Investigation into the impact of age and mixing with ewes on eating quality of rams

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Aims

- To identify the age at which sexual maturity affects the eating quality of rams.

- To determine whether the mixing of rams with ewe lambs affects the flavour of the ram lamb meat

Experimental:- Rearing of Lambs

- Lambs were from the same farm, breed and fed on the same grass and supplementary diet.
- Born in late March- early April and weaned in early August.
- “Mixed” ram lambs were held with ewes while unmixed rams were segregated from females after weaning.
- Lambs were slaughtered to a defined schedule at the same meat plant over a five month timescale.

Experimental design

Sex	Mixing	Age at slaughter (months)						
		5.5	6.5	7.25	7.75	8.5	9.75	10.75
Rams	Mixed		RM		RM	RM	RM	RM
Rams	Unmixed	RU	RU		RU	RU	RU	RU
Ewes	n/a	Ewe		Ewe				Ewe

Consumer Panels

Consumer panels: 200 assessors scored "*liking of appearance*", "*aroma*" and "*overall liking*" on both lean and fat however "*liking of flavour*" and "*texture*" on lean only.

Cooking Procedure: 2.5cm thick loin slices with fat attached cooked in a commercial fan oven to 74^0C and rested for 2 minutes before serving.

Sensory Profiling

Seven experienced taste panellists, trained to assess the *appearance*, *flavour*, *texture* and *aftertaste*.

Training included specific training on “ram or mutton like” odours.

Assessors developed 61 attributes

For aroma these included such attributes as *sheep pen*, *slurry*, *mothball, ram, sweaty and old aromas*

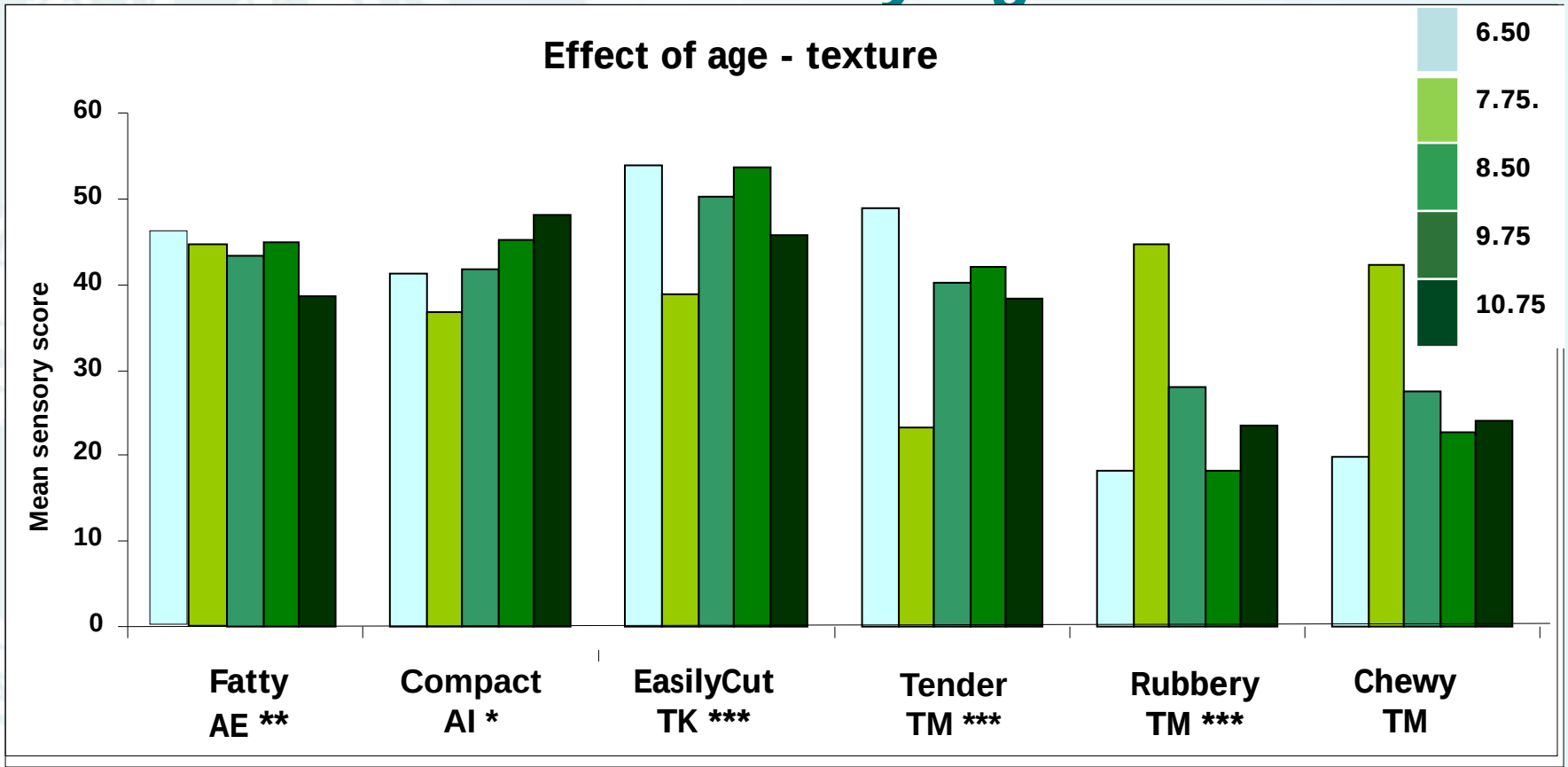
Statistical Analysis

- REML analysis
- External preference mapping
- Internal preference mapping

Comparison of mixed and unmixed rams

Sex	Mixing	Age at slaughter (months)						
		5.5	6.5	7.25	7.75	8.5	9.75	10.75
Rams	Mixed		RM		RM	RM	RM	RM
Rams	Unmixed	RU	RU		RU	RU	RU	RU
Ewes	n/a	Ewe		Ewe				Ewe

