



## FEEDING FATS SAFETY

### One-Year Meeting

9-10 February 2006 - Barcelona

**WP-1: Characterization and classification of feeding fats  
(preliminary results)**

**Environmental contaminants:  
PAHs and PBDEs in feeding fats**

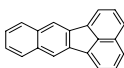
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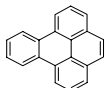


## Polycyclic aromatic Hydrocarbons (PAHs)

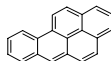
Name	Abbreviation
Benzo(b)fluoranthene + Benzo(k)fluoranthene	BF
Benzo(e)pyrene	BeP
Benzo(a)pyrene	BaP
Perylene	Per
Indeno(123-cd)pyrene	IP
Dibenzo(ah)anthracene + Dibenzo(ac)anthracene	DA
Benzo(ghi)perylene	BP



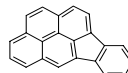
BkF



BeP



BaP



IP



BP

**PAH determination :**





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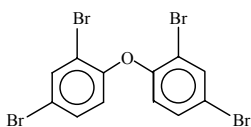
### Selected PAHs (high molecular weight compounds):

1. Toxicity
2. Reference endpoint for human consumption: BaP legal limit of 2 ng/g
3. Loss/degradation of lower molecular weight compounds during elaboration of feed

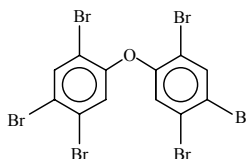


## Polybromodiphenylethers (PBDEs)

Name	Abbreviation
2,2',4,4'-tetraBDE	BDE 47
2,2',4,4',5-pentaBDE	BDE 99
2,3',4,4',6-pentaBDE	BDE 119
2,2',4,4',5,5'-hexaBDE	BDE 153



BDE 47



BDE 153

### PBDE determination :





## Total PAH levels in fat categories

	Total [HAP] (ng/g) : min - max (median) [BF, BeP, BaP, Per, DA, IP, BP]
ANFA	1 - 54 (1)
AOCHE	1 - 340 (20)
AOPHY	1 - 190 (25)
EBE	8 - 56 (32)
FACS	14 - 61 (16)
FISH	1 - 9 (3)
HYBY	3 - 24 (7)
LECI	1 - 8 (4)
MIX	1 - 62 (8)
RECY	1 - 103 (7)



## Slightly contaminated categories by PAHs

LECI (lecithins), FISH (fish oils), HYBY (hydrogenated fats from by-products)

	LECI	FISH	HYBY
Number of samples	9	9	6
Total PAHs	<0.5 - 3 ng/g	<0.5 - 3 ng/g	<0.5 - 3 ng/g
Samples with BaP > 2 ng/g	1/9 (≈ 3 ng/g)	0/9	1/9 (≈ 3 ng/g)

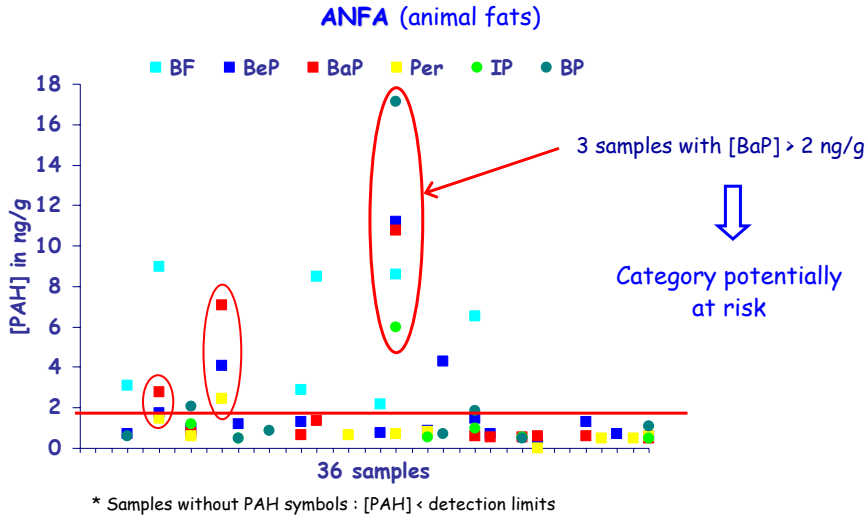
⇒ Fat Categories exhibiting the lowest PAH levels



