



Factors affecting lamb meat flavour

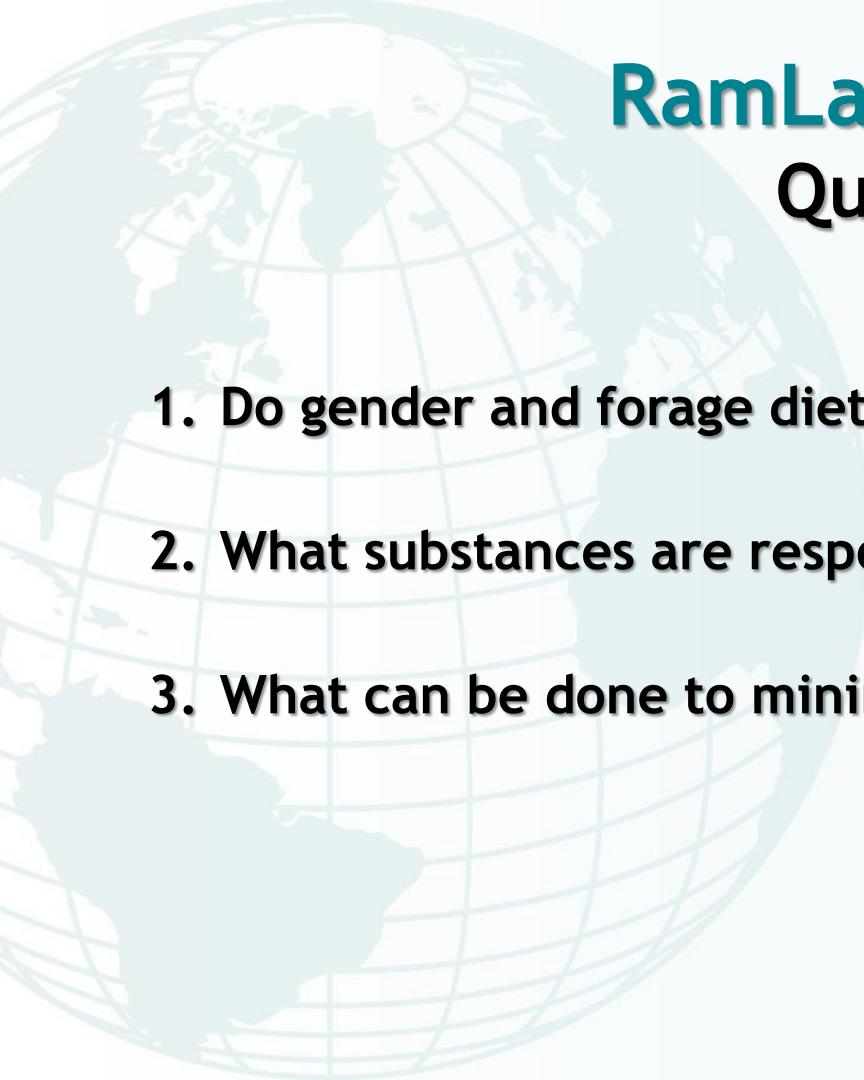
Results of DAFM project “RamLamb”

**Linda Farmer,
Janeen Speers, Aurelie Aubrey, Terence Hagan, David
Sanderson, Colin McRoberts, Alison White, Alan Gordon
(AFBI), Frank Monahan (UCD) and many others...**



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Ireland's Global University





RamLamb Project

Questions:

- 1. Do gender and forage diets affect the flavour of lamb?**
- 2. What substances are responsible for any off-flavours/odours?**
- 3. What can be done to minimise it?**

Trial A Experimental design



Farm	Diet	BSxSBx		Suffx		
		Ram	Cast	Ram	Cast	
Outdoor	Fresh Grass	6	6	6	6	24
Outdoor	Stubble Turnip	6	6	6	6	24
Outdoor	Forage Rape	6	6	6	6	24
Indoor	Conc	6	6	6	6	24
Indoor	Clover silage	6	6	6	6	24
Indoor	Grass Silage	6	6	6	6	24
		36	36	36	36	Total = 144

Total = 144 lambs



Trial B Experimental design



Farm	Diet	BSxSBx		SuffTex		
		Ram	Cast	Ram	Cast	
Outdoor	Fresh Grass	6	6	6	6	24
Outdoor	Stubble Turnip	6	6	6	6	24
Outdoor	Forage Rape	6	6	6	6	24
Indoor	Conc A	11	11	-	-	22
Indoor	Conc B	11	11	-	-	22
Indoor	Grass Silage	11	11	-	-	22
		51	51	18	18	Total = 138

Total = 138 lambs



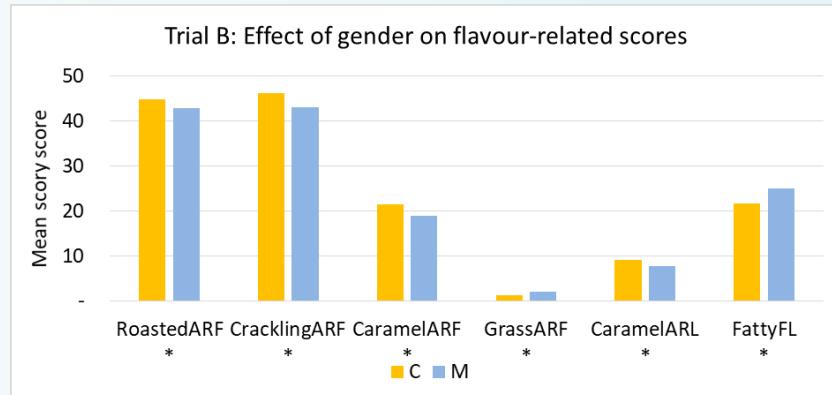
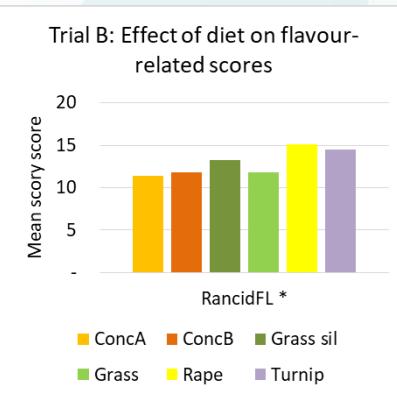
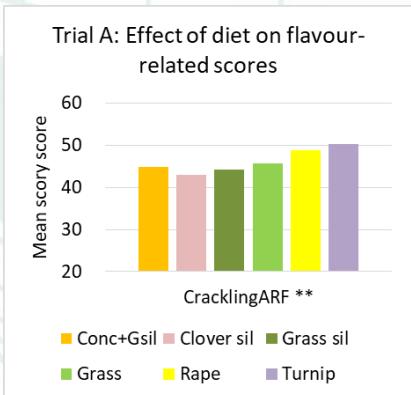
RamLamb: Analyses conducted