Profiling results:- *Texture attributes influenced by age*



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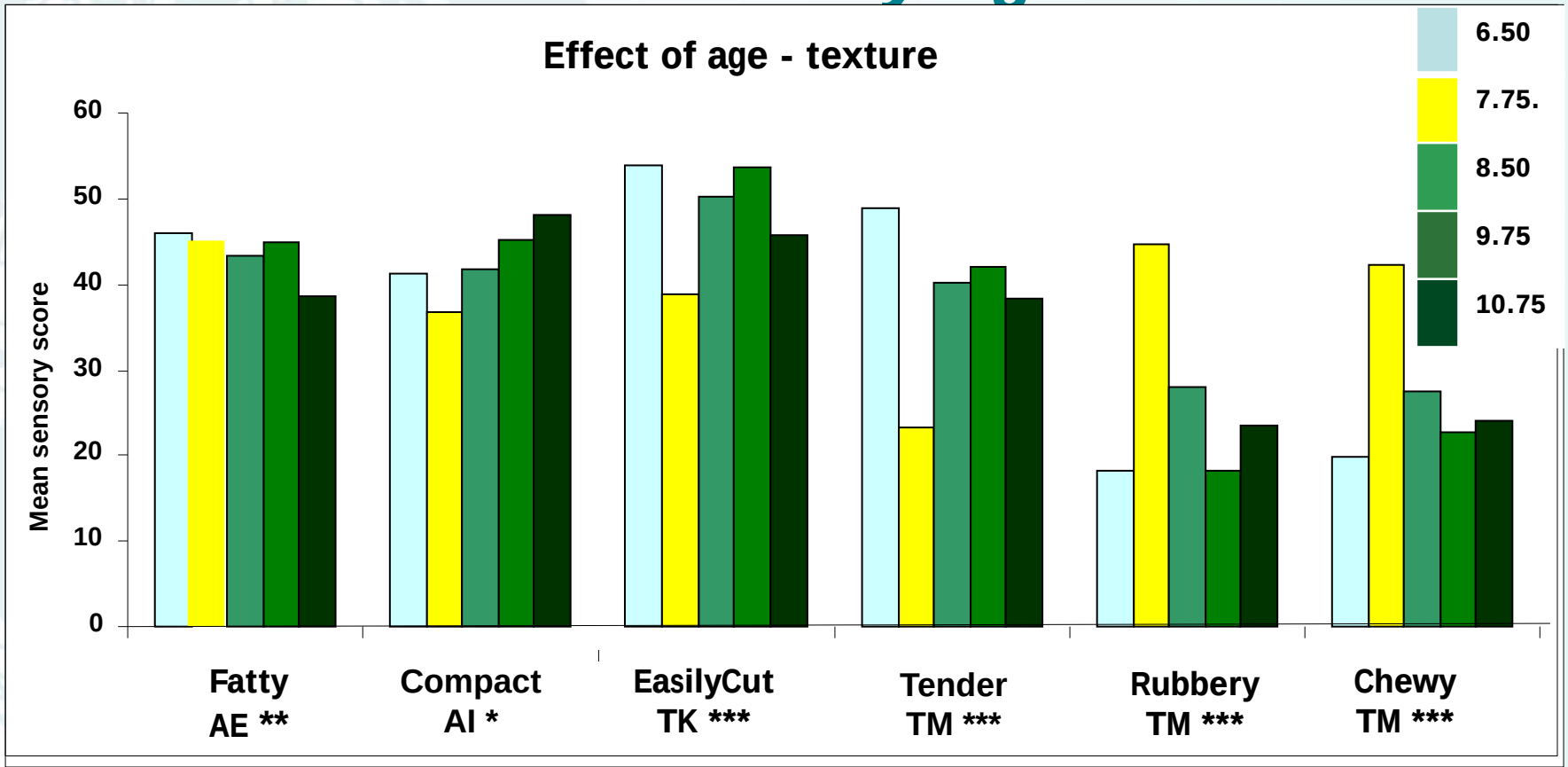
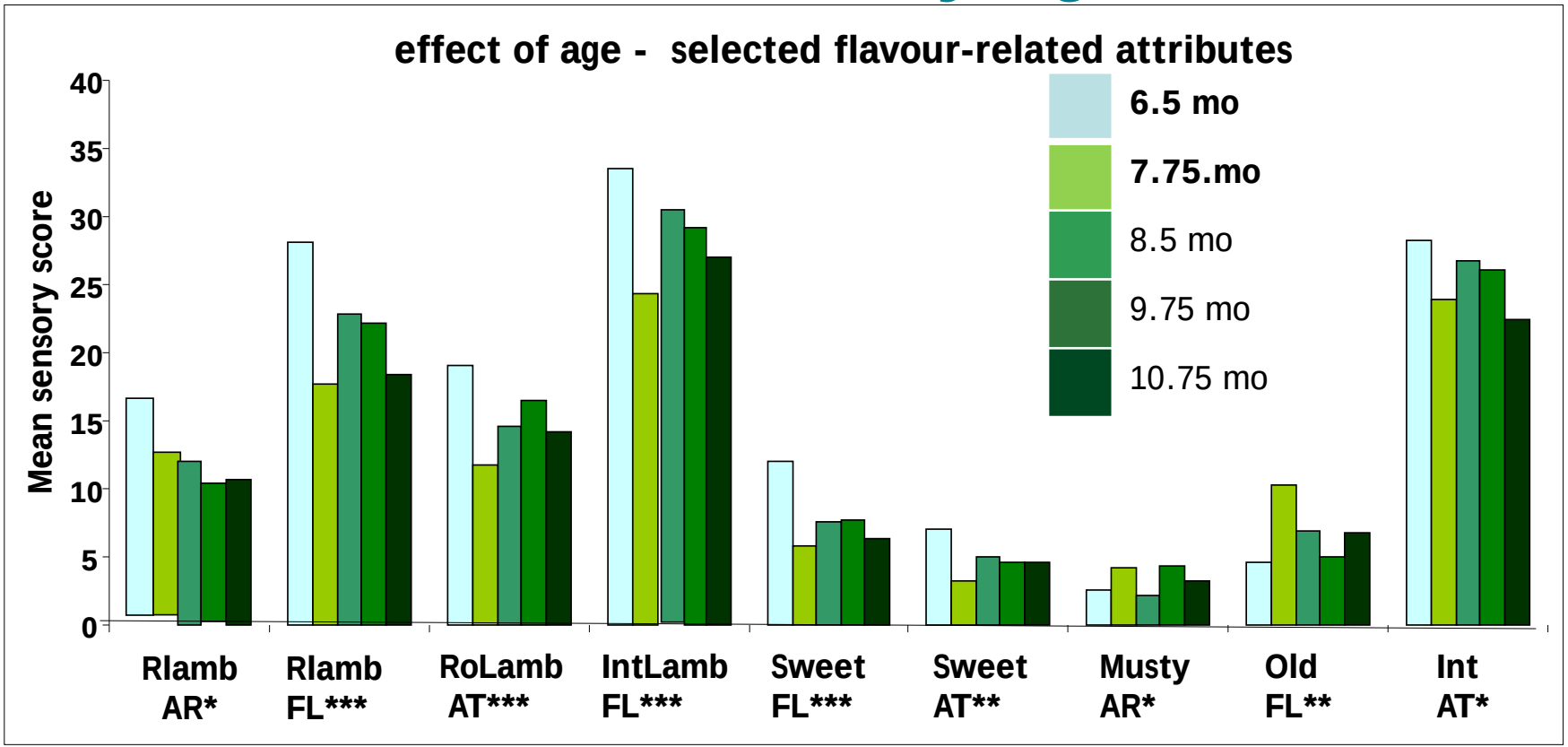


