Impact of EFSA opinions on current use of feed flavourings

EFSA - Info Session on Applications - FEED

Technical Meeting with Stakeholders on Feed Additives Applications

Barcelona - 6 May 2015

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Introduction

- Feed Flavourings Authorisation Consortium (FFAC)
- About Feed Flavourings

Feed Flavourings Consortium

ffac
Feed Flavourings Authorisation Consortium

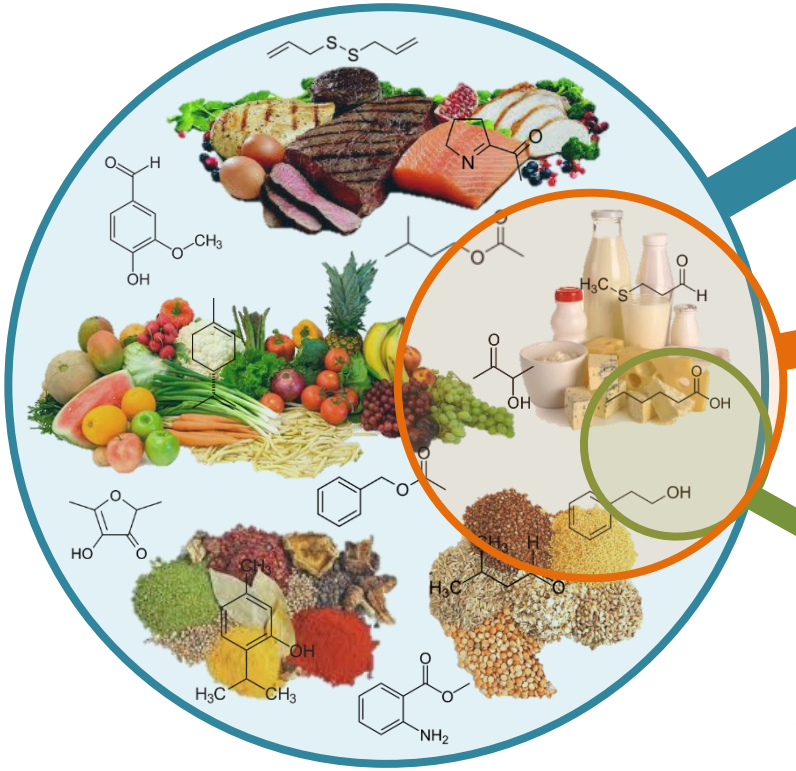
- FFAC basic information
  - Date of constitution: 29 June 2007
  - Aim: to get the authorisation of a feed flavourings common list
  - Membership: 26 Companies (up to 40 in 2012)
  - FFAC submissions: 58 dossiers with a total number of 838 additives

Type of application	Example	Dossiers	Additives
Group dossiers for CDF chemically defined flavourings	Chemical group 25: thymol Phenol derivatives containing ring-alkyl, ring-alkoxy, and side-chains with an oxygenated functional group	31	583
Stand-alone dossiers for CDF chemically defined flavourings	Naringin	5	7
Stand-alone dossiers for AF artificial flavourings	Sodium saccharin	2	2
Group dossiers for BDF botanically defined flavourings	Lamiales: Melissa oil	20	246

About Feed Flavourings

- Why this big number of flavouring substances?

Mimicry of the naturally occurring flavours



≈ 10.000 substances
predicted to occur in foods
≈ 8.000 already identified in the
Volatile Compounds in Food (VCF) database

≈ 2.600 substances
Food flavourings
listed in the Union List of flavourings
intended for use in foodstuffs

≈ 600 substances
Feed flavourings
submitted by FFAC as chemically defined
flavourings intended for use in feedingstuffs

About Feed Flavourings

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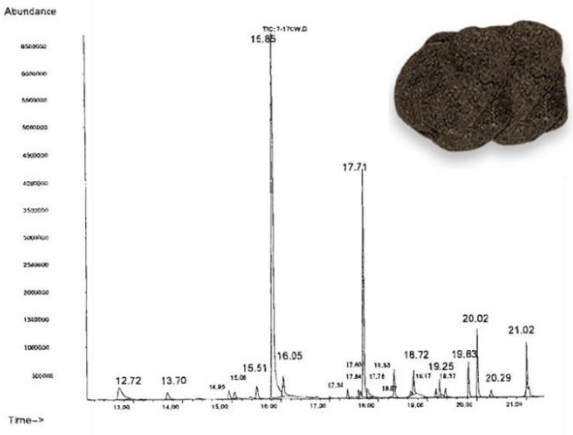
- Why flavouring mixtures?

