



Feeding Fats Safety

WP 2

Mariola Baucells, WP2 Leader

UAB
Universitat Autònoma
de Barcelona



UNIVERSIDAD
POLITECNICA
DE VALENCIA



Introduction

- Fat supplementation is a normal practice in feed formulation
- Added fats represent a highly concentrated energy source
- They come from industry processes



Possible presence of **degradation products** and **contaminants**



Specific degradation products
triglyceride
9.

Lower or non-nutritive value
Potentially harmful effects



Objective WP 2



To assess the risk related to the use of recycled fats in the feed industry and in animal production

Broiler chicken & Rabbit production



4 trials: December 2005 – October 2006

- Trial 1, *Trans* Fatty Acids (T)
- Trial 2, Dioxins and PCBs (C)
- Trial 3, PAHs (P)
- Trial 4, Lipid Oxidation (O)

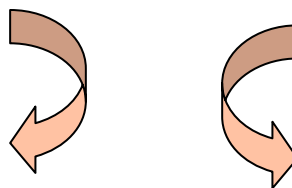


Objective WP 2



To assess the risk related to the use of recycled fats in the feed industry and in animal production

Broiler chicken & Rabbit production



Growing Performance

Health Status

Deliverable 5

Deliverable 6

WP2 Final Report, October 2007



UAB

Universitat Autònoma
de Barcelona

WP2- Procedures



UNIVERSIDAD
POLITECNICA
DE VALENCIA

- Growing performances:
 - Control of feed intake and body weight gain
 - Daily incidences
 - Digestibility trials
- Carcass:
 - Final body weight
 - Yield carcass
 - Abdominal fat content

- Health status:
 - Post-mortem inspection
 - Determination of different parameters:
 - Biochemical
 - Microbiological
 - Histological



Feeding Fats Safety

WP 2 – UAB Final Results



José Alfredo Choque; Arantza Gómez de Segura; Susana Martín-Orúe;
Sabrina Endo Takahashi; Fredy Mateus; Ana C Barroeta and Mariola Baucells

Animal Nutrition, Management and Welfare Research Group
Veterinary School

UAB

Universitat Autònoma
de Barcelona



Growing performances



6% added fat; Two treatments: **H and L**; feed & water *ad libitum*

64 broiler chickens: 8 replicates x 4 animals x 2 Tts CAGES

80 broiler chickens : 4 replicates x 10 animals x 2 Tts FLOOR

2 Digestibility balances: 14-16 days & 37-39 days (three last trials)

No remarkable incidences or mortality in the animals

Normal growth – Normal final weights- Normal carcass parameters

Trans Fatty acids



HIGH 12.40%
LOW 0.65%

	LT	HT	RSD	P value
Final BW (g)	2678	2513	94,5	0,006
BW gain (g/d)	62,4	58,3	2,29	0,005
Feed intake (g/d)	114	112,8	3,74	0,68
Feed efficiency	1,83	1,94	0,06	0,004



Growing performances



6% added fat; Two treatments: **H and L**; feed & water *ad libitum*

64 broiler chickens: 8 replicates x 4 animals x 2 Tts CAGES

80 broiler chickens : 4 replicates x 10 animals x 2 Tts FLOOR

2 Digestibility balances: 14-16 days & 37-39 days (three last trials)

No remarkable incidences or mortality in the animals

Normal growth – Normal final weights- Normal carcass parameters

Trans Fatty acids

HIGH 12.40%
LOW 0.65%



	LT	HT	RSD	P value
Final BW (g)	2678	2513	94,5	0,006
BW gain (g/d)	62,4	58,3	2,29	0,005
Feed intake (g/d)	114	112,8	3,74	0,68
Feed efficiency	1,83	1,94	0,06	0,004