- Sensory profiling
- Volatile odour compounds
- Branched chain fatty acids
- Antioxidants
- Precursors
- Total Fatty acids



Effect of gender and diet on aroma and flavour

	Trial A	Trial B
Aroma/flavour/aftertaste attributes tested:	34	40
Significant effects		
- Diet	1	1
- Gender	0	6
- Diet x gender	0	0



BUT

Incidences of off-odour and off-flavour

- Detected in some lambs by some people

Farmyard

Aroma of Meat

Bloody

Aroma of Fat

Rancid

Flavour

Lactic

Piggy

Aroma of Meat

Metallic

Flavour

Bloody

Flavour

Sulphurous

Aroma of Meat

Acidic

Flavour

Lactic

Aroma of Fat

Sour

Musty

Aroma of Fat

Bloody

Aftertaste

Chemical

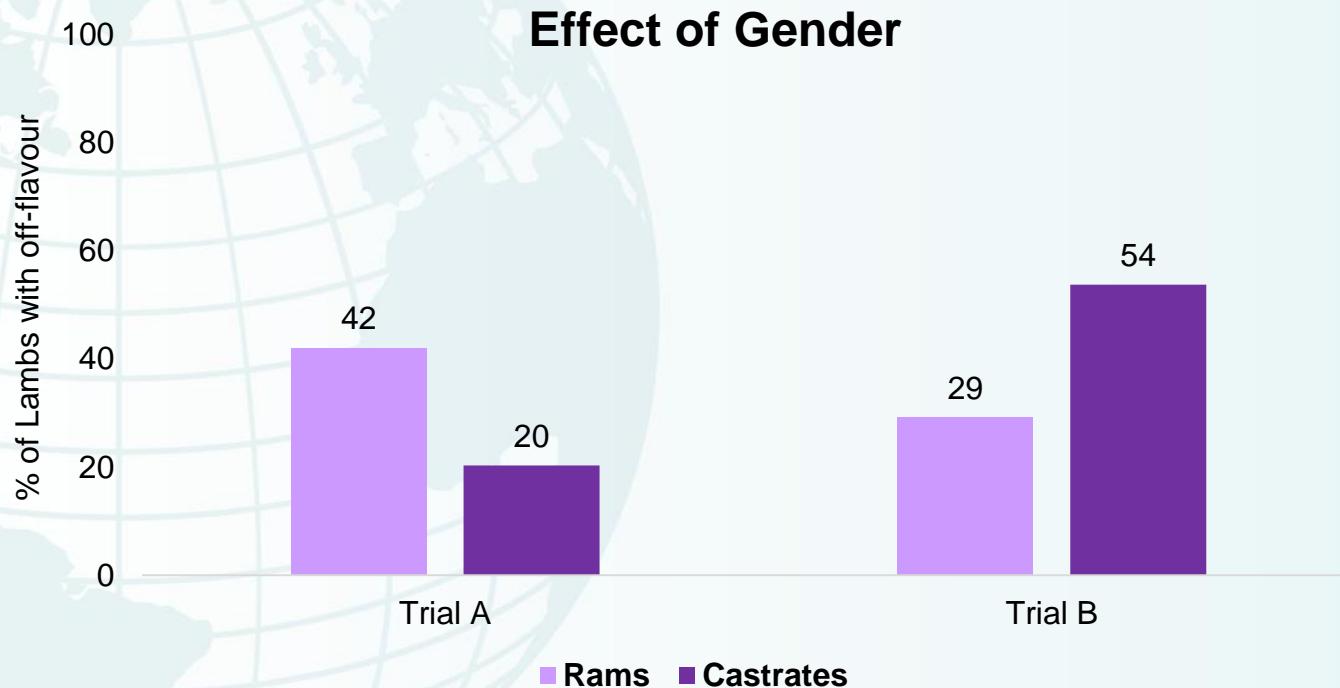
Aroma of Fat

Sour

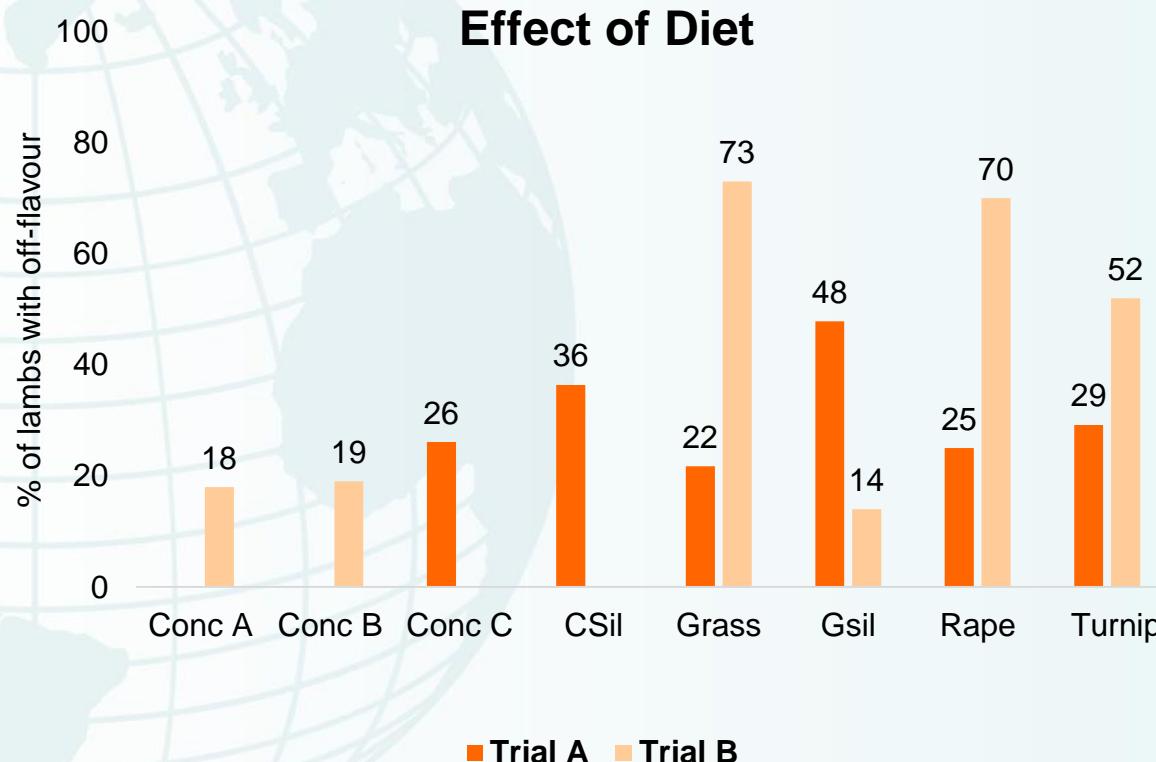
Aroma of Meat

- Off-odour/off-flavour present if at least 2 people detect one of these at + 2 x standard deviation

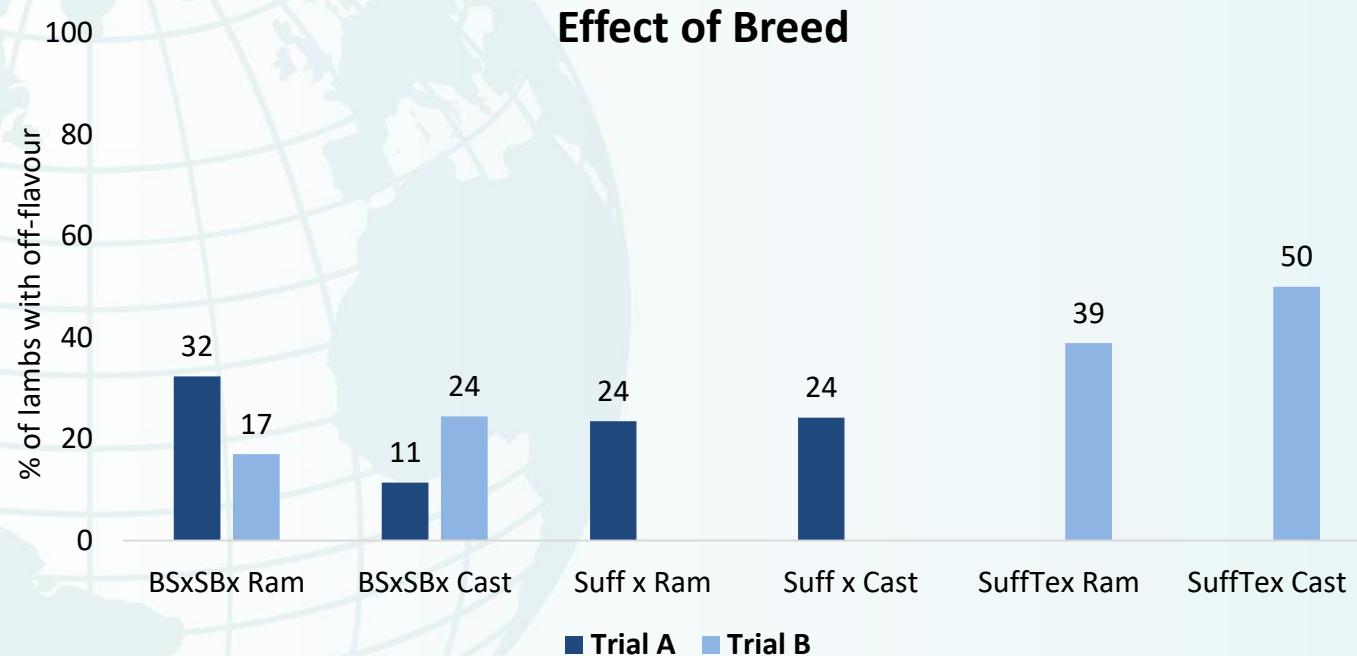
Frequency of off-flavours & odours Trial A & B



Frequency of off-flavours & odours Trial A & B



Frequency of off-flavours & odours Trial A & B





Sporadic off-flavours

- No clear animal cause
- What else could cause this?
 - Farm of origin?
 - Genetics?
 - Microbiota?

Chemical causes of off-flavours in lamb

Branched chain fatty acids (BCFAs)