Mimicry of the naturally occurring flavours

- Odour and taste are of prime importance for telling good “nutritive” food from bad “potentially toxic” food and for being able to hedonically differentiate among foods.
- In mammals the sense of smell is able to detect and discriminate a wide range of natural occurring odour mixtures from each other and create a distinguishable “combinatorial odour code” for each food flavour.
- The perception of mixtures of odorants is not just a simple sum of the percepts of the individual components. In complex mixtures the odorants lose their individuality and produce a new odour code not elicited by the single components.

Chromatogram of a fresh black truffle flavour using SPME extraction



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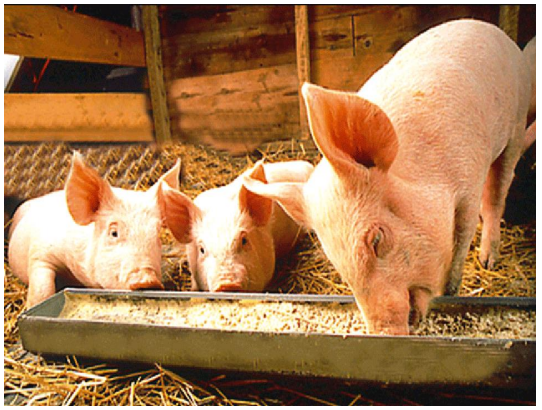
About Feed Flavourings

- Which is the purpose of adding flavourings to feed?

Flavourings functionality

- Increase feed smell or palatability of feedingstuffs to improve or modify its acceptance and consumption.
- Overcome variations in taste and smell caused by formulation changes of feed diets.
- Mask the taste of feed ingredients of low palatability or medicated treatments that would be less acceptable without the addition of flavourings.
- Improve early feed intake in young animals after and before weaning by creating recognition of familiar flavours.
- Brand differentiation of different feedingstuffs.



Using flavourings in animal feed is done to achieve at least one of these effects

About Feed Flavourings

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- How are these flavour blends designed?

Current Industry Practice

- Commercial feed flavours are blends of flavouring compounds designed by experts (flavourists) which try to reconstruct the authentic chemosensory percept of natural food and feed flavours.
- A feed flavour formula contains many flavouring compounds, usually between 20 to 50 of different chemical or botanical groups, and also other non-flavouring compounds added for their functionality or as carriers.
- The number, type and concentration of flavouring compounds included in a formula depend mainly on the desired qualitative and quantitative sensory effect in the feedingstuff.

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About Feed Flavourings

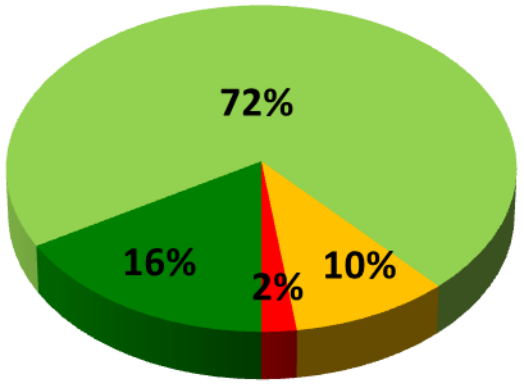
- Which are their use levels?

FFAC proposed use levels

- To cover the variety of type of flavours and potential feed applications, a wide range of use levels is required.
- For the safety assessment of chemically defined (CD) flavourings a normal (N) use level and a high (H) use level (5xN), derived from a poundage survey within FFAC, were allocated for each flavouring.
- 4 main categories of CD flavourings were established according the proposed use levels
  - High intensity: level of use between 0,01 - 1 mg/kg feed
  - Low poundage: level of use between 1 - 5 mg/kg feed
  - Medium poundage: level of use between 5 - 25 mg/kg feed
  - High poundage: level of use between 25 -125 mg/kg feed

Overall range between 0,01 to 125 mg/kg feed

Distribution based on proposed use levels
Nr. of CD flavourings/category



FFAC key flavourings

About Feed Flavourings

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- Why this range of use levels?