%	HT	LT
SFA	85	54
MUFA	15	37
PUFA	0	9



Growing performances



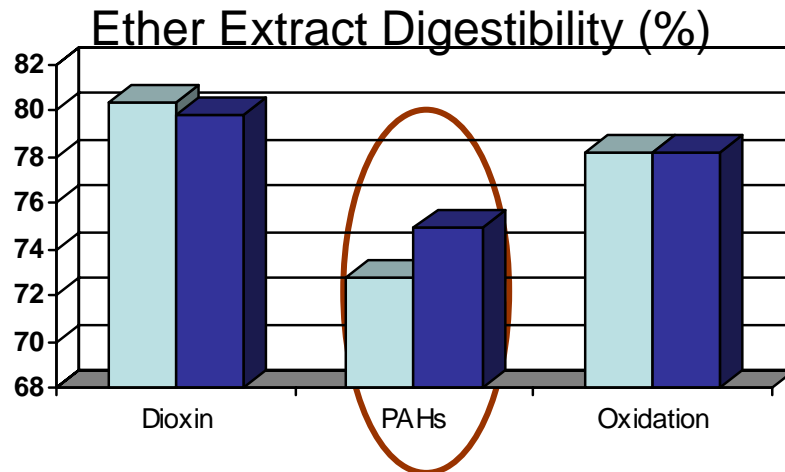
6% added fat; Two treatments: **H and L**; feed & water *ad libitum*
 64 broiler chickens: 8 replicates x 4 animals x 2 Tts CAGES
 80 broiler chickens: 4 replicates x 10 animals x 2 Tts FLOOR
 2 Digestibility balances: 14-16 days & 37-39 days (three last trials)

No remarkable incidences or mortality in the animals

Normal growth – Normal final weights- Normal carcass parameters

PAHs ng/g oil

HIGH 5290
LOW <18



Acid oils





Health Status

Level of alteration

6% added fat; Two treatments: H and L

80 chicken broiler: 4 replicates x 10 animals x 2 Tts

The animals were sequentially slaughtered at 9,13,21 and 37 days old



Summary of samples collected and analytical determinations

Sample	Analytical Determination	Sampling days (days old)	Samp./Treat in each exp.	Analyzed samples
Blood	Haemolysis rate TBARs	9, 13, 21 and 37	8	256
Cecal content	Microbiota Diversity (t-RFLP) SCFA and lactic production	9, 21 and 37	8	192
Excreta	Oocysts of <i>Eimeria</i> (coccidia McMaster determination)	18 and 37	4	64
Jejunum Portion	Histomorphology: Villous height Crypt depth Intraepithelial lymphocytes	9 and 21	8	128

Age



Health Status

6% added fat; Two treatments: **H** and **L**

80 chicken broiler: 4 replicates x 10 animals x 2 Tts

The animals were sequentially slaughtered at 9,13,21 and 37 days old



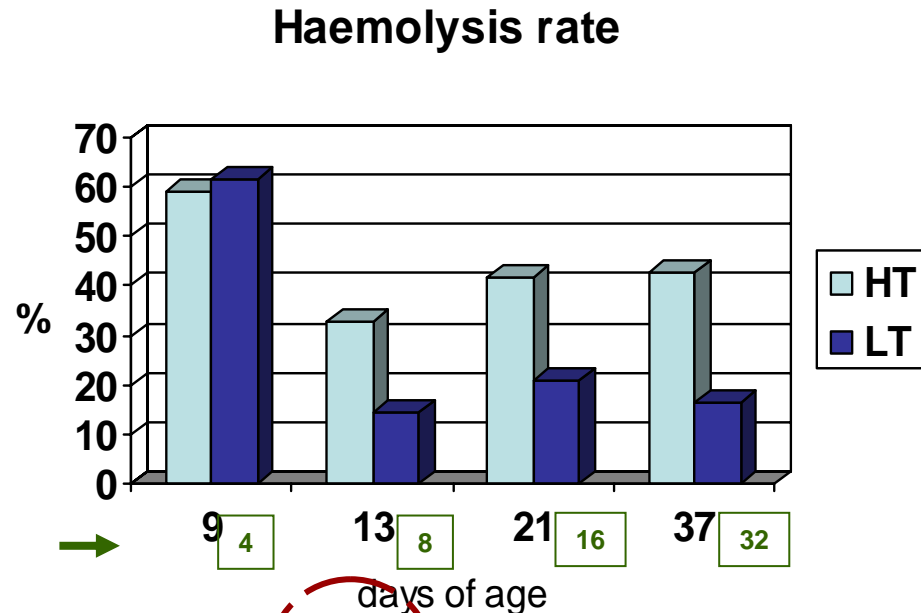
Not remarkable organic lesions post-mortem

