

Occurrence of T-2 and HT-2 toxins in Oats in European Union Since 1994

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Sum of T-2 and HT-2 in Oats and Oat Products from 2005

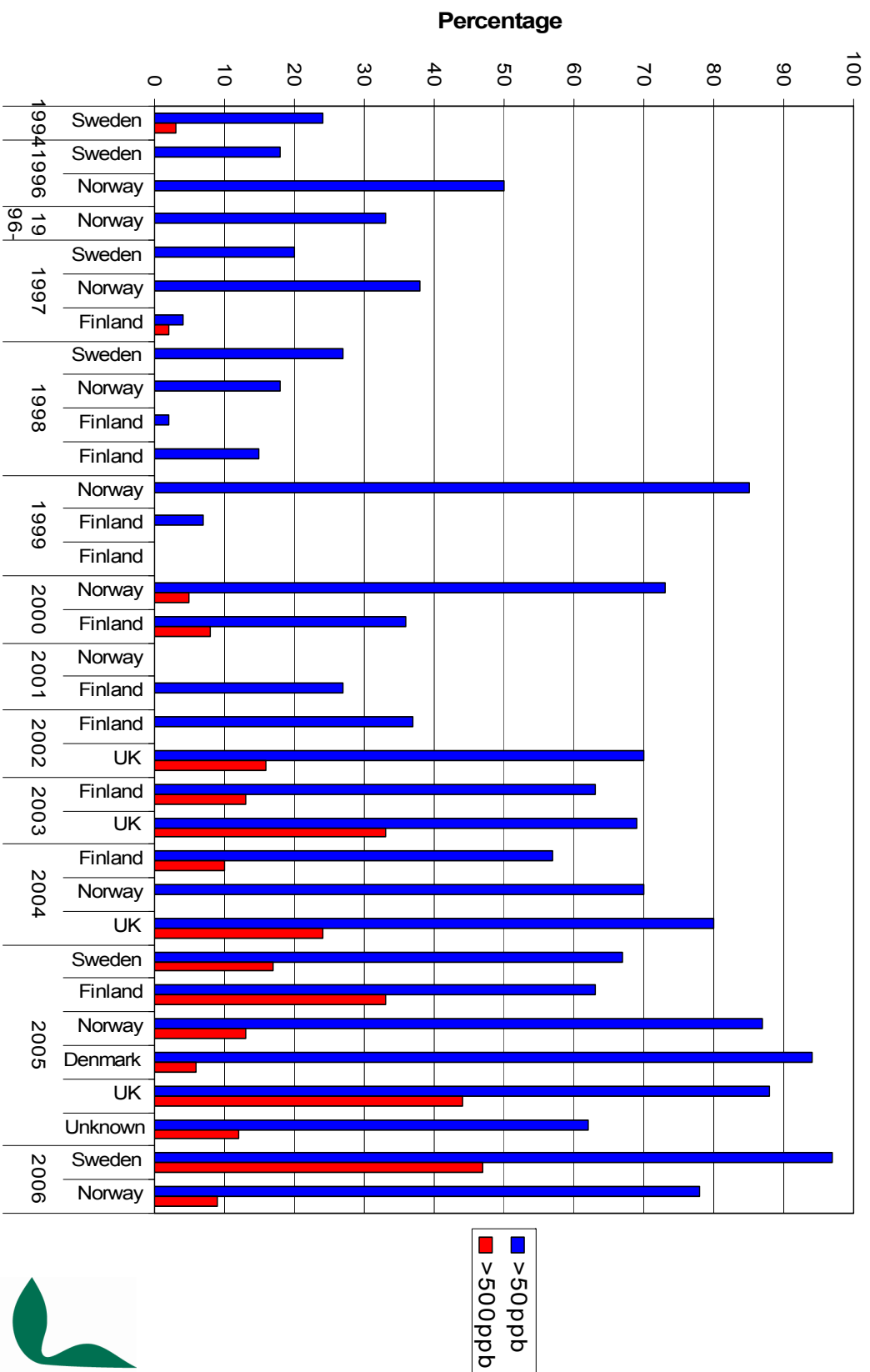
Country	Type of Material	Number	Mean ($\mu\text{g}/\text{kg}$)	Median ($\mu\text{g}/\text{kg}$)	Max ($\mu\text{g}/\text{kg}$)	Ref
Finland	Whole	60	440	186	3 500	Hietaniemi 2006
Norway	Whole	4	267	228	550	Biselli 2006
Norway	Whole	126	283	180	2 041	Clasen 2006
Sweden	Whole	23	233	93	1 165	Pettersson 2006
Denmark	Whole	18	312	221	2 560	Biselli 2006
UK	Whole	134	694	403	3 188	Edwards 2006
Unknown	Whole	38	871	86	14 640	Biselli 2006
Unknown	Whole organic	64	31	13	337	Biselli 2006
Unknown	peeled, flakes	29	48	18	607	Biselli 2006
Unknown	products	8	7		36	Biselli 2006