Factors affecting flavouring use levels in feed

- Sensory properties of flavourings
  - Broad range of odour profiles and concentrations depending on odour thresholds.

Table 1: Odorant qualities and threshold concentrations of selected key food odorants (KFO).

KFO	Odor quality	Threshold conc. [$\mu g\,kg^{-1}$ water][a]
ethanol	alcoholic	990000
2-methyl-1-propanol	malty	19000
acetic acid	vingar-like	5600
1-hexanol	green, grassy	590
(*E*)-2-hexenal	green, apple-like	110
2-phenylethanol	flowery, wine-like	18
(*R*)-limonene	citrus-like	13
2-methoxy-4-vinylphenol	smoky	5
3-hydroxy-4,5-dimethyl-2(5*H*)-furanone	seasoning-like	2
butan-2,3-dione	butter-like	1
3-methylbutanal	malty	0.5
3-(methylthio)propanal	cooked potato-	0.4
(*E*)-2-hexenal	green, grassy	0.1
2-acetyl-1-pyrroline	popcorn-like	0.05
(*E*,*E*)-2,4-decadienal	fatty, French fries-like	0.03
wine lactone	coconut-like	0.02
(*E*)-β-damascenone	cooked apple-like	0.01
(*E*,*Z*)-2,6-nonadienal	cucumber-like	0.005
(*Z*)-1,5-octadien-3-one	geranium-like	0.0003
1-*p*-menthene-8-thiol	grapefruit-like	0.0002
2-methyl-3-furanthiol	meaty, bouil-lon-like	0.00003

10 orders of magnitude

Angew. Chem. Int. Ed. 2014, 53, 2–22

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- Why this range of use levels?

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- Sensory properties of flavourings
  - Broad range of odour profiles and concentrations depending on odour thresholds.
  - Similar broad ranges are also needed in food applications.

Scientific Opinion on Flavouring Group Evaluation 20, Revision 4 (FGE.20Rev4)

FLNo	EU Register name	FFAC Normal Use Level (mg/kg)	FFAC High Use Level (mg/kg)
05.129	2-Methoxybenzaldehyde	1	5
09.762	Pentyl salicylate	1	5

Food category (Commission Regulation (EC) No 1565/2000)	Normal use levels (mg/kg) Maximum use levels (mg/kg)	
	FL 05.129	FL 09.762
01.0 Dairy products	3 15	7 35
02.0 Fats and oils	2 10	5 25
03.0 Edible ices	3 15	10 50
04.1 Processed fruit	2 10	7 35
05.0 Confectionery	5 25	10 50
06.0 Cereals and cereal products	2 10	5 25
07.0 Bakery wares	- -	10 50
08.0 Meat and meat products	1 5	2 10
09.0 Fish and fish products	1 5	2 10
12.0 Salts, spices, soups, sauces...	2 10	5 25
13.0 Foodstuffs for nutritional uses	3 15	10 50
14.1 Non-alcoholic beverages	2 10	5 25
14.2 Alcoholic beverages	5 25	10 50
15.0 Ready-to-eat savouries	5 25	20 100
16.0 Composite foods	2 10	5 25

About Feed Flavourings

- Why this range of use levels?

Factors affecting flavouring use levels in feed

- Sensory properties of flavourings
  - Broad range of odour profiles and concentrations depending on odour thresholds.
  - Similar broad ranges are also needed in food applications.
- Feedingstuff composition
  - Interaction with the feed matrix

Baseline feedingstuff odour

Detection thresholds of different feed ingredients in a neutral mineral carrier

Lucta S.A. - Unpublished

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Factors affecting flavouring use levels in feed