Profiling results:- *Selected flavour attributes influenced by age*



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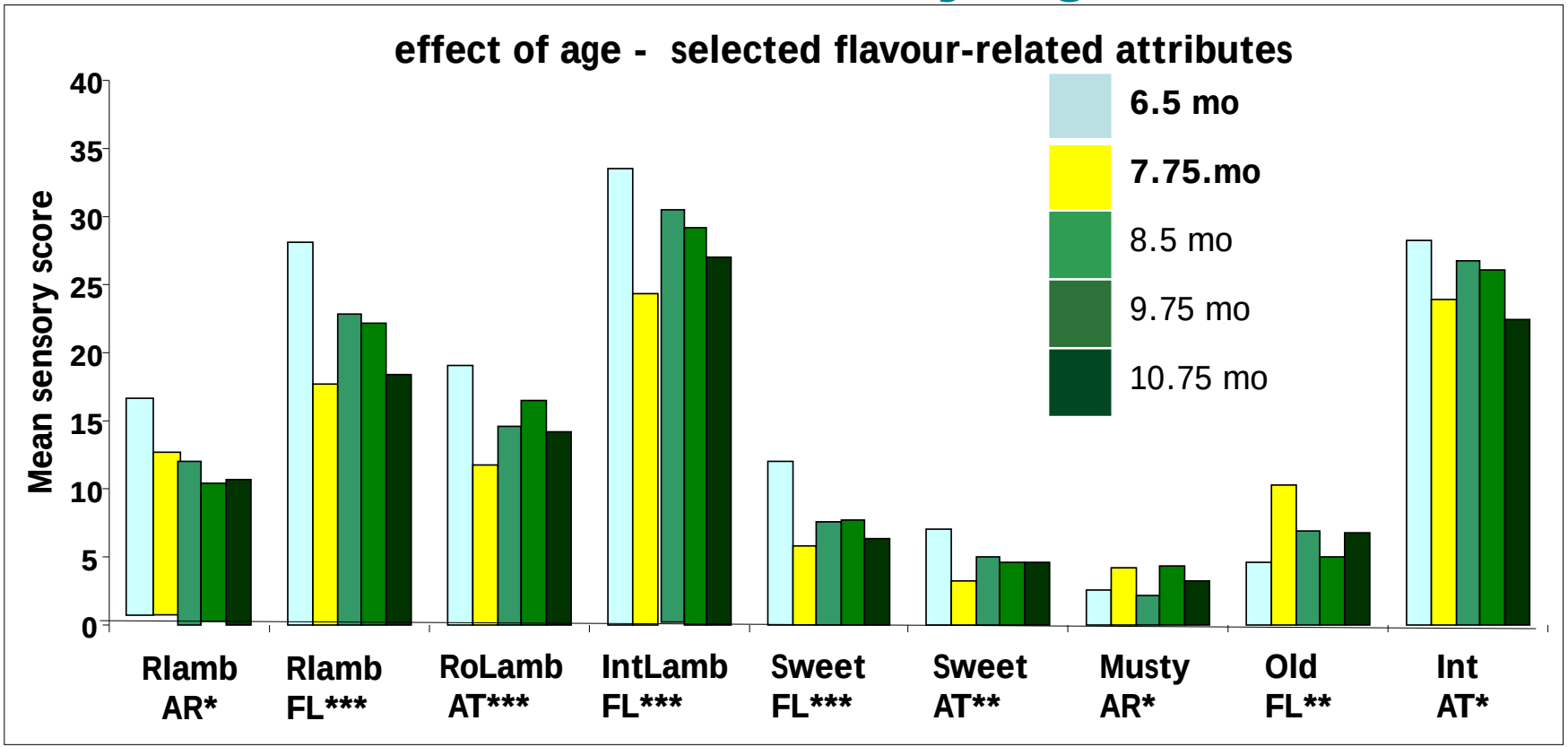
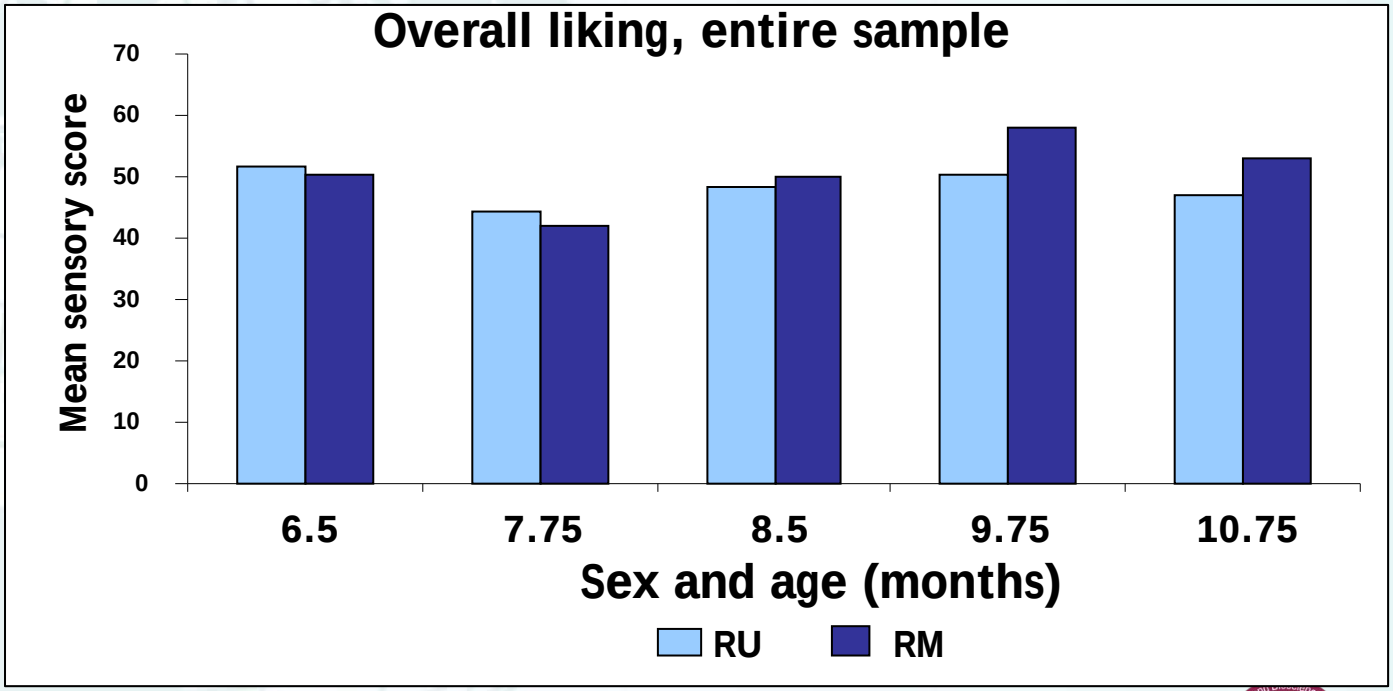


Consumer Results: *Comparison of rams of different ages, mixed and unmixed, for overall liking*

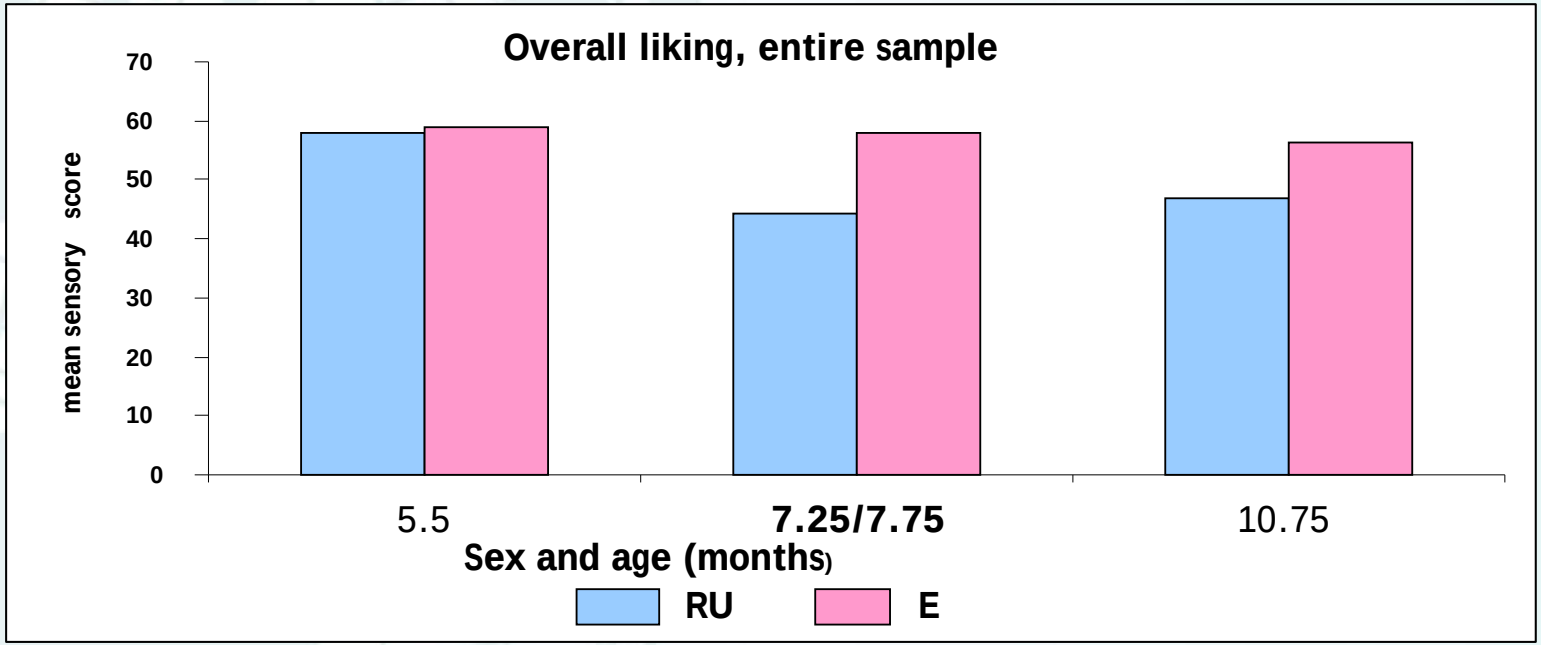


Sex: ns, Age: **, Sex.Age: ns

Comparison of unmixed rams with ewes

Sex	Mixing	Age at slaughter (months)						
		5.5	6.5	7.25	7.75	8.5	9.75	10.75
Rams	Mixed		RM		RM	RM	RM	RM
Rams	Unmixed	RU	RU		RU	RU	RU	RU
Ewes	n/a	Ewe		Ewe				Ewe