Sum T-2 och HT-2 in Oat Surveys 1994-2006

Year	Country	Number of Samples	Percent >10ppb	Percent >50ppb	Percent >500ppb	Mean (µg/kg)	Median (µg/kg)	Max (µg/kg)	Ref
1994	Sweden	34		24	3	81	25	871	Pettersson 2000
1996	Sweden	80		18	0	57	20	390	Pettersson 2000
	Norway	14	100			190		718	Langseth et al 2001
1996-98	Norway	178	70			108		1260	Langseth and Rundberget 1999
1997	Sweden	84		20	0	39	15	216	Pettersson 2000
	Norway	84	71			132		1260	Langseth et al 2001
	Finland	51			0	<50	<50	856	Hietaniemi et al. 2004
1998	Sweden	33		27	0	33	15	134	Pettersson 2000
	Norway	80	63			68		585	Langseth et al 2001
	Finland	52		4	0	<50	<50	116	Hietaniemi et al. 2004
	Finland	13			0	20	10	116	Eskola et al. 2000
1999	Norway	20		85	0	117		330	Langseth et al 2000
	Finland	59		2	0	<50	<50	240	Hietaniemi et al. 2004
	Finland	10		0	0	10	10	10	Yli-Mattila et al. 2004
2000	Norway	22		73	5	86	53	564	SCOOP 2003
	Finland	25		36	8	137	25	1369	Hietaniemi 2006
2001	Norway	24		0	0	10	10	10	SCOOP 2003
	Finland	37		27	0	59	25	273	Hietaniemi 2006
2002	Finland	30		37	0	78	38	427	Hietaniemi 2006
	UK	92	85	70	16	311	106	4844	Edwards 2006
2003	Finland	30		63	13	305	116	1647	Hietaniemi 2006
	UK	104	90	69	33	727	204	9990	Edwards 2006
2004	Finland	30		57	10	282	104	2850	Hietaniemi 2006
	Norway	56		70	0	106	86	334	Clasen 2006
	UK	128	94	80	24	500	202	6997	Edwards 2006
2005	Finland	60		63	33	440	186	3500	Hietaniemi 2006
	Sweden	24		67	17	260	95	1165	Pettersson 2006
	Norway	126		87	13	283	180	2041	Clasen 2006
	Denmark	18	100	94	6	312	221	2560	Biselli 2006
	UK	134	97	88	44	694	403	3188	Edwards 2006
	Unknown	42	81	62	12	814	91	14640	Biselli 2006
2006	Sweden	36		97	47	521	482	1416	Pettersson 2006
	Norway	102		78	9	218	145	1675	Clasen 2006