Trans Fatty acids



HIGH 12.40%
LOW 0.65%

Experimental period



P values : **Tt < 0.01**; age <0.001; (Tt x age) >0.10



Health Status

6% added fat; Two treatments: **H and L**

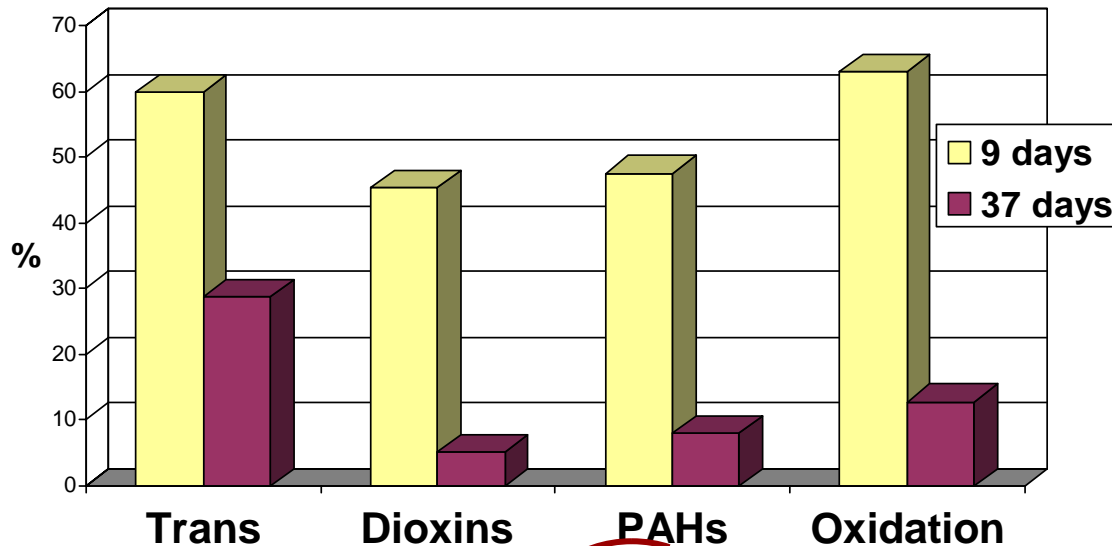
80 broiler chickens: 4 replicates x 10 animals x 2 Tts

The animals were sequentially slaughtered at 9,13,21 and 37 days old



Differences in red cell membrane integrity varied with age

Haemolysis rate



P values: Trial < 0.001; age < 0.001; (T x a) > 0.10



Health Status

6% added fat; Two treatments: **H** and **L**

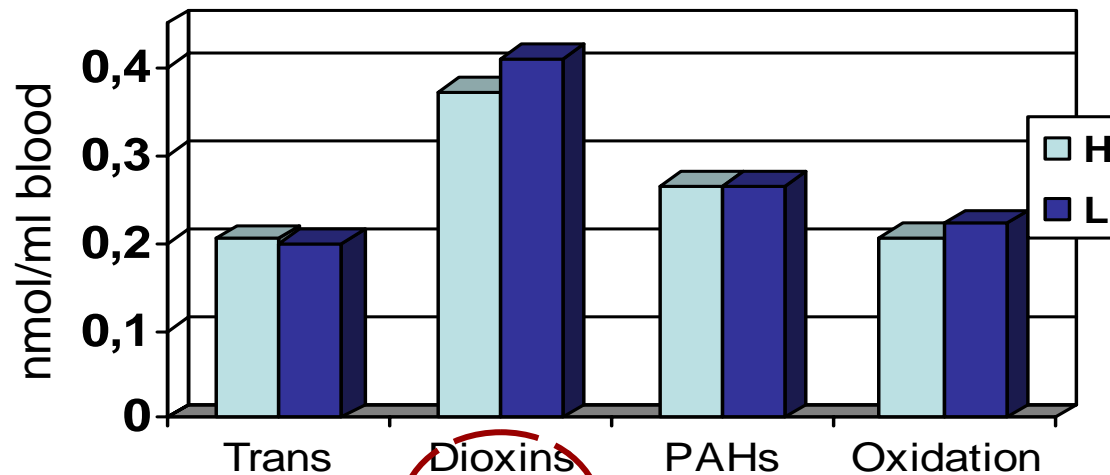
80 broiler chickens: 4 replicates x 10 animals x 2 TTs