4-Methyloctanoic acid

4-Methylnonanoic acid

4-Ethyloctanoic acid

Indoles

Indole

Skatole

Phenols

p-Cresol

2-Isopropyl phenol

3,4-Dimethylphenol

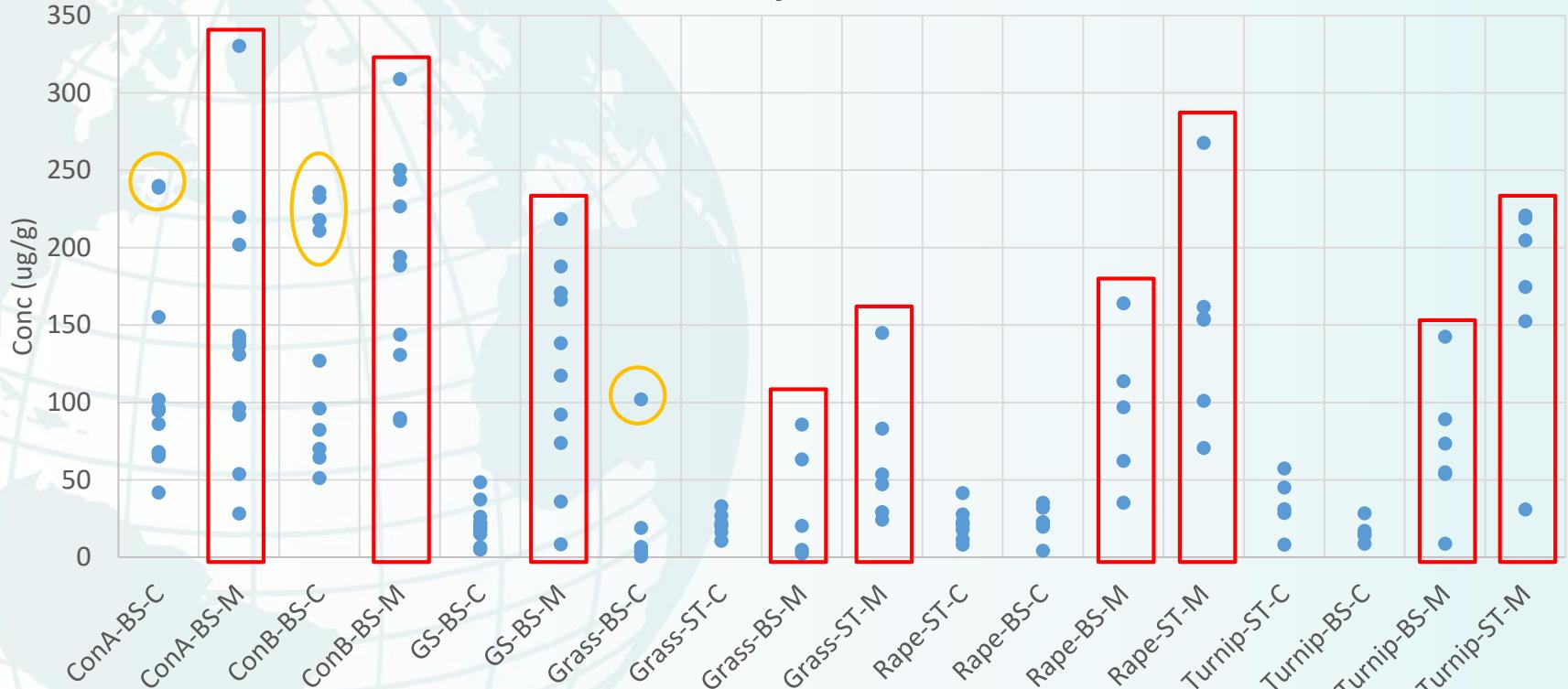
3-Isopropyl phenol

Other compounds

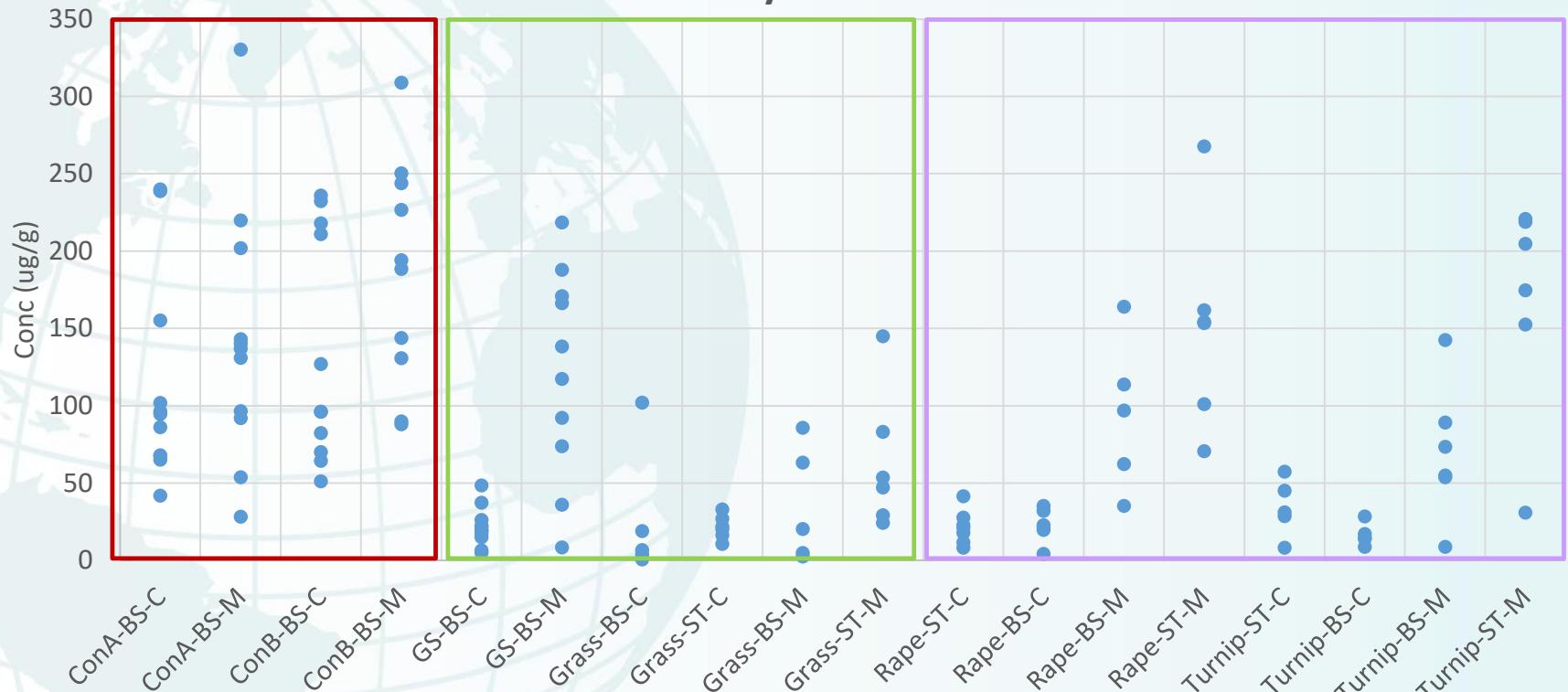
Dimethyl disulphide

3-methylbutanoic acid

Trial B 4-Methyloctanoic Acid



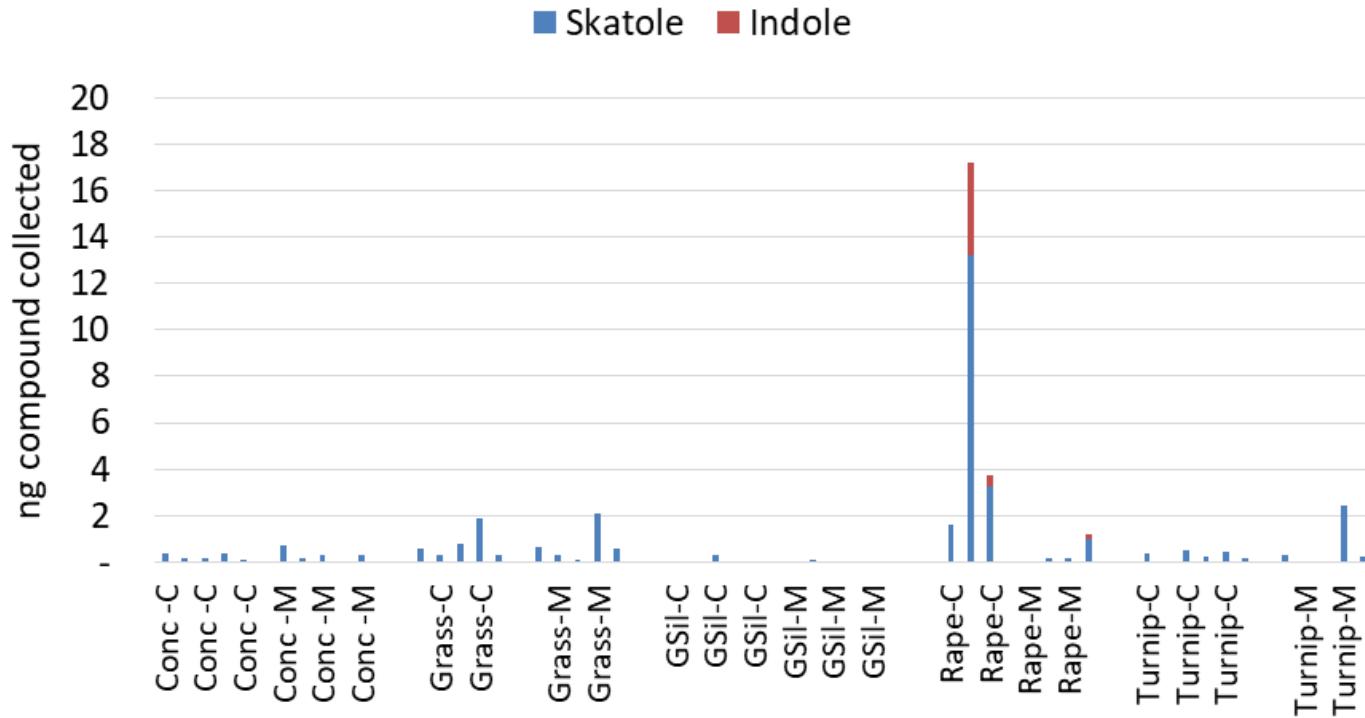
Trial B 4-Methyloctanoic Acid