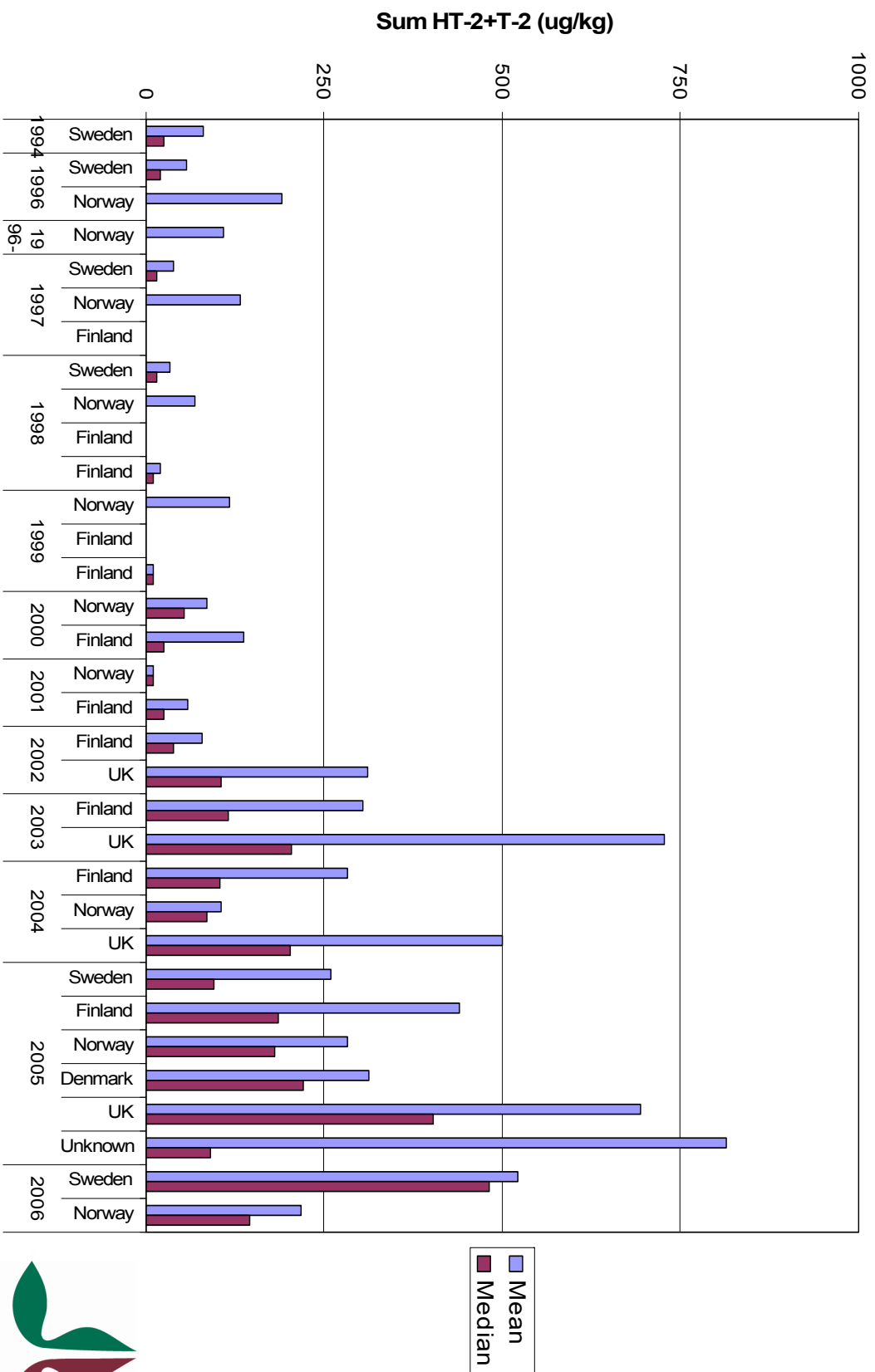
Sum of T-2 and HT-2 in Oat Surveys

Percentage of Samples Above Certain Levels

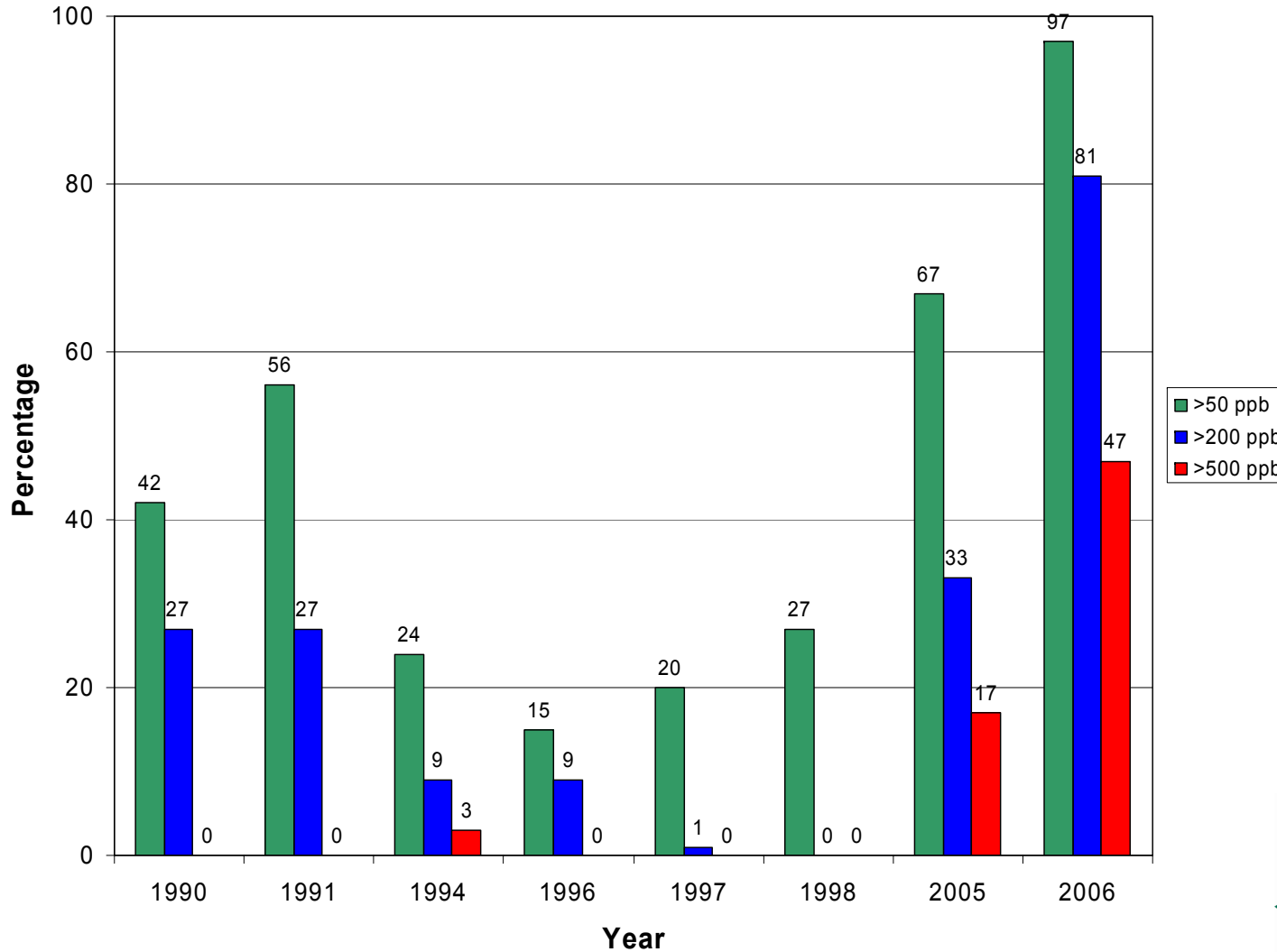


Sum of T-2 and HT-2 in Oat Surveys

Mean and Median Levels



Sum of HT-2 and T-2 toxin in Oats from Sweden, 24-87 samples per year



Analytical Methods HT-2 + T-2 toxins

- Difficult analyses – Improvements needed
 - No standardized method
 - 50% variation between laboratories
 - GC-MS → LC-MS
- Calibration
 - Calibrant concentration
 - Certified Reference Materials lacking
 - Control samples + Proficiency testing
 - Matrix effects
- Detection level
 - Lowered 50 → 5 ppb

Research for Reduction of HT-2 + T-2 in Oats

- Different occurrence to deoxynivalenol
 - Recommendations not applicable
- Producer *Fusarium langsethiae*
 - Hard artificial infection at flowering
- More common after warm and dry seasons
- Organic farming - lowering?
- Crop rotation - oats increasing?
- Shelling – reduction → 92 %

Shelling – Dehulling Oats

Distribution of Trichothecenes between Fractions

Trichothecene	Number	Groat/kernel (%)	Husk (%)
Deoxynivalenol	29	17±8	83±8
Nivalenol	5	10±4	90±4
HT-2 toxin	36	6±6	94±6
T-2 toxin	27	11±7	89±7

(After Clasen 2003)

Persons and Laboratories

Communicating Analytical Results on HT-2 and T-2 toxins in Oats

Person	Laboratory
Biselli, Scarlett	Eurofins, Hamburg, Germany
Clasen, Per-Erik	Veterinary Institute, Oslo, Norway
Edwards, Simon	Haper Adams University College, Newport, UK
Hietaniemi, Veli	MTT Agrifood Research Finland, Jokionnen, Finland
Pettersson, Hans	Swedish University of Agricultural Sciences, Uppsala, Sweden

Thanks to all of them and their financiers



Thanks for Your Attention!

and

Thanks to All Contributing
Laboratories