The animals were sequentially slaughtered at 9,13,21 and 37 days old

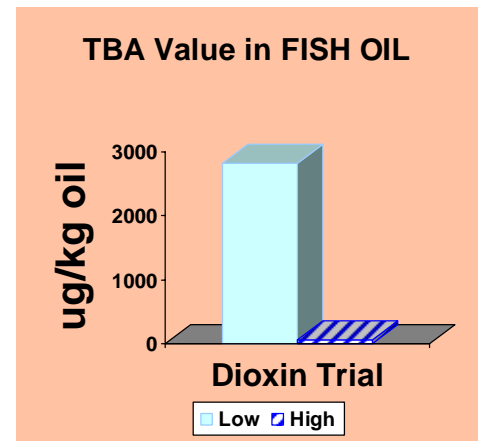


Low levels for all treatments, except with those that contain fish oils (Dioxins trial)

TBARs- 37 days old



P values: Trial < 0.01; Tto > 0.10; (TxTto) > 0.05





Health Status

6% added fat; Two treatments: **H** and **L**

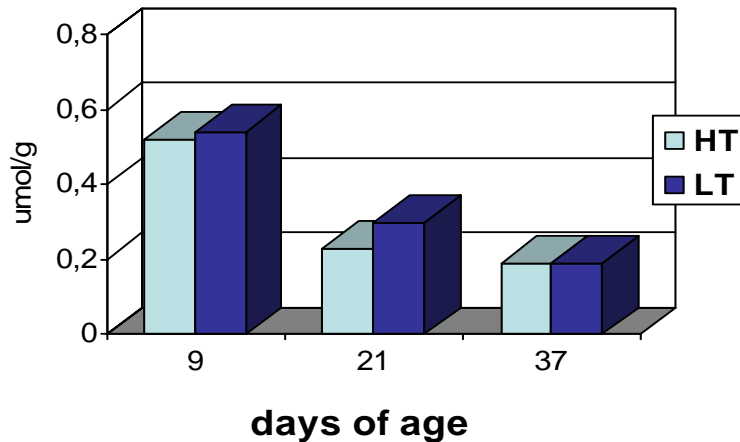
80 broiler chickens: 4 replicates x 10 animals x 2 TTs

The animals were sequentially slaughtered at 9,13,21 and 37 days old



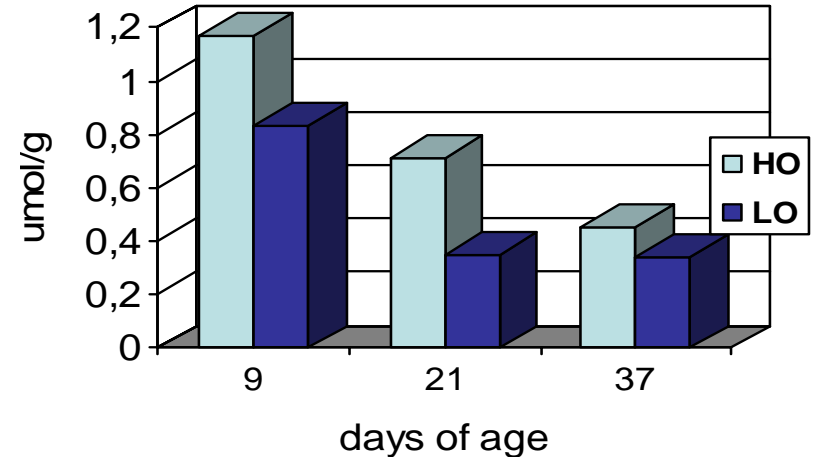
No differences in total SCFA between treatments in the different periods of slaughtering