Comparison of ewes and rams (unmixed) at 5.5, 7.25/7.75, 10.75mo

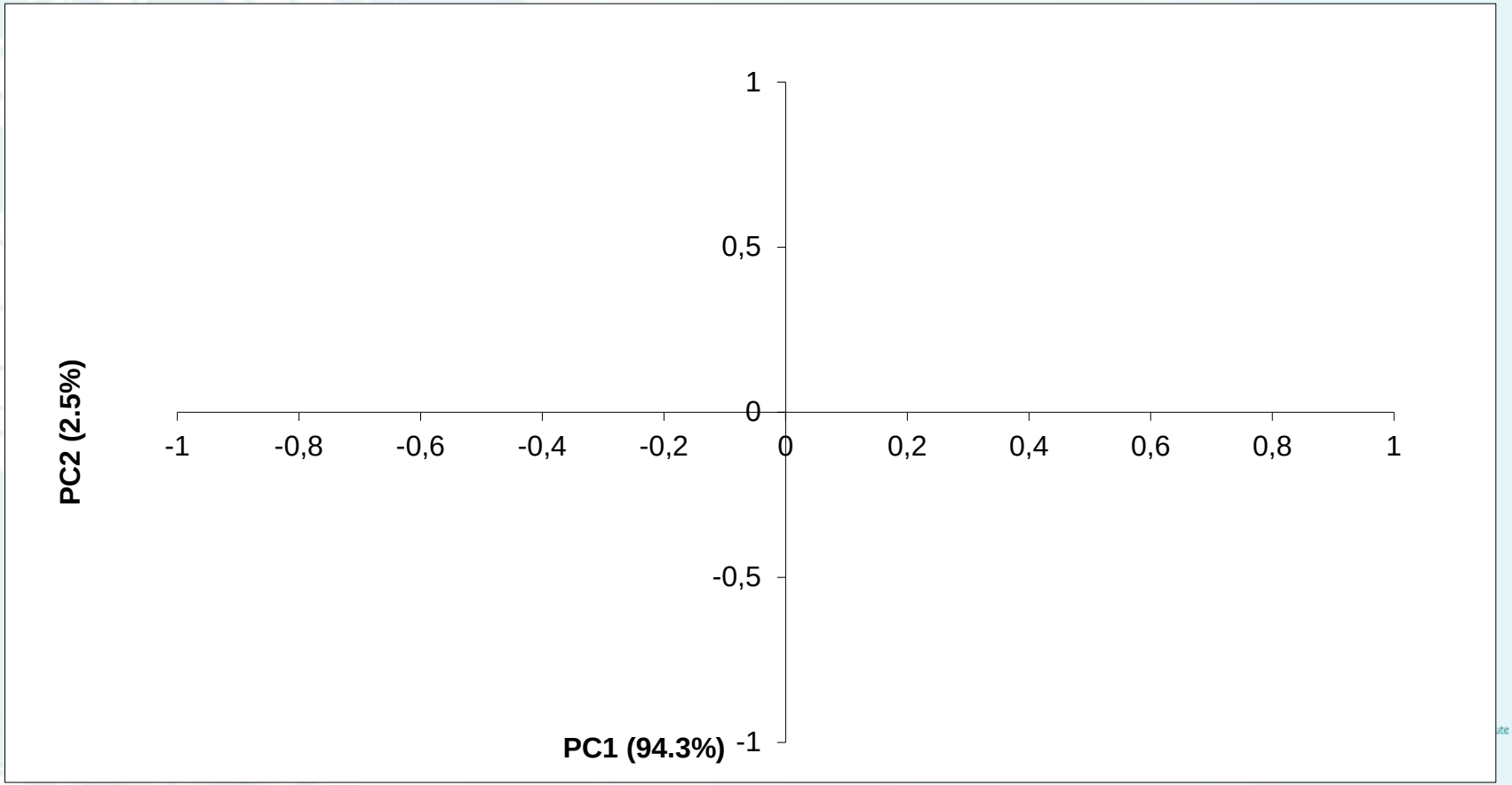


*Sex: ***, Age: *, Sex.Age: ns (0.052)*

Initial Conclusions

- Lambs slaughtered at 7.75 months were significantly different and less acceptable.
- Overall liking for ewes compared with unmixed rams was significantly higher at 7.25/7.75 and 10.75 months
- Multivariate statistical techniques such as *external and internal preference mapping* may further explain differences between sex, age and mixed/unmixed.

External preference map- Texture



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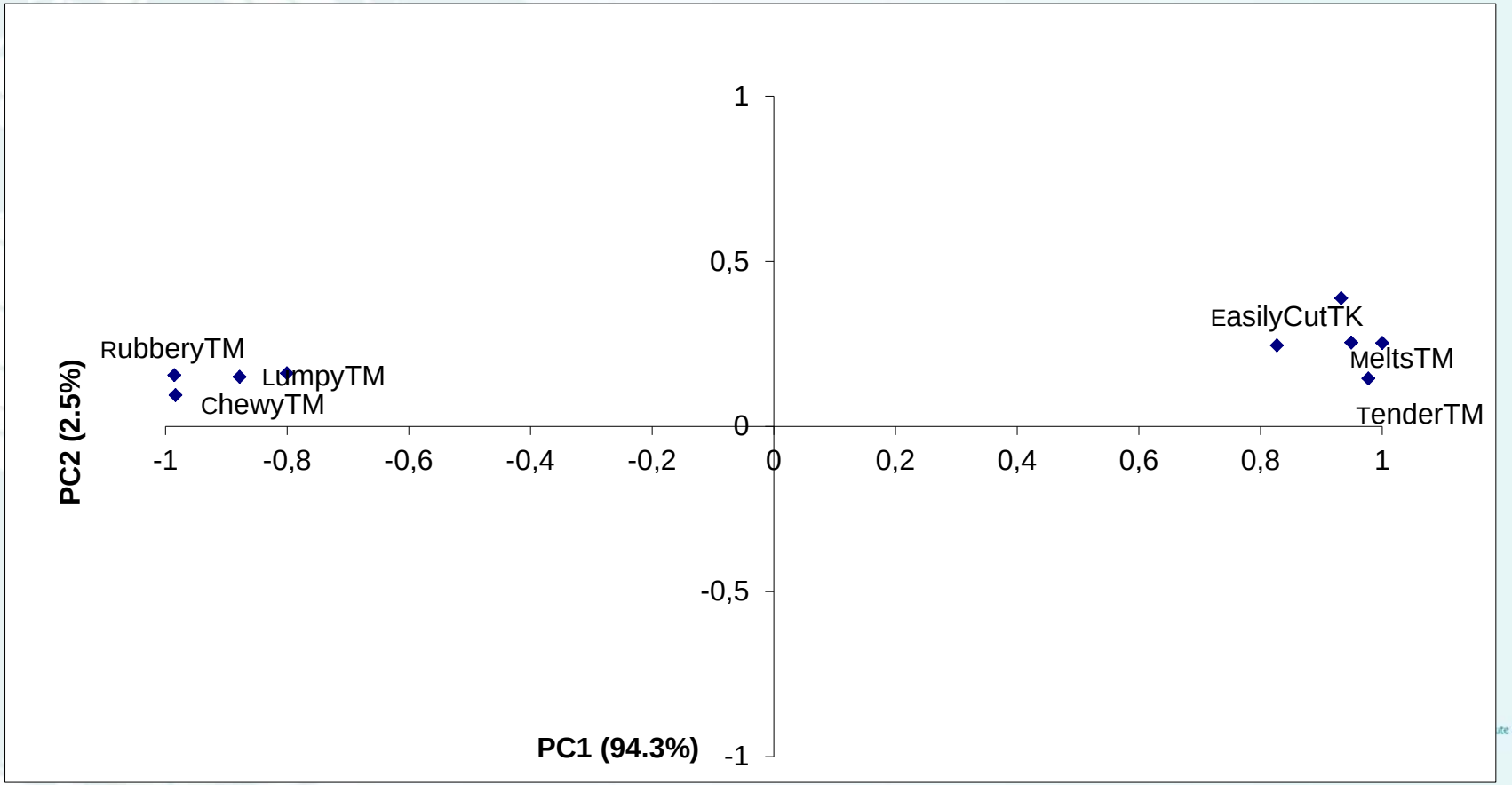