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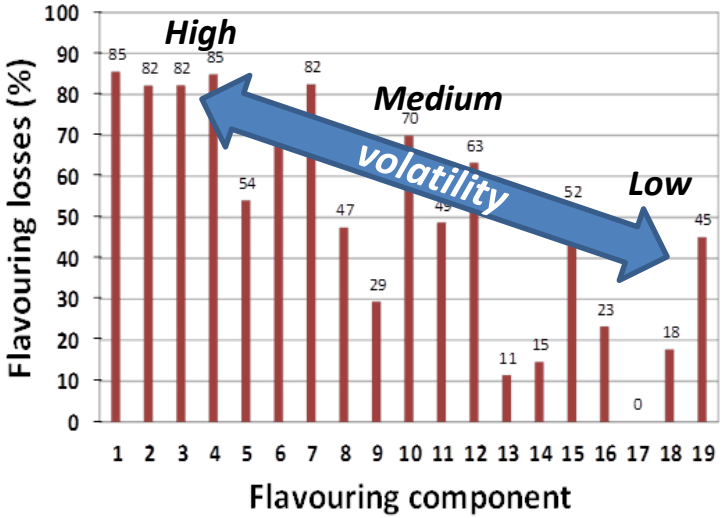
- Feedingstuff composition
  - Interaction with the feed matrix
- Feed manufacturing process

Mash feed | Crumble feed | Pelleted feed | Extruded feed

Losses during manufacturing



Individual losses of strawberry flavour components after a standard feed pelleting process (70ºC) determined by GC analysis of head-space using SPME

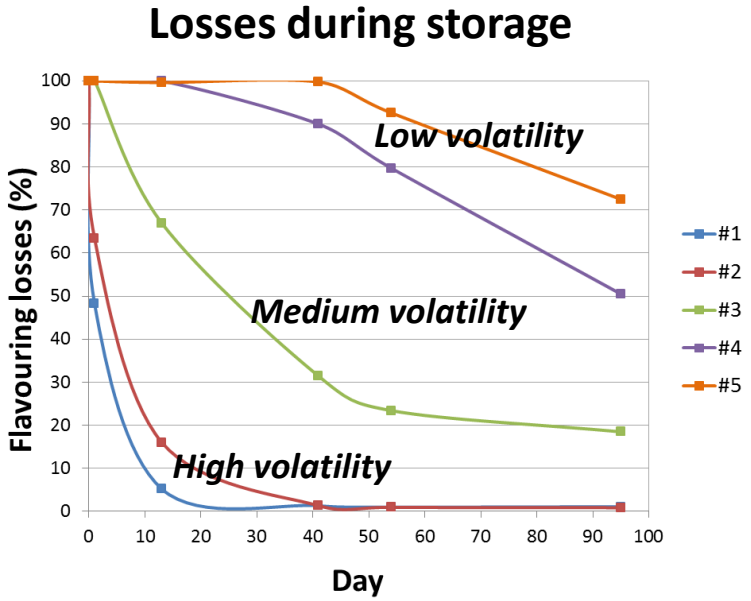
Lucta S.A. - Unpublished

About Feed Flavourings

- Why this range of use levels?

Factors affecting flavouring use levels in feed

- Sensory properties of flavourings
  - Broad range of odour profiles and concentrations depending on odour thresholds.
  - Similar broad ranges are also needed in food applications.
- Feedingstuff composition
  - Interaction with the feed matrix
- Feed manufacturing process
- Flavour stability during storage



Individual losses of 5 red fruit model flavour components of different volatility in a flavoured feed sample stored at room temperature and paper bag packaging

Lucta S.A. - Unpublished

EFSA Opinions Summary

EFSA Opinions Summary

- EFSA Opinions published: 25/38

Dossier	EFSA Opinion	Number of flavourings
CG01	EFSA Journal 2013;11(4):3169	86
CG02	EFSA Journal 2012;10(10):2927	34
CG06	EFSA Journal 2012;10(11):2966	13
CG09	EFSA Journal 2012;10(10):2928	30
CG11	EFSA Journal 2012;10(3):2622	3
CG13	EFSA Journal 2012;10(7):2786	4
CG13	EFSA Journal 2014;12(3):3608	2
CG15	EFSA Journal 2012;10(3):2625	18
CG16	EFSA Journal 2012;10(11):2967	4
CG17	EFSA Journal 2012;10(1):2532	1
CG18	EFSA Journal 2011;9(12):2440	4
CG20	EFSA Journal 2013;11(5):3208	32
CG23	EFSA Journal 2012;10(7):2785	36
CG25	EFSA Journal 2012;10(2):2573	16
CG26	EFSA Journal 2012;10(5):2678	8
CG27	EFSA Journal 2011;9(11):2441	2
CG29	EFSA Journal 2013;11(8):3323	1
CG31	EFSA Journal 2015;13(3):4053	9
CG33	EFSA Journal 2012;10(5):2679	3
CG34	EFSA Journal 2014;12(5):3670	20
IMP/GMP	EFSA Journal 2014;12(3):3606	3
Glycyrrhizic acid ammoniated	EFSA Journal 2015;13(1):3971	1
Naringin	EFSA Journal 2011;9(11):2416	1
Thaumatin	EFSA Journal 2011;9(9):2354	1
Tannic acid	EFSA Journal 2014;12(10):3828	1
NHDC	EFSA Journal 2011;9(12):2444	1
		334

