

Dioxin in Food/Feed: US FDA sampling

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Documents of interest for FDA

- 2001 JECFA dioxin assessment
- 2003 NAS dioxin in food supply report
- EPA assessment in response to 2006 NAS review of the 2003 draft EPA dioxin re-assessment
- Draft CODEX code of practice



Concepts to consider in addressing dioxin in food

- Hazard assessment supports action
- Period of intake relevant to toxicity is long
Clipping highs is ineffective for risk reduction
- Effect of regulatory limits is uncertain
- Broad, diffuse sources for dioxins
- High cost of monitoring



Hazard and risk

- EPA, SCF, WHO, JECFA assessments agree
 - Exposures are in a range we don't like to see, considering the relative-risk they indicate.
 - There is a basis for considering further action.
- The question is do we know what actions will improve health?
 - Which actions with regard to food levels will effectively and equitably reduce exposure?
 - What is the net risk change for risk management choices?



Setting levels is an almost impossible task

This is just the fish.

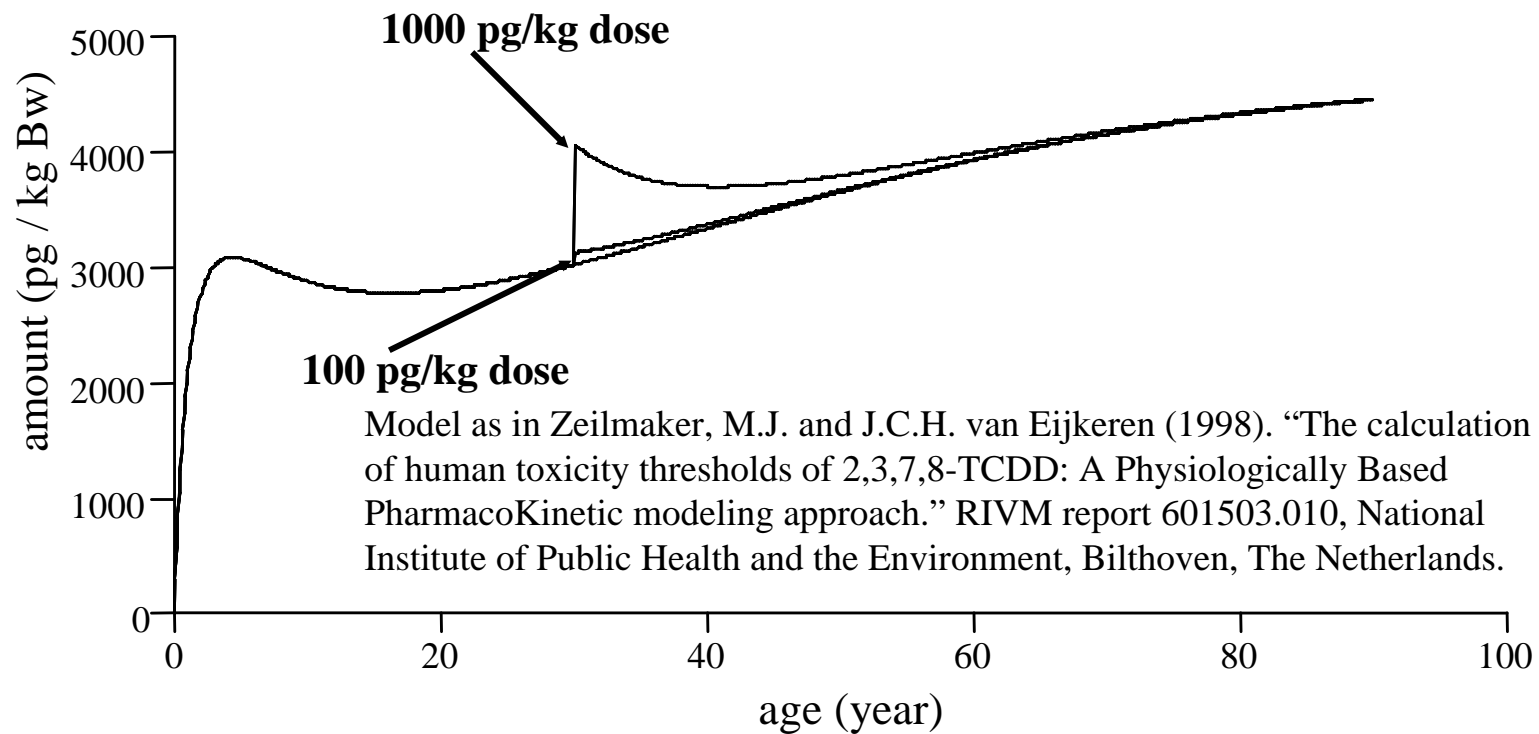


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Table 3-28. Background CDD/CDF TEQs in Fish and Shellfish, Consumption Rates, and Intakes

Fish Class	Species	Consumption Rate (g/day)	N	CDD/CDF TEQ Conc. (Pg/g fresh wt.)	CDD/CDF TEQ Intake (pg/day)
Estuarine Finfish	Flounder (e)(f)	0.58	3	1.8	1.0
	Rockfish/Striped Bass (d)	0.043	26	1.2	0.052
	Salmon (d)	0.042	39	0.57	0.024
	Mullet (a)	0.034	2	0.068	0.0023
	Other Flatfish, Perch, Croaker, Herring, Anchovy, Smelts, Eel, Sturgeon Total Other*	0.88	0	1.3	1.1
Freshwater Finfish	Catfish-farmed (b,d,h)	0.9	30	2.0	1.8
	Trout-farmed (e,h)	0.41	6	1.9	0.78
	Perch (e) (walleye)	0.17	3	1.2	0.20
	Carp (e)	0.14	4	1.2	0.17
	Pike (e) (pickerel)	0.035	3	0.49	0.017
	Salmon (d)	0.00083	39	0.57	0.00047