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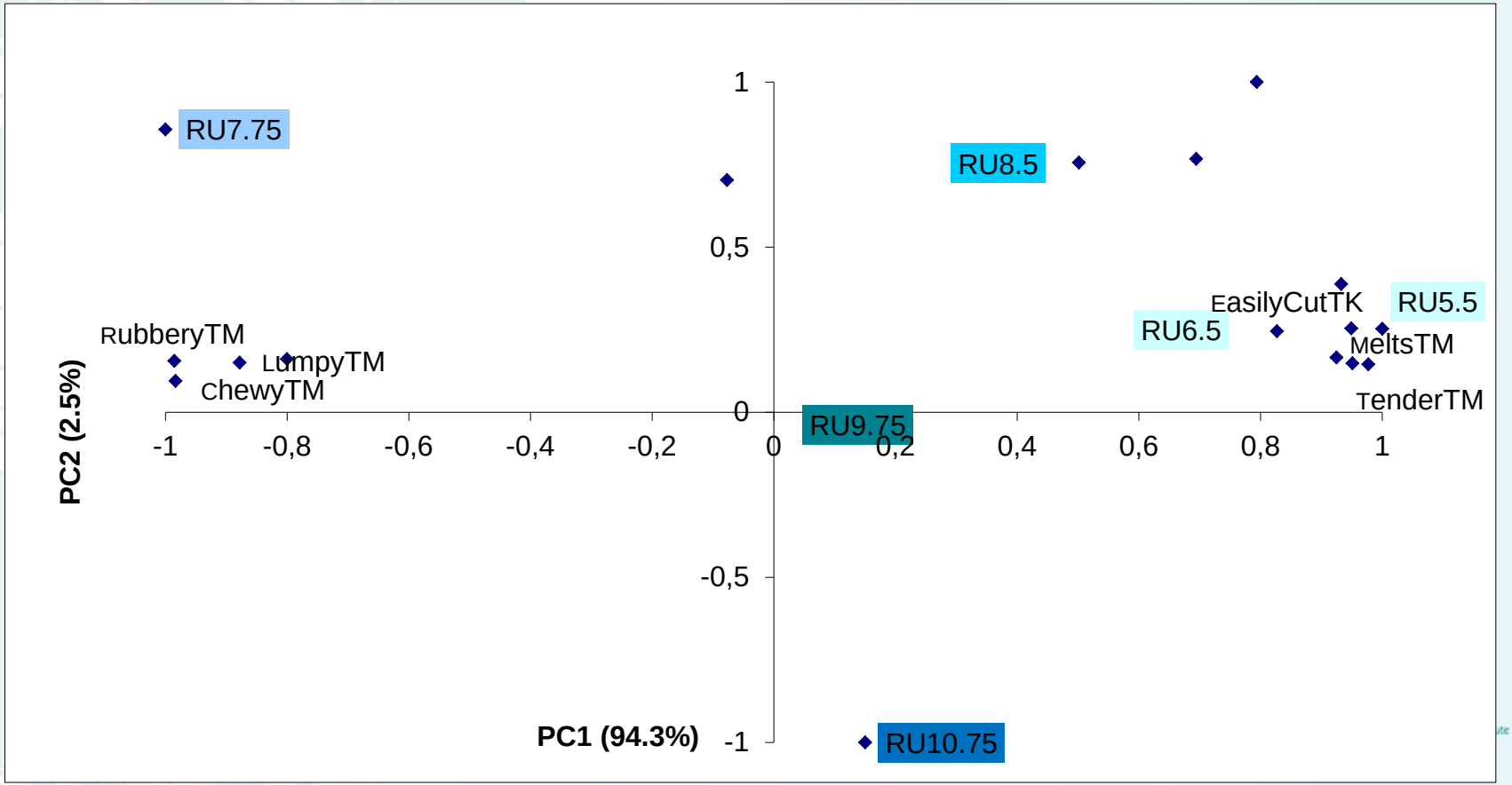

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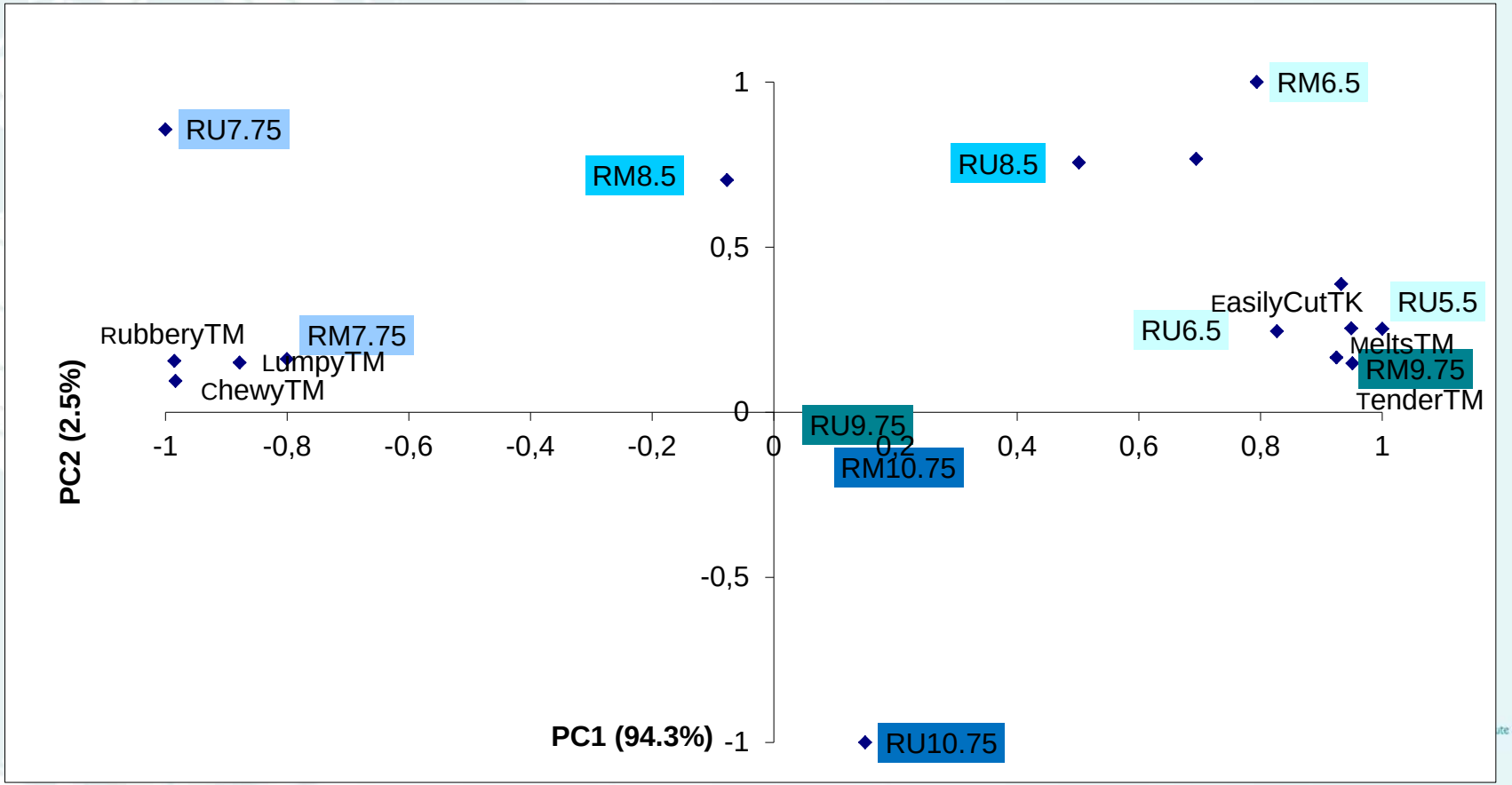