Chemical causes of off-flavours in lamb

Branched chain fatty acids (BCFAs)	4-Methyloctanoic acid
	4-Methylnonanoic acid
	4-Ethyloctanoic acid
Indoles	Indole Skatole
Phenols	p-Cresol 2-Isopropyl phenol 3,4-Dimethylphenol 3-Isopropyl phenol
Other compounds	Dimethyl disulphide 3-methylbutanoic acid

Skatole and Indole

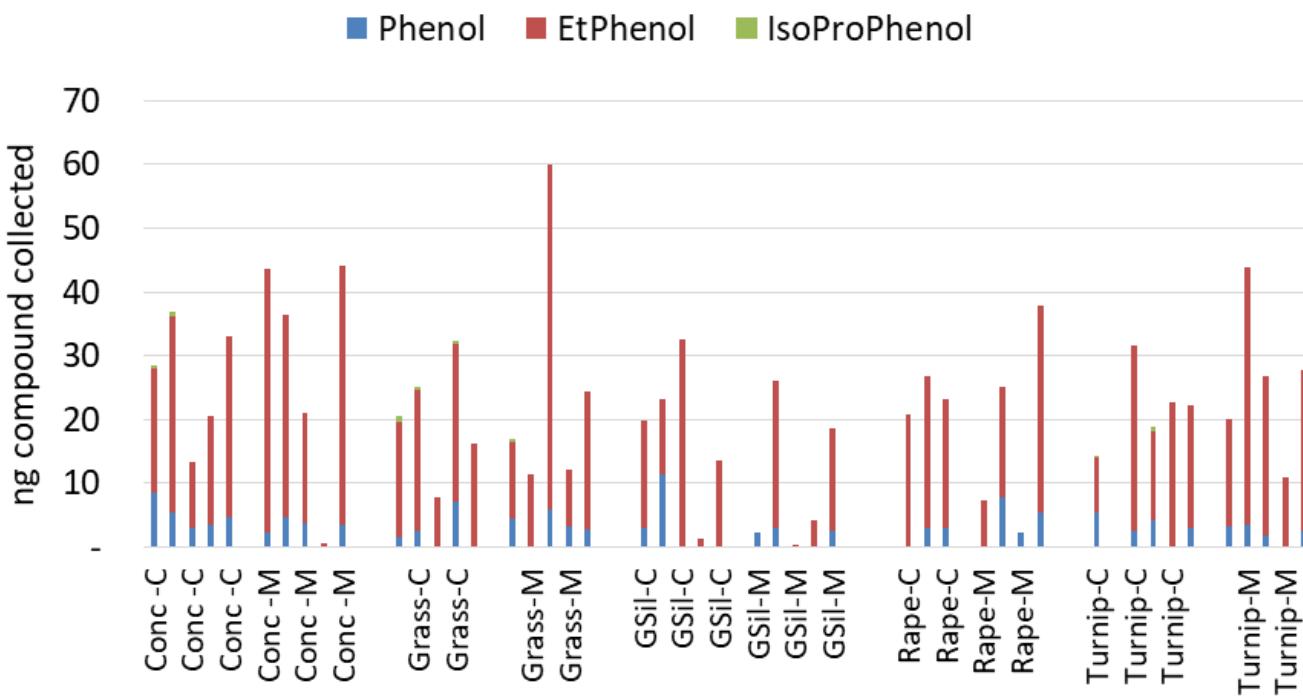


Some higher levels
(rape-fed castrates),
but not in the rest.