	Other: Whitefish, Cisco, Smelts, Rainbow, Sturgeon Total Other*	0.01387	0	1.3	0.018
Total Freshwater/Est. Finfish		3.3	116	1.6	5.2
Freshwater/Estuarine Shellfish	Shrimp (b,c)	2.0	19	0.08	0.16
	Crab Average	0.30	33	0.60	0.18
	Oyster Average	0.15	18	0.57	0.086
	Scallop (d)	0.0011	11	0.16	0.00018
	Crayfish	0.0090	25	0.74	0.0067
	Other: Clam, Snails Total Other**	0.0157	0	0.43	0.0068
Total Freshwater/Est. Shellfish		2.5	173	0.18	0.44
Unknown Freshwater/Est. Species	Fish***	0.14	0	1.3	0.18
Total Fresh./Est. Fish		5.9	289	1.0	5.9
Marine Finfish	Tuna (c)	3.1	16	0.06	0.19
	Cod (c)	1.4	18	0.15	0.21
	Salmon (d)	1.3	39	0.57	0.74
	Pollack (d)	0.25	19	0.22	0.055
	Mackerel (a)	0.11	1	0.95	0.10
	Other: Porgy, Haddock, Whiting, Squid, Perch, Sardine, Sea Bass, Swordfish, Pompano, Octopus, Flatfish, Halibut, Snapper, Whitefish, Smelt, Shark, Roe Total Other****	1.8	0	0.39	0.7
	Total Marine Finfish		8.0	93	0.25
Marine Shellfish	Scallop (d)	0.19	11	0.16	0.030
	Lobster (d)	0.19	16	0.26	0.049
	Crab (d)	0.16	38	0.36	0.058
	Other: Clams, Mussels, Conch, Snails Total Other****	0.77	0	0.26	0.20
Total Marine Shellfish		1.3	65	0.26	0.34
Unknown Marine Species	Seafood (g)***	0.080	0	0.39	0.031
	Fish***	0.220	0	0.39	0.09
Total Marine Fish		9.6	158	0.26	2.5
TOTAL FISH		15.5	359	0.54	8.3

Short term variation in intake is relatively unimportant



FDA approach

Sampling

Evaluate exposure level

Follow up where sources are unusually high

Good practice development



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FDA Dioxin Strategy

- FDA has been concerned about DLCs and has been monitoring food and feed with the goal of identifying ways to reduce dietary exposure
- In July 2001, FDA developed a strategy for DLCs (www.cfsan.fda.gov/~lrd/dioxstra.html)
- The purpose of FDA's Dioxin Strategy, which significantly expanded FDA's dioxin monitoring program, is to develop the science to support appropriate risk management actions