## Feeding Fats Safety



### Slightly contaminated categories by PAHs ... with possible exceptions



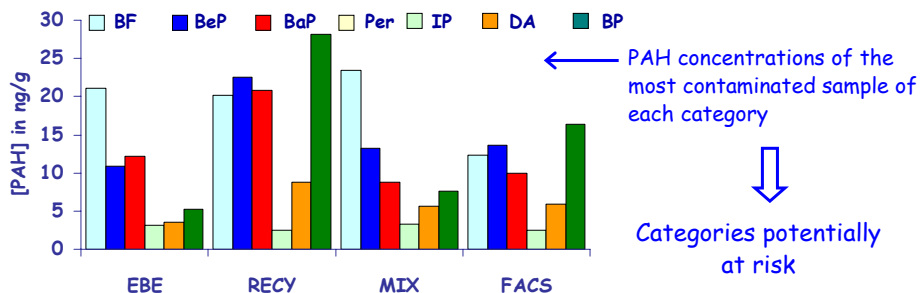
## Feeding Fats Safety



### Slightly contaminated categories by PAHs ... with possible exceptions

EBE (oils extracted from exhausted bleaching earth), RECY (recycled cooking oils), MIX (miscellaneous products), FACS (fatty acid calcium soaps)

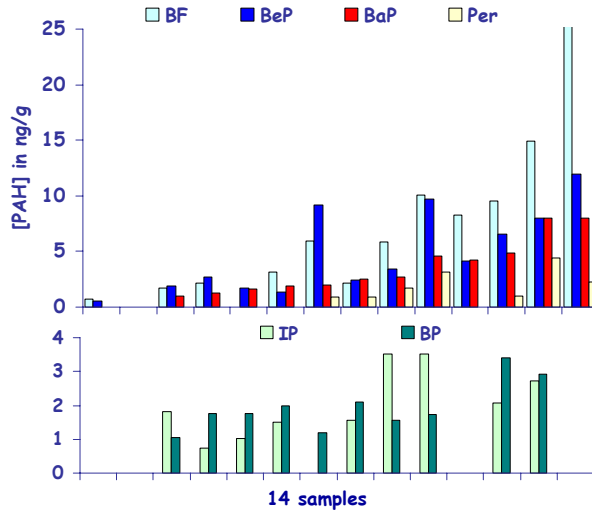
	EBE	RECY	MIX	FACS
Nb samples	2	8	10	3
Total PAHs	<0.5 - 3 ng/g	<0.5 - 3 ng/g	<0.5 - 3 ng/g	<0.5 - 3 ng/g
Samples with BaP > 2 ng/g	2/2 (3-10 ng/g)	2/8 (3-20 ng/g)	1/10 (9 ng/g)	2/3 (3-10 ng/g)





## Slightly to heavily contaminated categories by PAHs

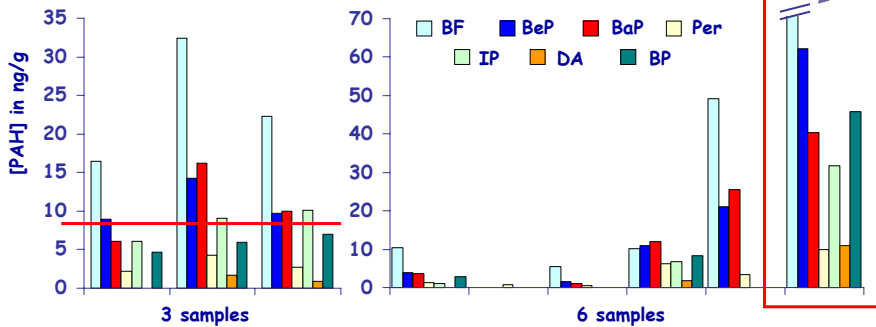
### AOCHE (acid oils from chemical refining) - vegetal



## Slightly to heavily contaminated categories by PAHs

### AOCHE - tropical

### AOCHE - olive



Similar contaminated levels

← 2 distinct groups of contamination level →

### AOCHE - animal

2 samples with low individual concentrations (<4 ng/g), and 1 of 2 with BaP ≈ 3 ng/g



## Slightly to heavily contaminated categories by PAHs

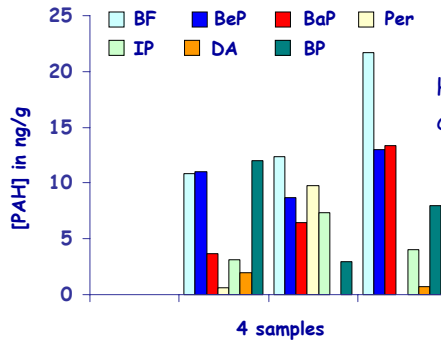
**AOPHY** (acid oils from physical refining)