Chemical causes of off-flavours in lamb

Branched chain fatty acids (BCFAs)	4-Methyloctanoic acid
	4-Methylnonanoic acid
	4-Ethyloctanoic acid
Indoles	Indole
	Skatole
Phenols	p-Cresol
	2-Isopropyl phenol
	3,4-Dimethylphenol
	3-Isopropyl phenol
Other compounds	Dimethyl disulphide
	3-methylbutanoic acid

Phenols

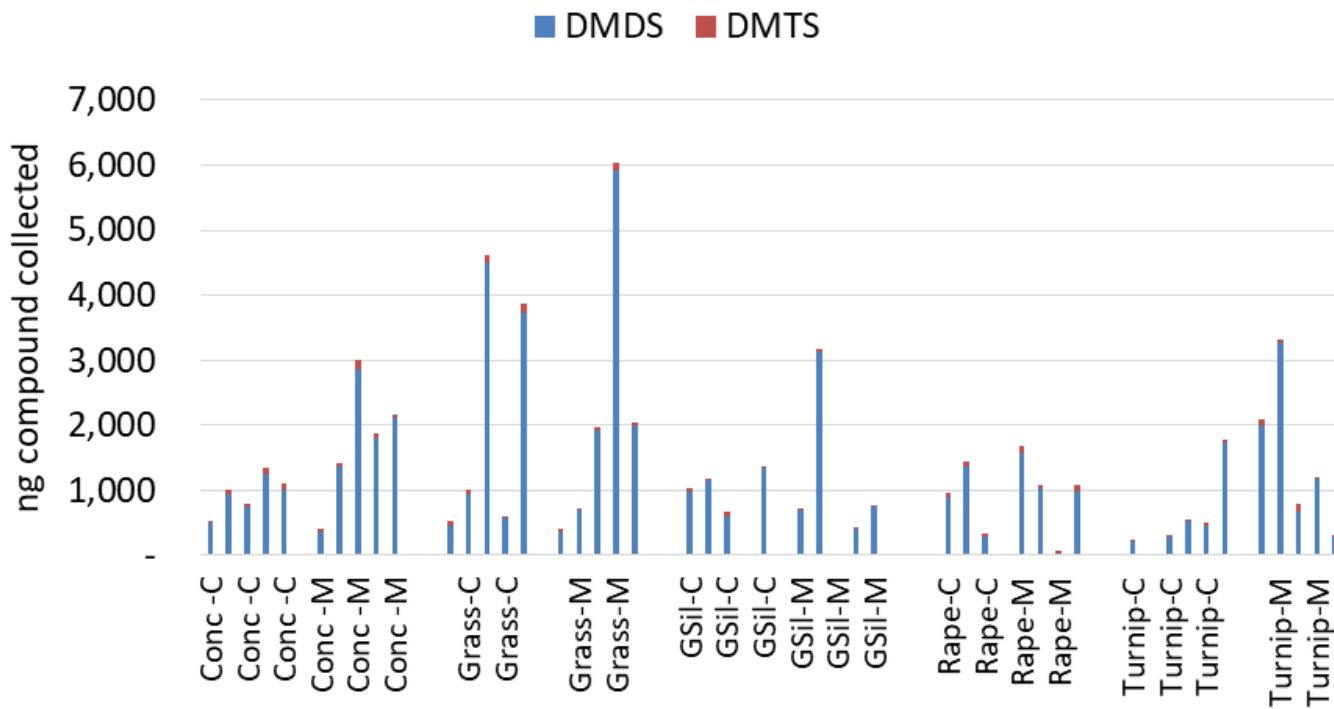


No evidence of sporadic peaks

Chemical causes of off-flavours in lamb

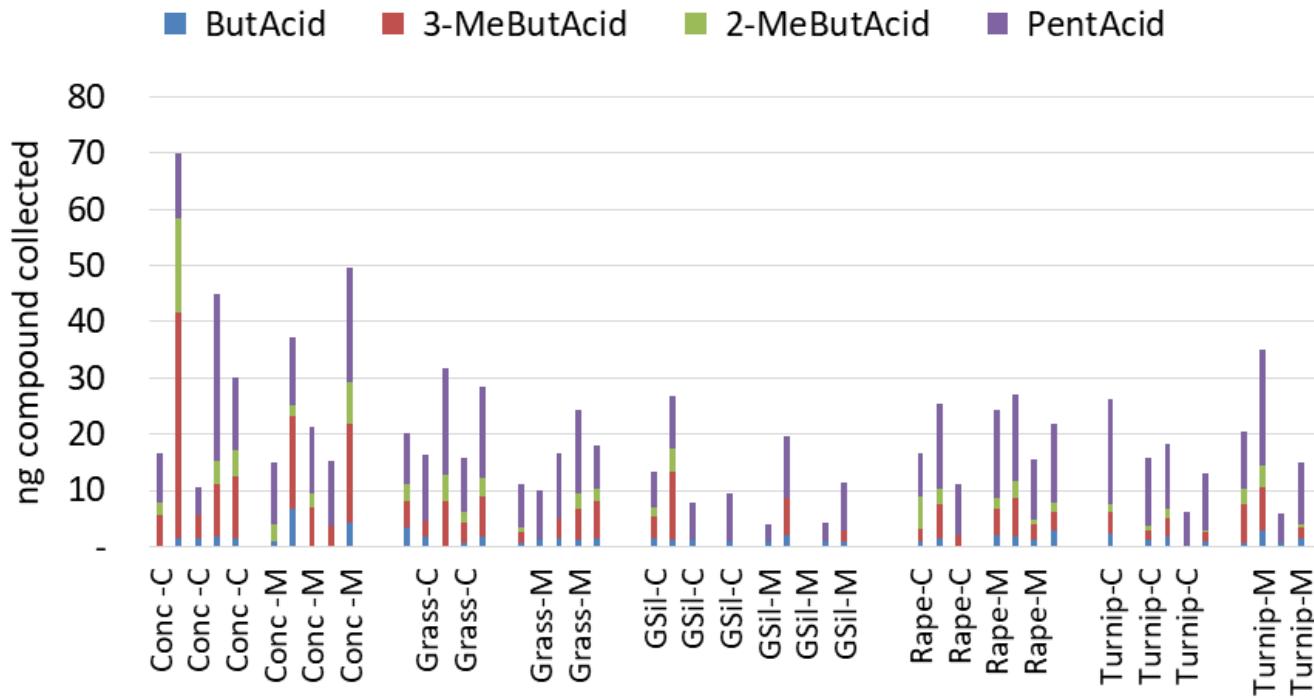
Branched chain fatty acids (BCFAs)	4-Methyloctanoic acid
	4-Methylnonanoic acid
	4-Ethyloctanoic acid
Indoles	Indole
	Skatole
Phenols	p-Cresol
	2-Isopropyl phenol
	3,4-Dimethylphenol
	3-Isopropyl phenol
Other compounds	Dimethyl disulphide
	3-methylbutanoic acid

Dimethyl di/trisulphide



Some
sporadic high
levels.