FDA Dioxin Program Goals

- Obtain profiles of background levels of DLCs in a wide variety of food and feed
- Identify opportunities for DLC reduction by eliminating or reducing contamination sources
- Provide estimates of dietary DLC exposure



FDA Sample Request Summary

Year	TDS	Targeted	Total
2001	270	~500	~800
2002	214	~1,000	~1,300
2003	232	~1,400	~1,600
2004	232	~1,400	~1,600
2005	232	~1,400	~1,600
2006	232	~850	~1,100



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FDA Targeted Sampling

- Milk/Dairy Products
- Eggs
- Fish, wild/farmed (retail/grower)
- Fats/Oils
- Grains/Cereals
- Fruits/Vegetables
- Tree Nuts/Peanuts
- Fat Soluble Vitamins
- Feed/Feed Components
- Follow-up Sampling

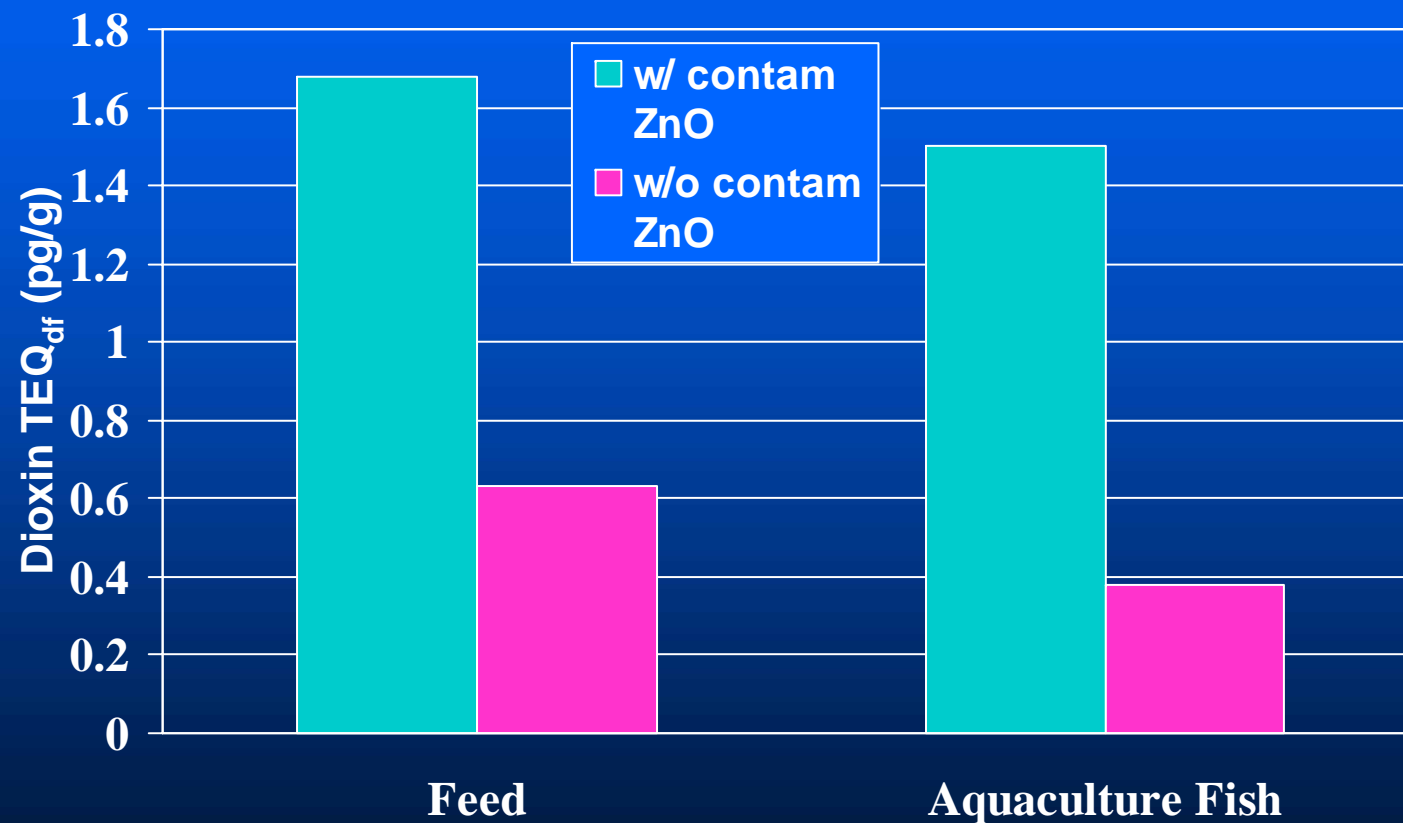


FDA Follow-up Investigation

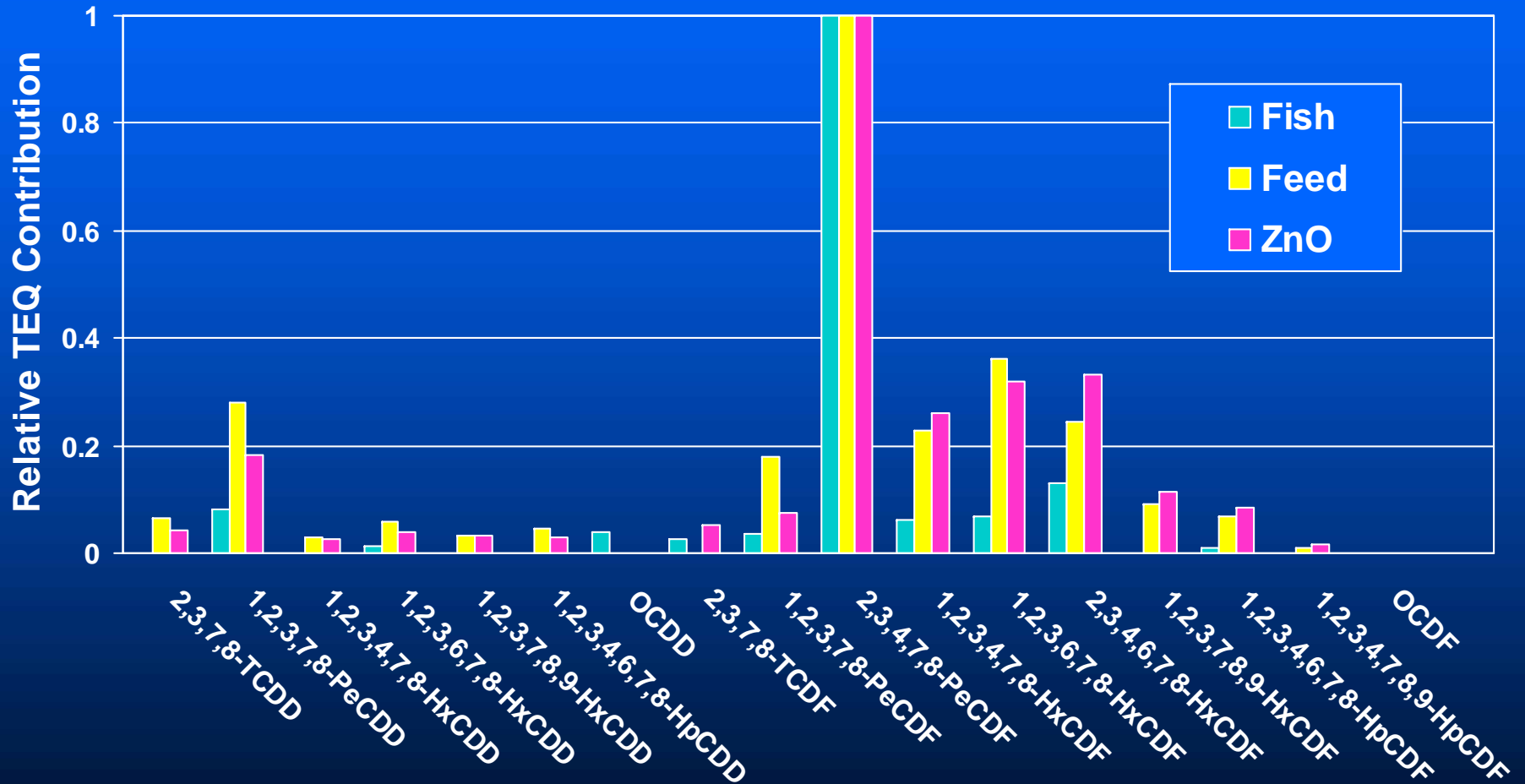
- CFSAN monitoring program identified aquaculture fish/feed samples with elevated PCDD/PCDF
- CFSAN/CVM issued investigation at feed mill finding elevated PCDD/PCDF in mineral premix
- CVM issued investigation at premix manufacturer and mineral supplier identifying a zinc oxide with elevated PCDD/PCDF
- Recall of mineral premix/feed containing the contaminated zinc oxide was implemented
(www.fda.gov/cvm/CVM_Updates/zincdioxin.htm)