Lactic acid



P values: $t = 0.613$; **age < 0.001**; $(t \times a) = 0.877$

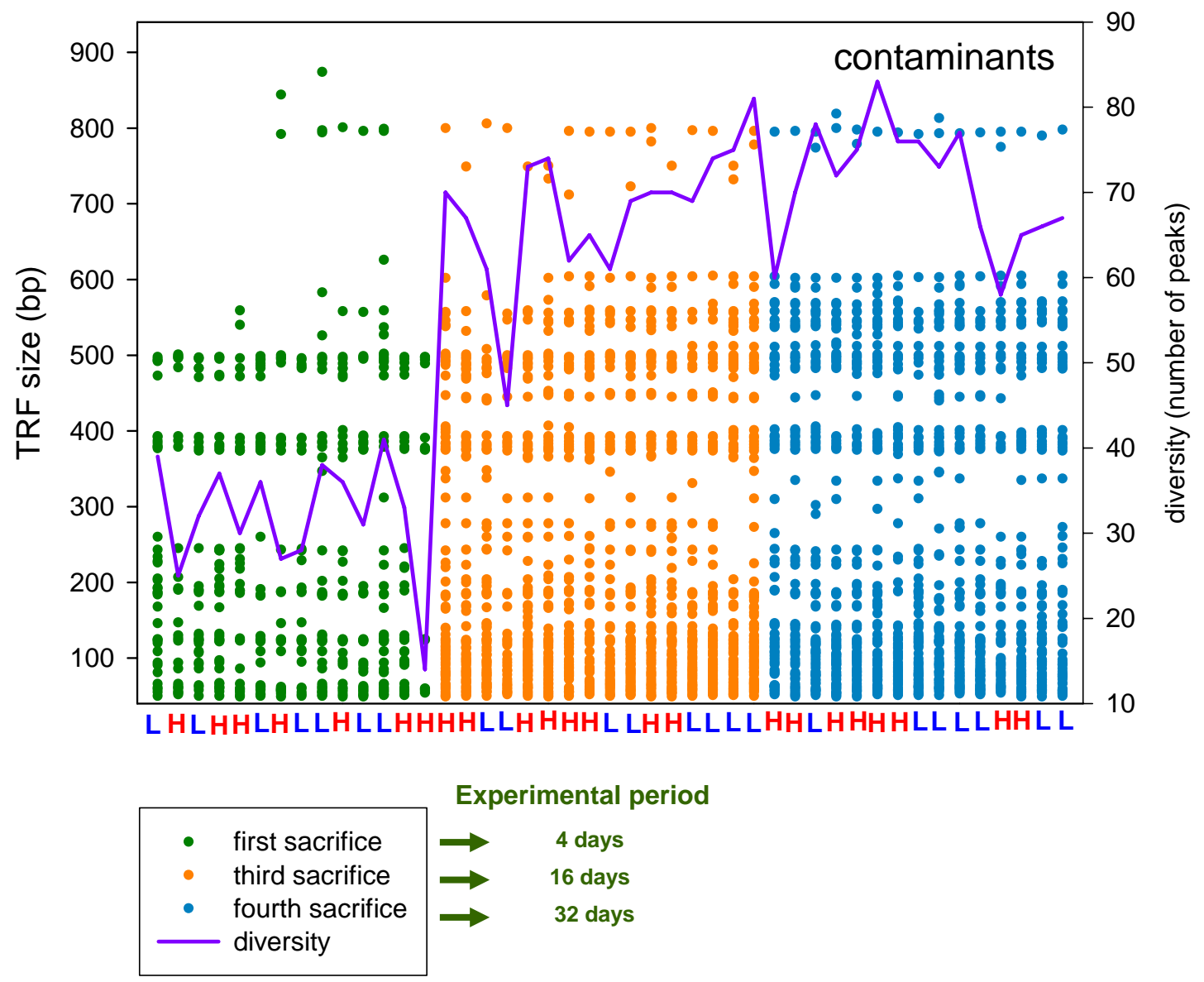
Lactic acid



P values: $t > 0.05$; **age = 0.006**; $(t \times a) = 0.688$

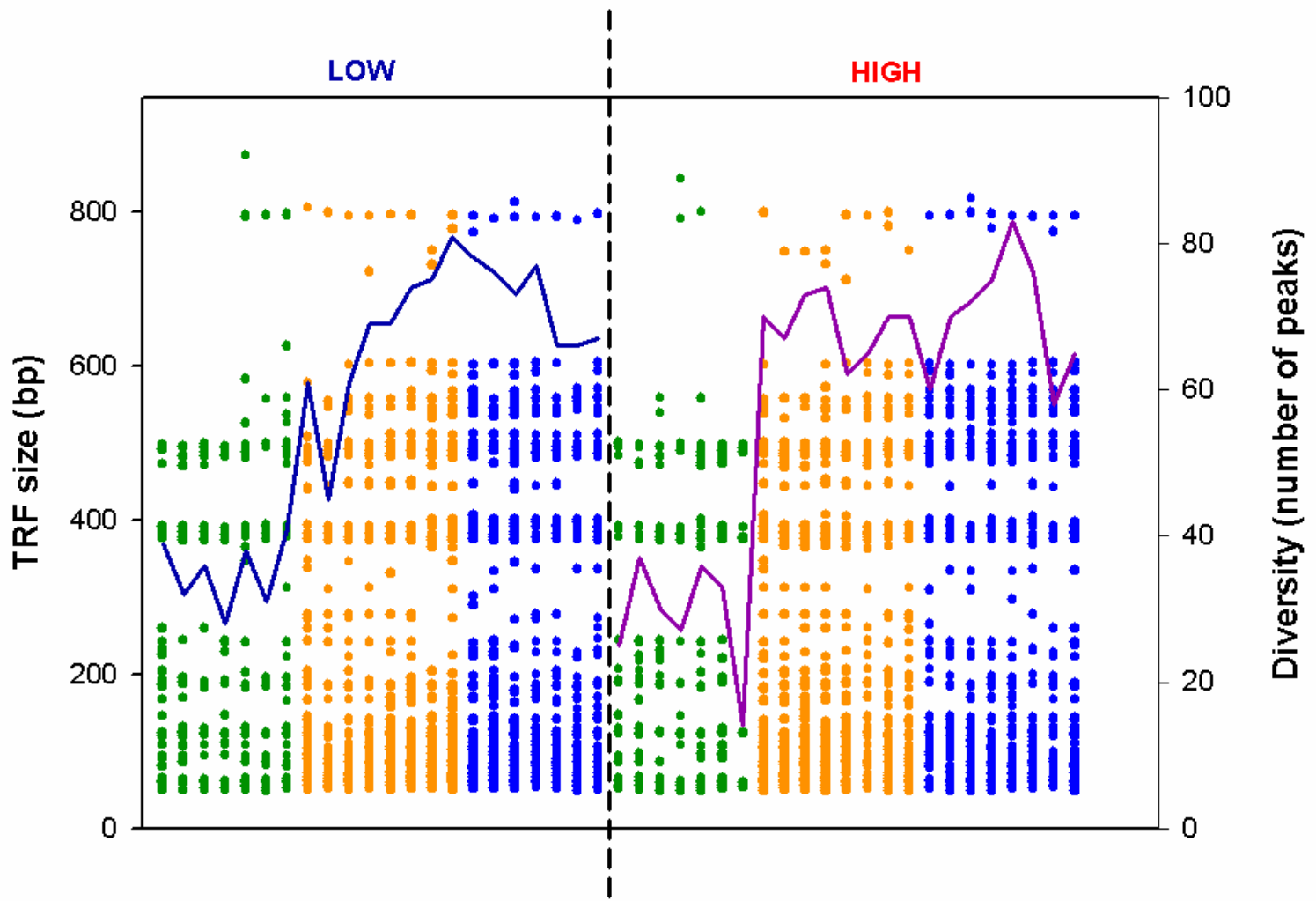


FINGERPRINTING TECHNIQUE: t-RFLP (Terminal restriction fragment length polymorfism)



