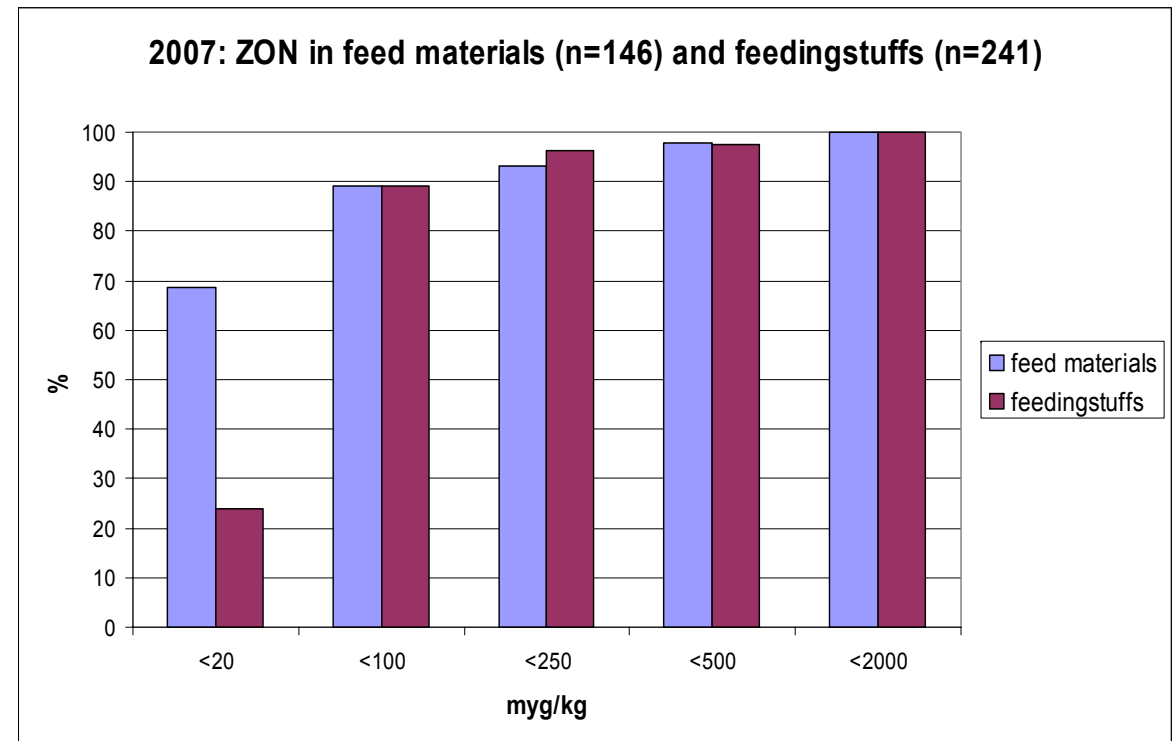
20 µg/kg: LOQ

100 µg/kg EU guidance value for complementary and complete feedingstuffs for piglets and gilts (young sows)

250 µg/kg EU guidance value for complementary and complete feedingstuffs for sows and fattening pigs

500 µg/kg EU guidance value for complementary and complete feedingstuffs for calves, dairy cattle, sheep and goats

2000 µg/kg EU guidance value for feed materials (cereals and cereal products with exception of maize by-products)



# Other *Fusarium* toxins in feedingstuffs (2007)

## Frequencies (%) of quantification (values > LOQs)

### Fumonisin B1+B2:

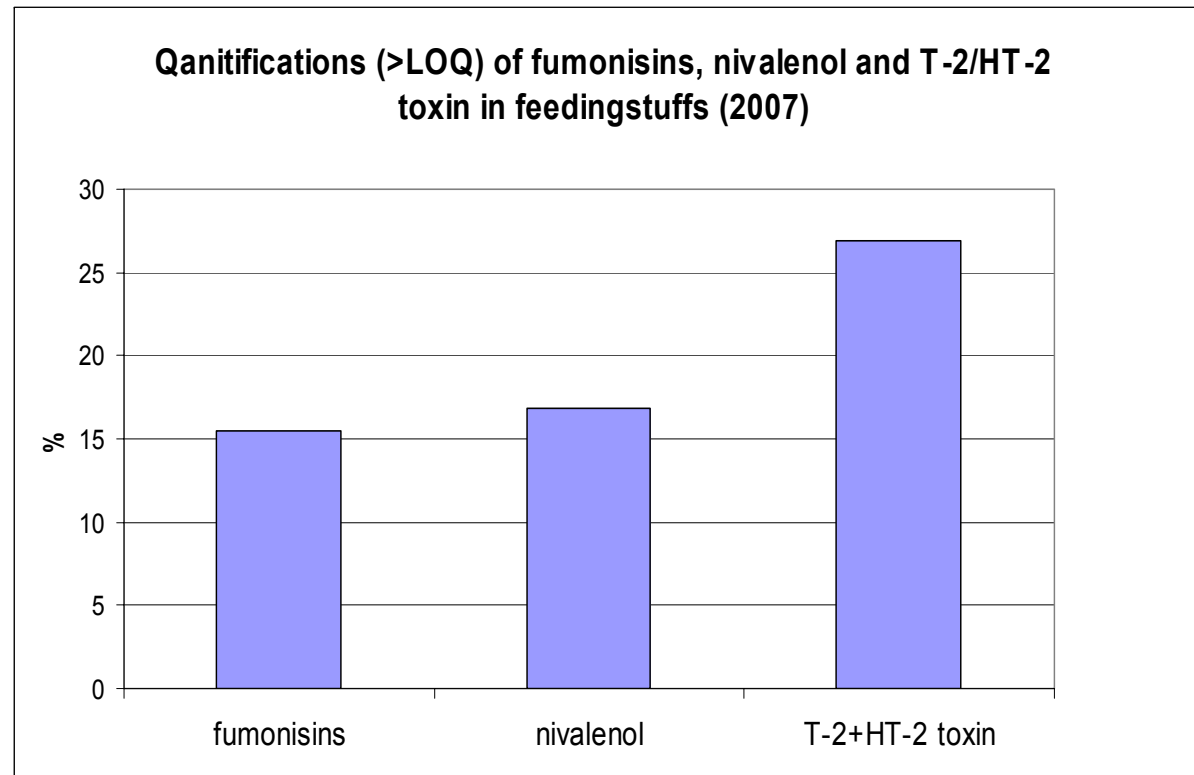
n=264; range: <LOD-3370 ppb; LOQ=100 ppb respectively

### Nivalenol:

n=399; range: <LOD-500 ppb; LOQ=75 ppb

### T-2 + HT-2 toxin:

n=26; range: <LOD- 124 ppb; LOQ=5 ppb respectively



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**Thank you for your attention**

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