Aquaculture Feed/Fish (FY02)



Relative TEQ Contribution in Fish, Feed, and Contaminated Zinc Oxide



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FDA's Total Diet Study

- TDS is FDA's ongoing market basket survey of approximately 280 foods in U.S. food supply
- FDA's TDS determines levels of various pesticide residues, contaminants and nutrients in *table-ready* foods
- In 1999, FDA began analyzing TDS foods for PCDD/PCDFs (3 DL-PCBs added in 2004)



TDS Food Results

TDS Food	Mean WHO-TEQ _{DF} * (pg/g food, ND=0)
Whole Milk	0.010
American Cheese	0.033
Ground Beef, pan cooked	0.126
White Bread	0.001
Butter	0.198
Bologna	0.130
Apple Juice	0.000
Scrambled Eggs	0.027



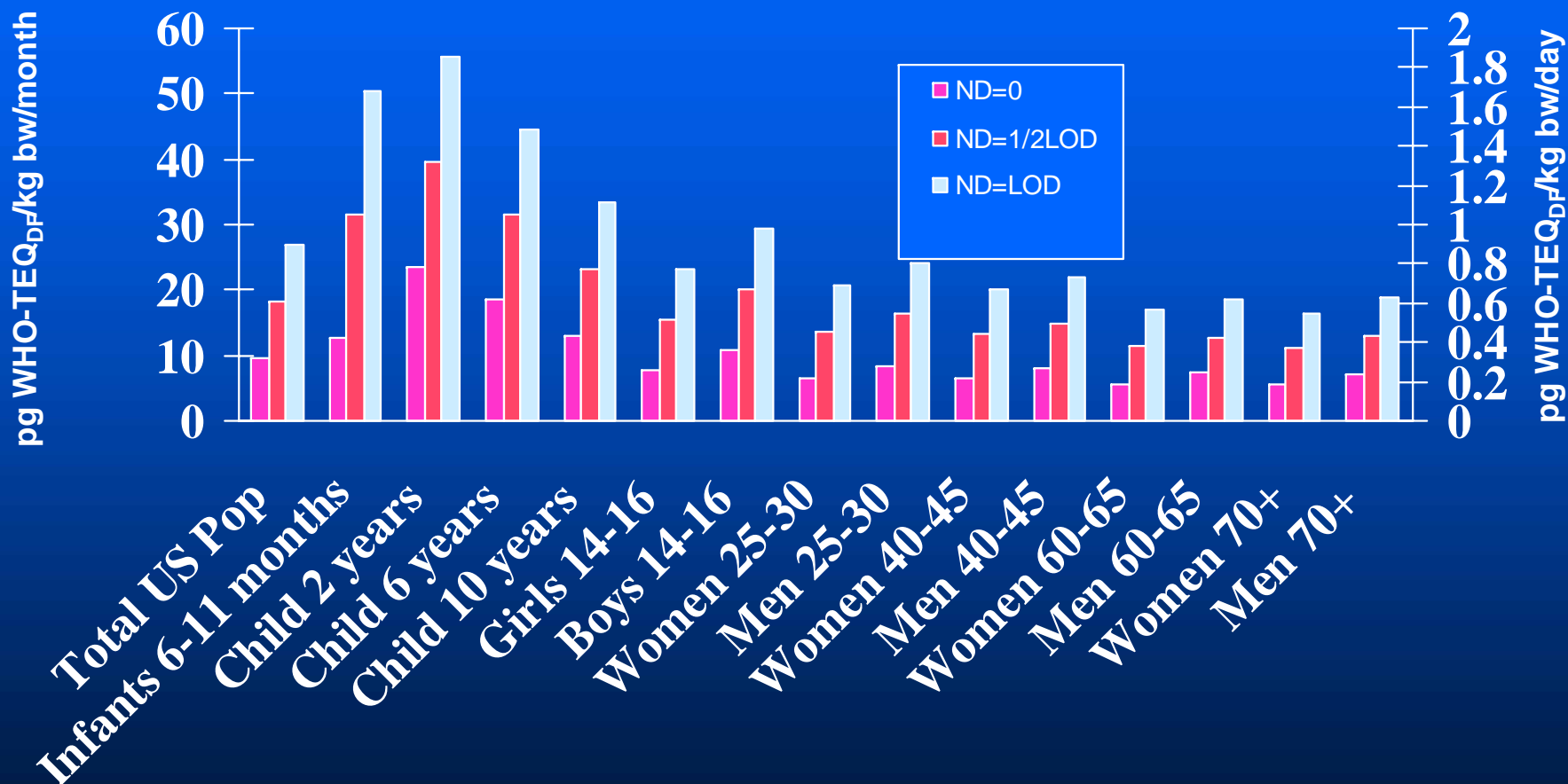
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*Values are mean WHO-TEQ_{DF} for
2001-2004 TDS foods.