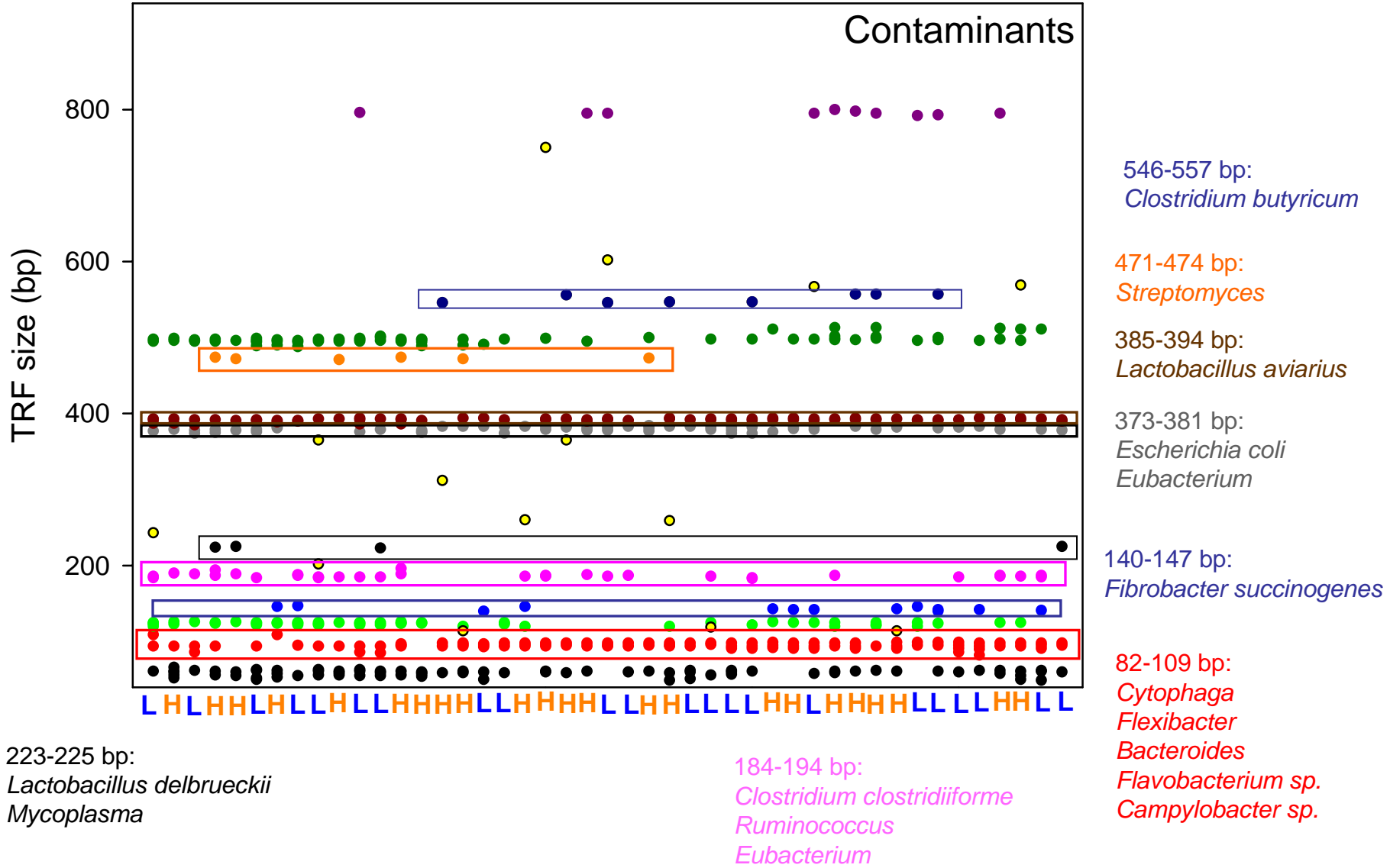


FINGERPRINTING TECHNIQUE: t-RFLP
(Terminal restriction fragment length polymorfism)





FINGERPRINTING TECHNIQUE: t-RFLP
(Terminal restriction fragment length polymorfism)





Health Status

6% added fat; Two treatments: **H and L**

80 broiler chickens: 4 replicates x 10 animals x 2 TTs

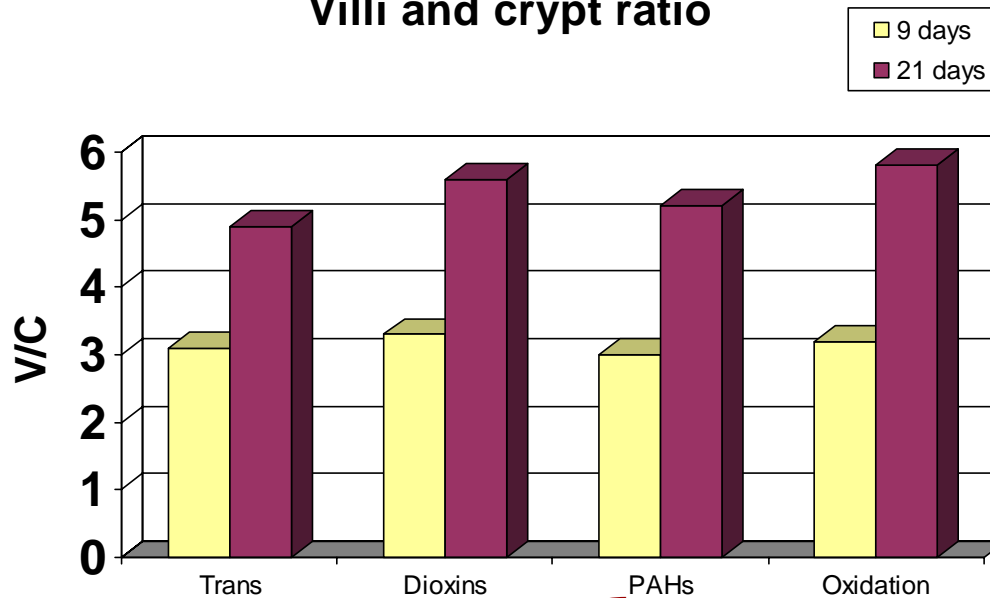
The animals were sequentially slaughtered at 9,13,21 and 37 days old



Coccidia in excreta: normal counts for commercial conditions

Gut Morphology (histological sections of jejunum) and ILN: no significant differences between Tts.

Villi and crypt ratio



P values: Trial =0.05; ~~age~~ **age <0.001 (T x a)>0,05**



Summary



In our experimental conditions :

1. The inclusion in broiler chickens feed of different fatty recycled materials differing in levels of *trans* fatty acids (12.4 vs. 0.65%); Dioxins and PCBs (28.8 vs. 9.64 pg WHO-TEQ PCDD/Fs +DL-PCBs/g oil); PAHs (5290 vs. <18 ngPAHs/g oil) or Lipid Oxidation (6.61 vs. 0.35% polymers and 67.43 vs. 2.74 p-anisidine values) had NO MAJOR effect on animal performances and health.
2. Some of the differences found between treatments *are more dependant* on the origin, quality and profile of the DIETARY FAT, than on the alteration itself.
3. The AGE of the animals has an important effect on the parameters studied.



Feeding Fats Safety



Thank You

UAB

Universitat Autònoma
de Barcelona