Short chain acids



Some
sporadic high
levels.

Especially in
concentrate-
fed lamb.

Candidates for sporadic off-flavours

- Branched chain fatty acids
- Short chain acids
- Indoles
- Sulphides
- Combination of these

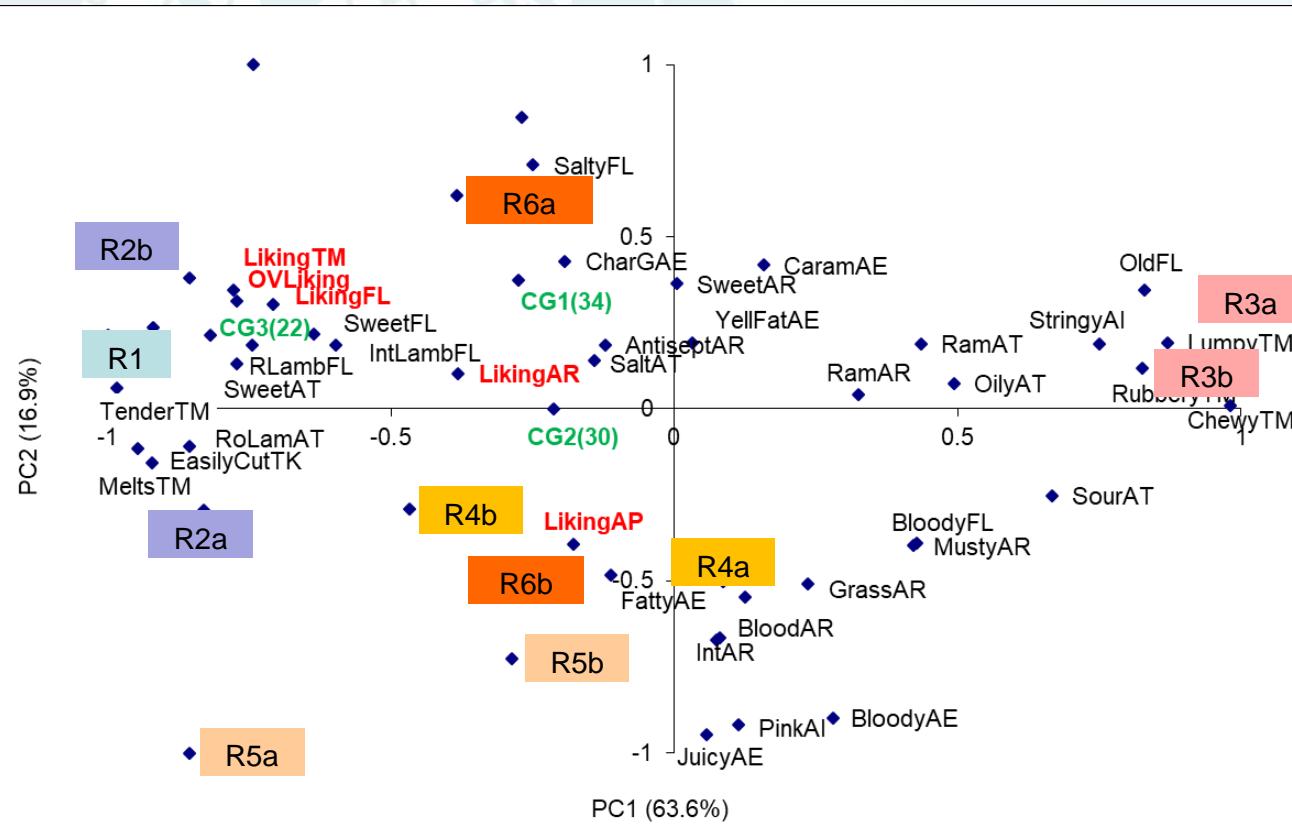
*Different compounds may affect
different people*

Consequences for consumers?

- Anecdotal information
 - “Lamb sometimes not nice”
 - “Sometimes get a bad smell in the house”
- Does this discourage purchase?

Can consumers tell the difference?