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PCDD/PCDF Exposure Estimates from 2001-2004 TDS Foods



From: www.cfsan.fda.gov/~lrd/dioxee.html

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Targeted (Non-TDS) Food Samples

- CFSAN will be posting PCDD/PCDF data for targeted (non-TDS) foods including additional exposure estimates from this data



Codex/Dioxin Code of Practice

- CFSAN heads U.S. delegation to Codex Committee on Contaminants in Food
- CFSAN has worked with other countries to develop international code of practice titled “Code of Practice for the Prevention and Reduction of Dioxin and Dioxin-Like PCB Contamination in Food and Feed”
- Code of Practice recently adopted by Codex Alimentarius Commission (July 2006)
- Available at: www.codexalimentarius.net (ALINORM 6/29/12, Appendix XXVI)



NAS “dioxin in food” report recommendations (July 2003)

Limited win/win situations

Data limitations

Resource bottleneck



NAS - Win/Win

Overlap with general dietary issues

- Promote changes on food availability that realize overlap with other issues
 - Sat fat. Obesity. Eat your veggies.
- Behavioral research
 - Dietary guidelines would reduce both dioxin and CHD/obesity if more people followed them
 - Research needed to find keys to changing behavior



NAS - Data limitations

Don't know enough about how dioxin enters the feed supply to make recommendations on how to control



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NAS - Fix the resource bottleneck

- Make methods cheaper (and get data) before deciding what to do
- Develop infrastructure to make it work for you where you can (develop good practices that alter use of and demand for higher dioxin sources/practices)
- Pool data, collaborate for change



NAS recommendation on levels

No levels now, given the knowledge base
(and the cost of analysis)

“consider setting legally binding limits on DLCs in forage and feed only when more complete data are generated and a better understanding is developed of how DLC contamination can be avoided.”



NAS dioxin 2006

- Not much for FDA directly, of course
- Recommendation to set an RfD may overlap with JECFA assessment
- Recommends that EPA develop a data base on food levels with congener-specific information in order to make exposure estimates more transparent



USG coordination on dioxin

- National Science and Technology Council
IWG for dioxin
- Ad hoc interagency working group on food
and feed sampling and follow-up
 - USDA, EPA, FDA, CDC
 - Currently quiescent



Next steps

- Exposure estimates that include
 - Dioxin like PCBs
 - Sampling beyond the “Total Diet Study”
- Data release
- Working with EPA in the NSTC IWG setting