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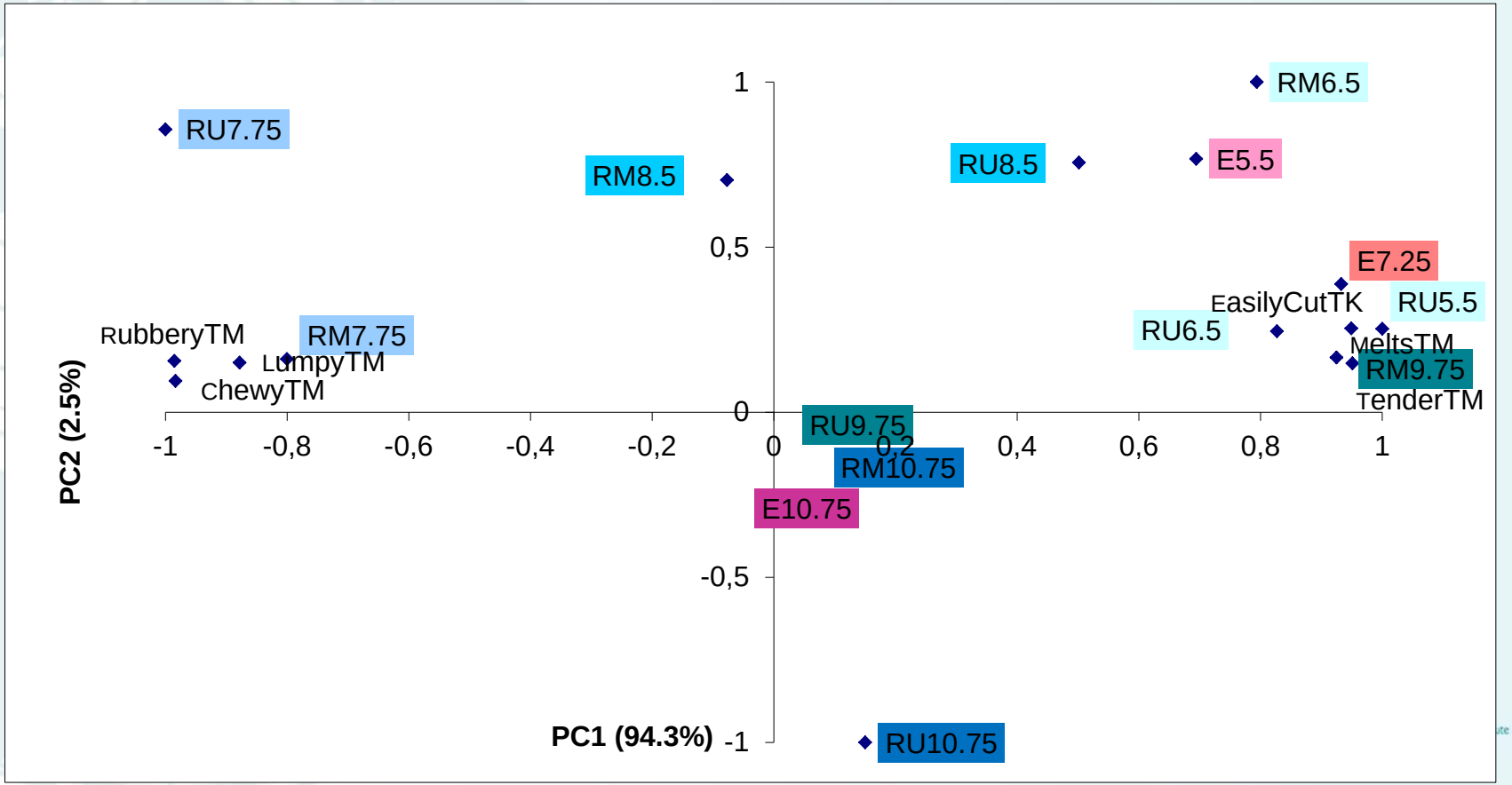

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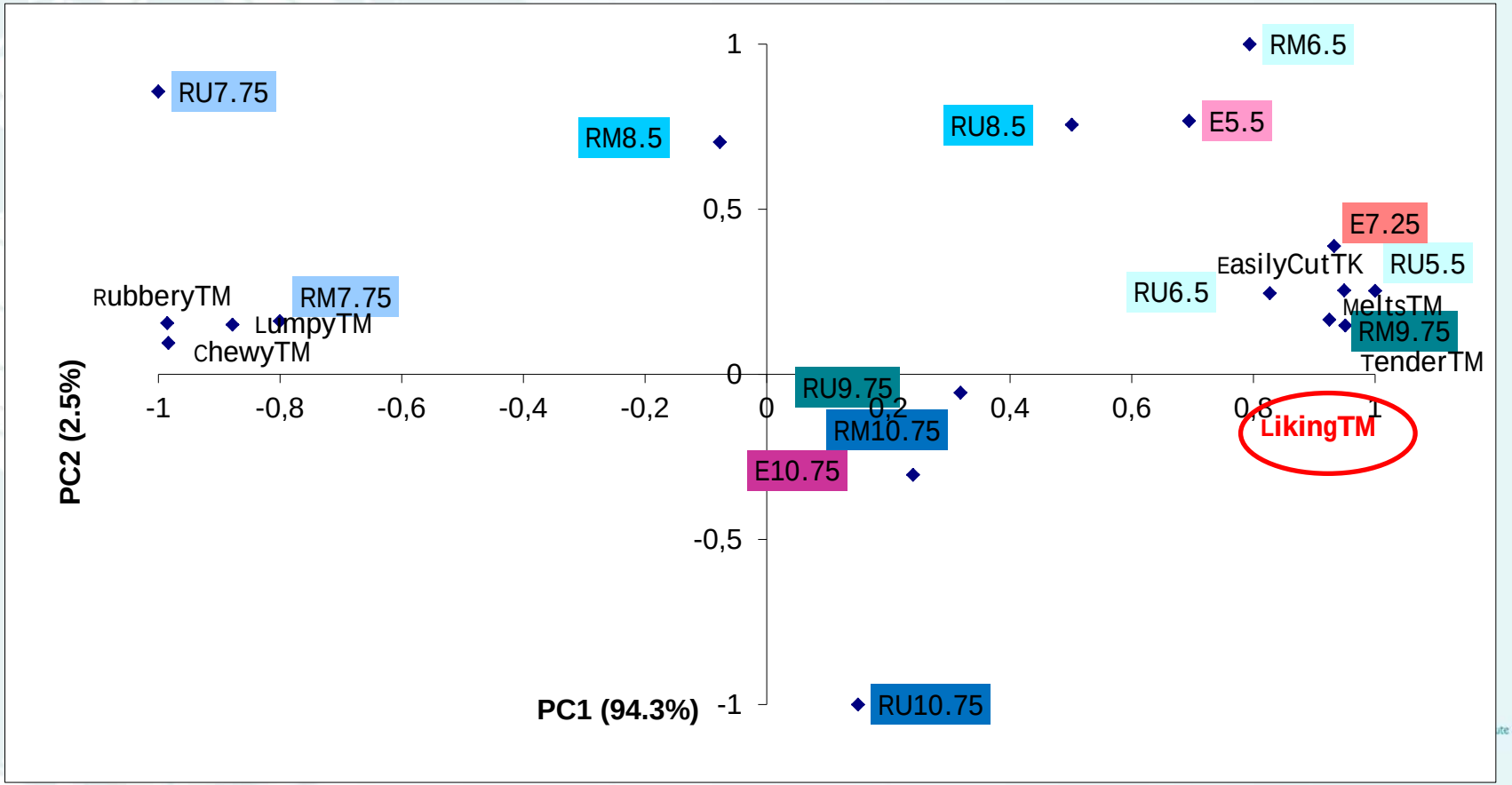
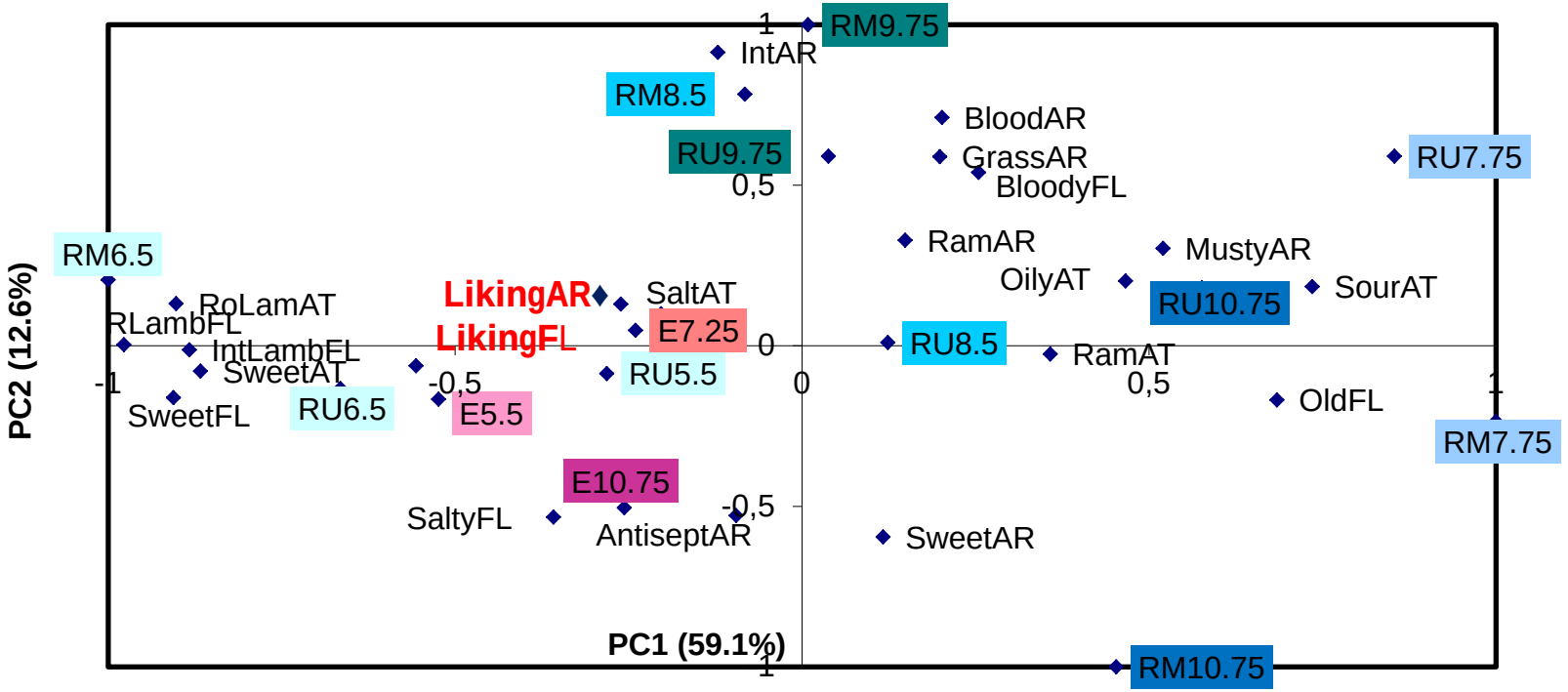