European Food Safety Authority

Total flavourings assessed : 334 (56,4%)

Total flavourings FFAC(1) : 592 (100,0%)

(1) CD Flavourings ("Chemically Defined" & Sweeteners)

EFSA recommendations not in line with industry practice

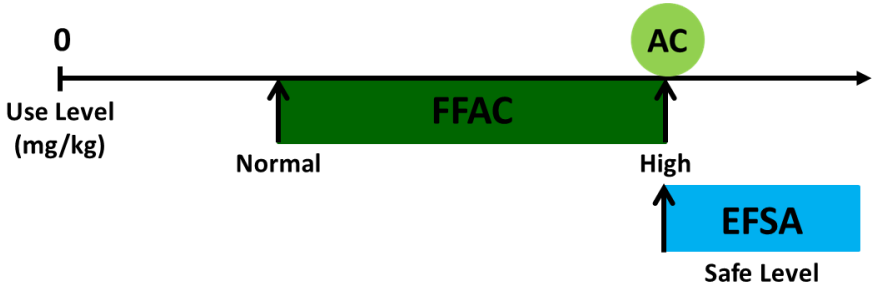
- Use levels
- Species restrictions
- Contra-indications

EFSA Opinions Summary

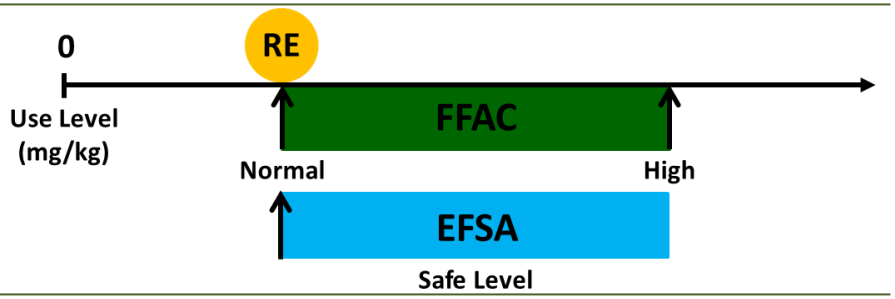
- FFAC Use Levels vs. EFSA Safe Levels

Classification Status

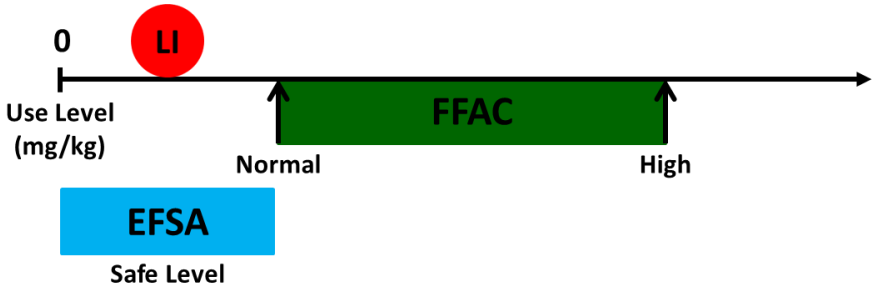
AC ➡ ***FFAC level is "Accepted"***
EFSA Safe Level
>= FFAC High Use Level



RE ➡ ***FFAC level is "Reduced"***
EFSA Safe Level
< FFAC High Use Level but
>= FFAC Normal Use Level