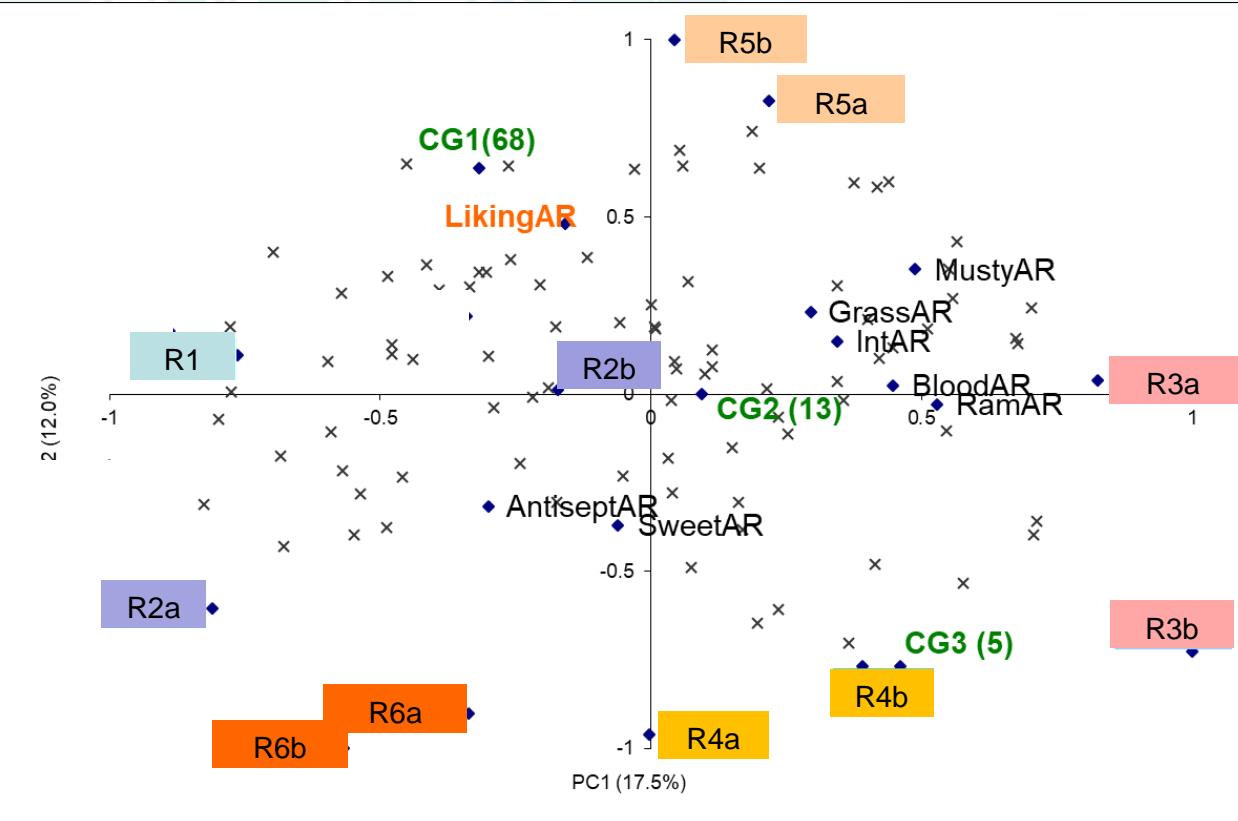
External preference mapping (overall liking)



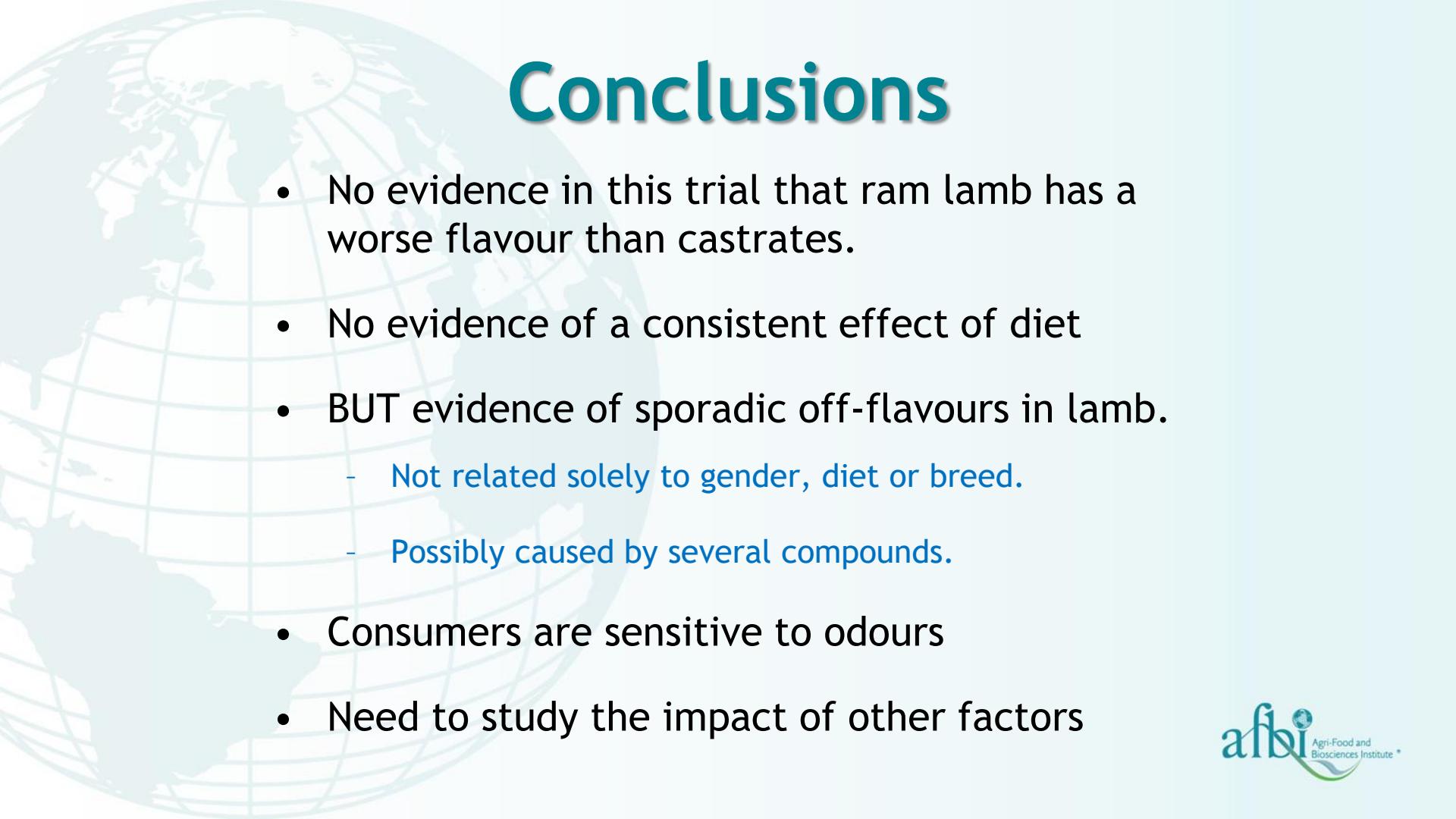
- Ram lambs slaughtered on different dates
- Trained panel differentiates samples by date of slaughter

Can consumers tell the difference?

Internal preference mapping (aroma liking)



- Ram lambs slaughtered on different dates
- Consumers differentiate samples by date of slaughter, on aroma alone!



Conclusions

- No evidence in this trial that ram lamb has a worse flavour than castrates.
- No evidence of a consistent effect of diet
- BUT evidence of sporadic off-flavours in lamb.
 - Not related solely to gender, diet or breed.
 - Possibly caused by several compounds.
- Consumers are sensitive to odours
- Need to study the impact of other factors