External preference map- Aroma, Flavour and Aftertaste



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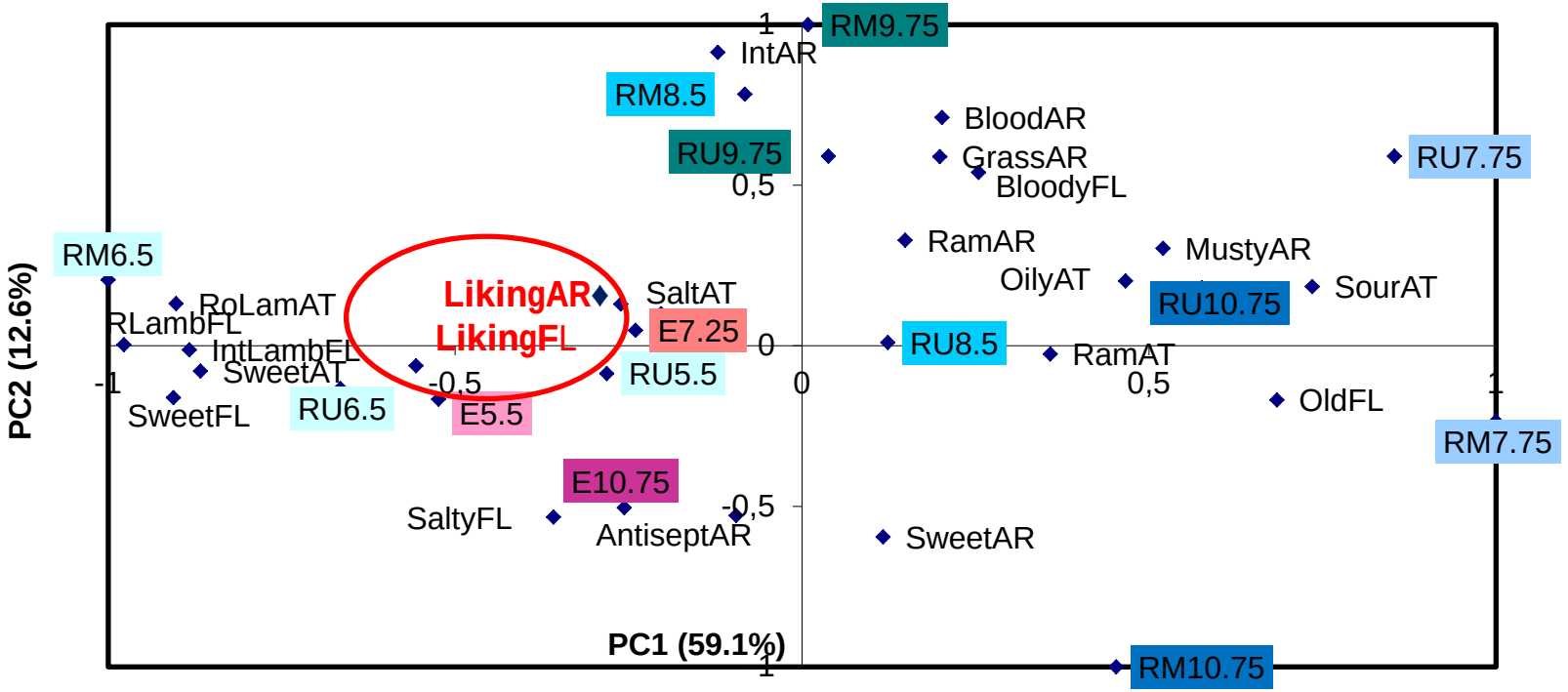

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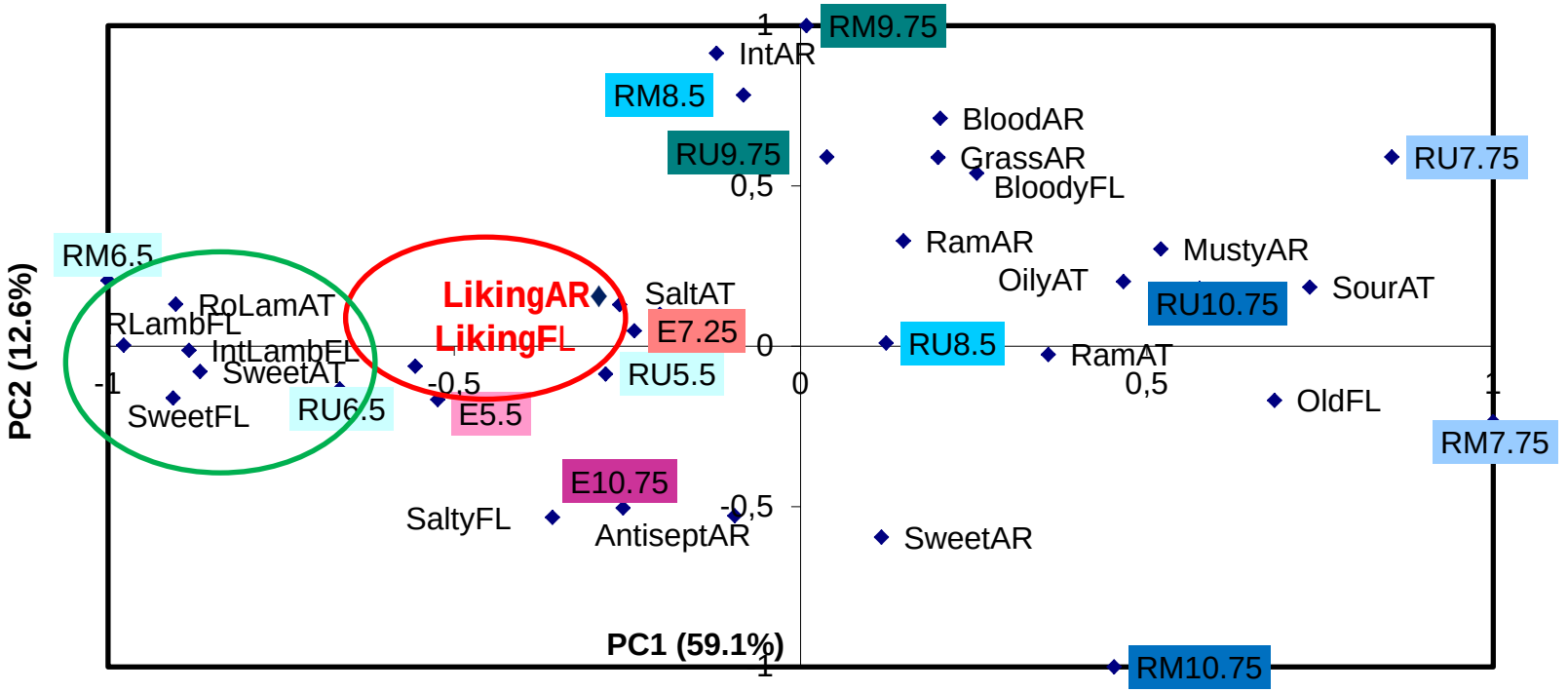