**AOPHY - animal** (1 sample)

**AOPHY - olive** (3 samples)

Low levels of individual PAHs  
( $<0.5$  to 4 ng/g)

**AOPHY - vegetal**

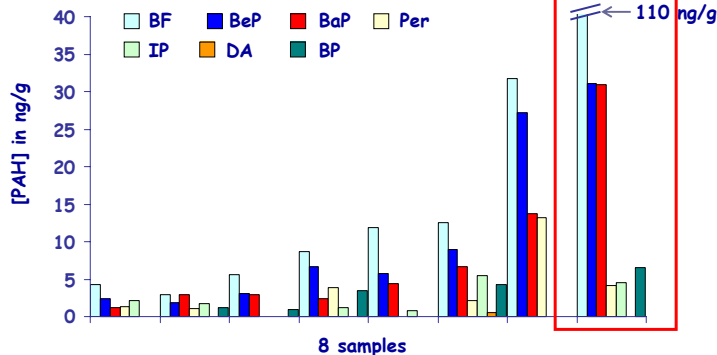


Highest levels of IP, DA and BP, compared to **AOCHE - vegetal**



## Slightly to heavily contaminated categories by PAHs

**AOPHY - tropical**



← 2 distinct groups of contamination level →

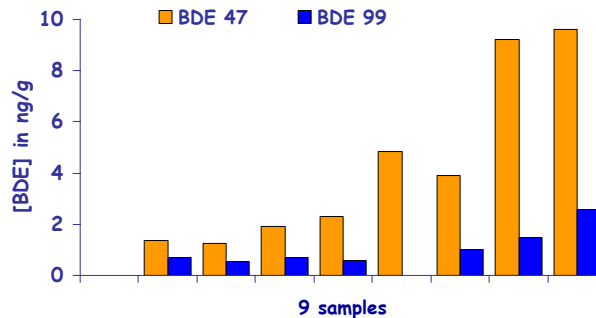


## PBDE contamination of feeding fats

- **AOCHE** (8 samples analyzed), **AOPHY** (3), **LECI** (2), **RECY** (3), **ANFA** (6), **EBE** (2), **HYBY** (2), **FACS** (1), and **MIX** (3) : PBDEs not detected

PBDE congener	BDE 47	BDE 99	BDE 119	BDE 153
Limit of detection	< 0.5 ng/g	< 0.5 ng/g	< 0.5 ng/g	< 1 ng/g

- **FISH** (fish oils)



## Conclusion

### PAH contamination of feeding fats :

#### > 3 levels of contamination :

- very **low** (<0.5 - 2 ng/g) : **FISH**, **HYBY**, **LECI**
- very **low** but potentially **at risk** : **ANFA**, **EBE**, **FACS**, **MIX**, **RECY**
- **low** to **very high** : **AOCHE**, **AOPHY**

#### > Contamination of **AOCHE** and **AOPHY** subcategories (animal, vegetal, tropical and olive origins):

- **AOCHE** : **tropical** and **olive** subcategories  
highest total PAHs = **340** ng/g, with [BaP] = **40** ng/g (olive sample)
- **AOPHY** : **tropical** and **vegetal** subcategories  
highest total PAHs = **190** ng/g, with [BaP] = **30** ng/g (tropical sample)



### Conclusion

#### PAH contamination of feeding fats :

➤ The case of BaP : comparison with a reference level set for human consumption, the BaP European legal limit of 2 ng/g

[BaP] ng/g	< 2	2 - 5	5 - 10	10 - 20	20 - 40	N > 2
ANFA	33	1	2			3/36
AOCHE	10	7	4	2	2	15/25
AOPHY	5	6	2	2	1	11/16
EBE		1	1			2/2
FACS	1	1	1			2/3
FISH	9					0/9
HYBY	5	1				1/6
LECI	9					0/9
MIX	9		1			1/10
RECY	6	1			1	2/8

Potential risk with the AOCHE and AOPHY fat categories (BaP level and occurrence) and, in a lesser extent, with the RECY category (BaP level)



### Conclusion

#### PBDE contamination of feeding fats :

➤ PBDEs were only detected in fish oil category, as expected (BDE 47 and BDE 99 < 10 ng/g)