LI ➡ ***FFAC level is "Limited"***
EFSA Safe Level
< FFAC Normal Use Level



EFSA Opinions Summary

- FFAC Use Levels vs. EFSA Safe Levels

Classification Status

AC ➡ *"Accepted"*

RE ➡ *"Reduced"*

LI ➡ *"Limited"*

NA ➡ *"Not Assessed"*

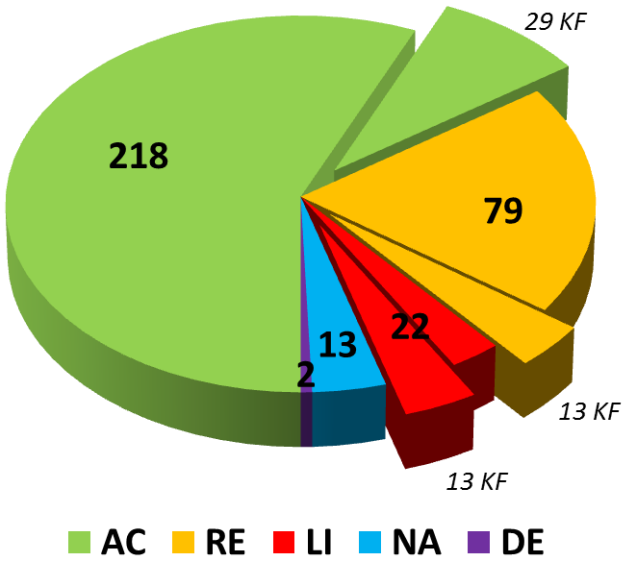
DE ➡ *"Deleted"*

Flavourings Distribution

Nr. of CD flavourings/status

Total CD flavourings assessed : 334

Key Flavourings (KF) : 55



67% of all "Reduced" & "Limited" levels are due to the application of TTC

Impact on business

Impact on business

- Overall impact of EFSA conclusions on use levels
  - 26 key FFAC CD flavourings already assessed by EFSA have a “Limited” or “Reduced” use level.
  - The majority of the flavour formulations present in the market are potentially affected by EFSA conclusions on use levels.
  - Since these limitations specifically affect key ingredients, used as major components in flavour formulations, reformulation involves getting completely different flavours to the current ones and in many cases it will be not possible to mimic natural occurring flavours.
  - The impact on the preference, performance, stability and cost of these reformulations is hardly predictable, but it will involve a huge commitment of time and resources for the Industry.

Impact on business

- Impact on flavour formulations: some examples

Dairy Flavours

Butyric acid

*EFSA max level = **5 ppm** in feed - FFAC Levels: 25 / 125 ppm*

Levels used in Cheese flavours: 50 ± 25 ppm added to feed

Vanillin

*EFSA max level = **25 ppm** in feed - FFAC Levels: 25/125 ppm*

Levels used in Vanilla flavours: 50 ± 25 ppm added to feed

Fruity Flavours

Isoamyl acetate

*EFSA max level = **5 ppm** in feed - FFAC Levels: 25 / 125 ppm*

Levels used in Fruity flavours: 75 ± 50 ppm added to feed

Ethyl butyrate

*EFSA max level = **5 ppm** in feed - FFAC Levels: 5 / 25 ppm*

Levels used in Fruity flavours: 15 ± 10 ppm added to feed

Herbal Flavours

Thymol

*EFSA max level = **5 ppm** in feed - FFAC Levels: 25 / 125 ppm*

Levels used in Thyme flavours: 30 ± 20 ppm added to feed

4-Methoxybenzaldehyde

*EFSA max level = **1 ppm** in feed - FFAC Levels: 5 / 25 ppm*

Levels used in Anise flavours: 15 ± 10 ppm added to feed

Impact on business

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- Concluding remarks
  - EFSA conclusions on use levels are affecting the current use of a significant number of flavourings which are potentially putting in risk the feed flavours business in Europe and in other markets.
  - FFAC is willing to generate new data to Commission and EFSA through a research programme that would aim at defending the current use of flavourings provided that they are safe for animals, environment and consumers.
  - A first tolerance trial has been performed by FFAC as a starting point for the discussion between EFSA and stakeholders to agree on a suitable research programme for feed flavourings.

Thank you for your attention !

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Feed Flavouring Authorisation Consortium