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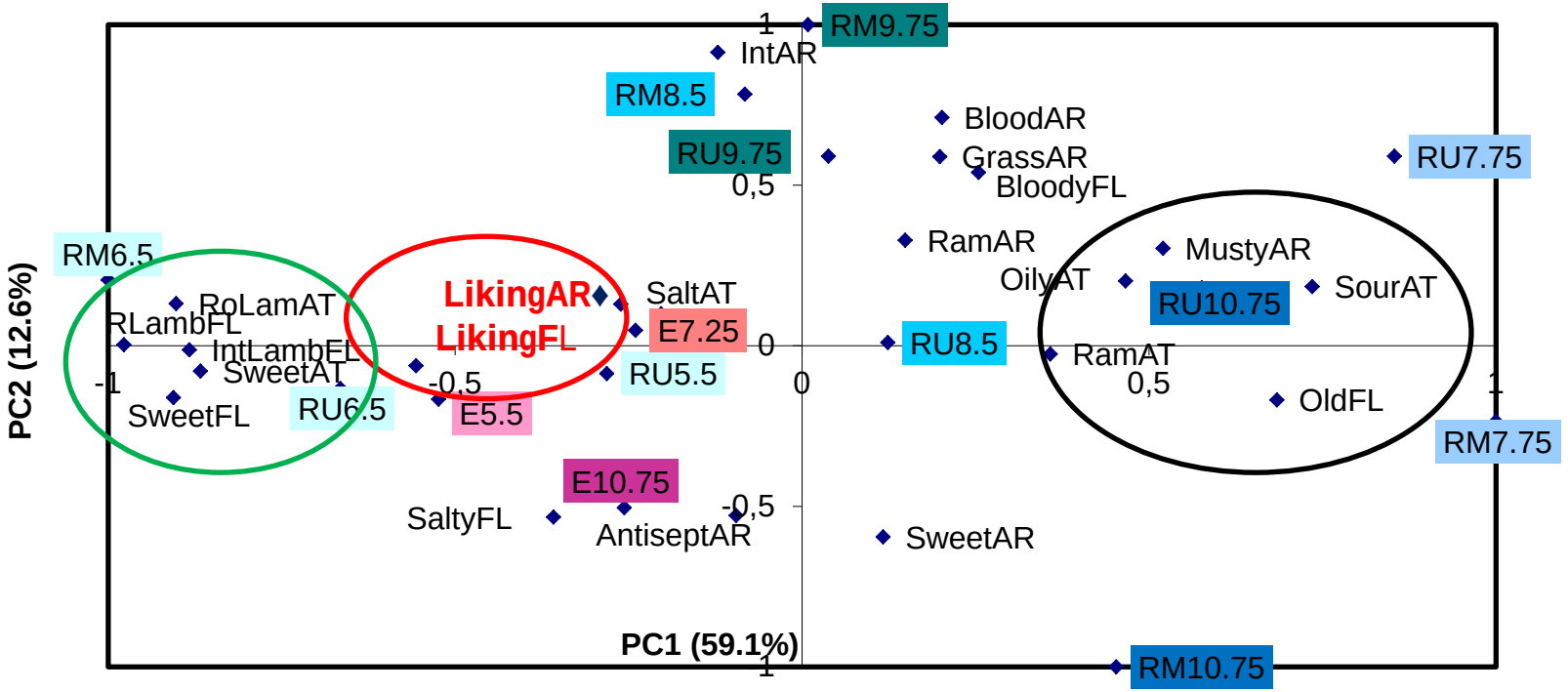

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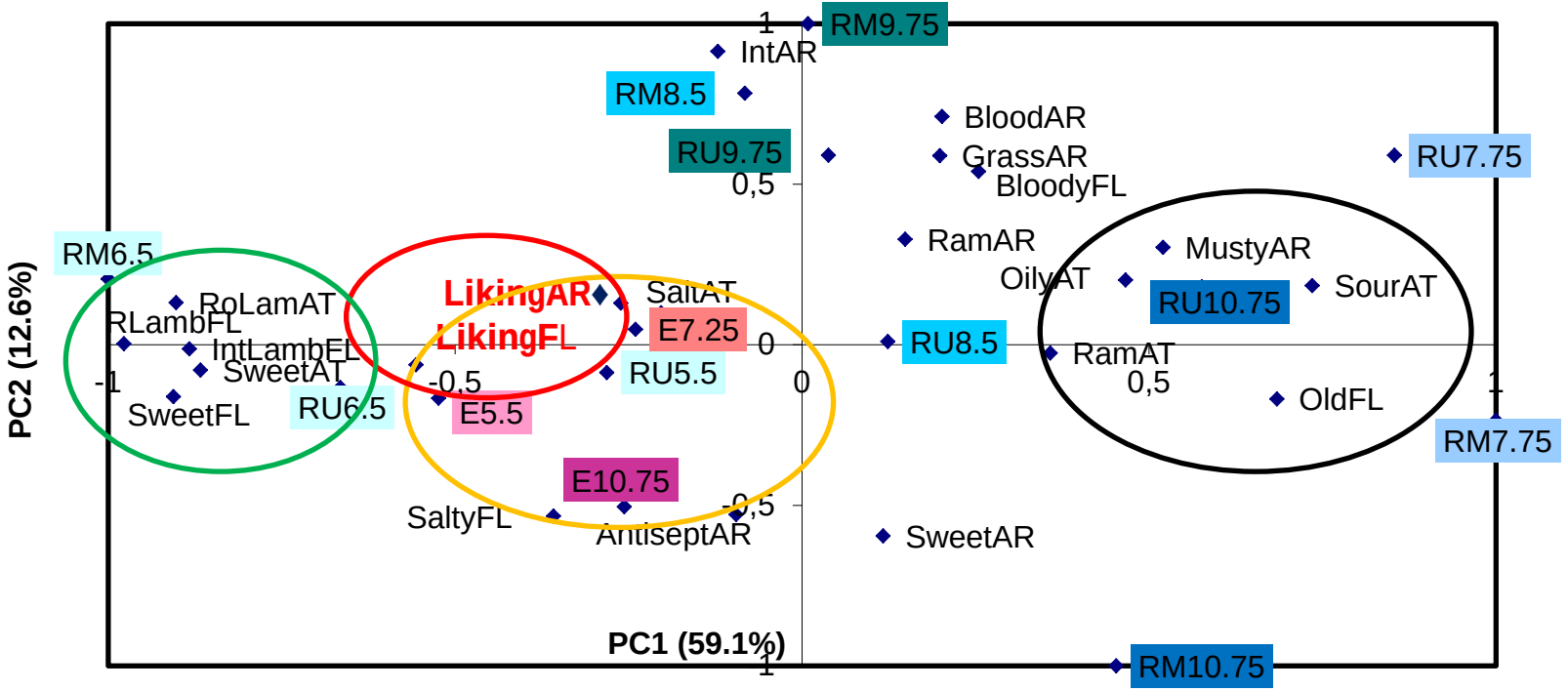

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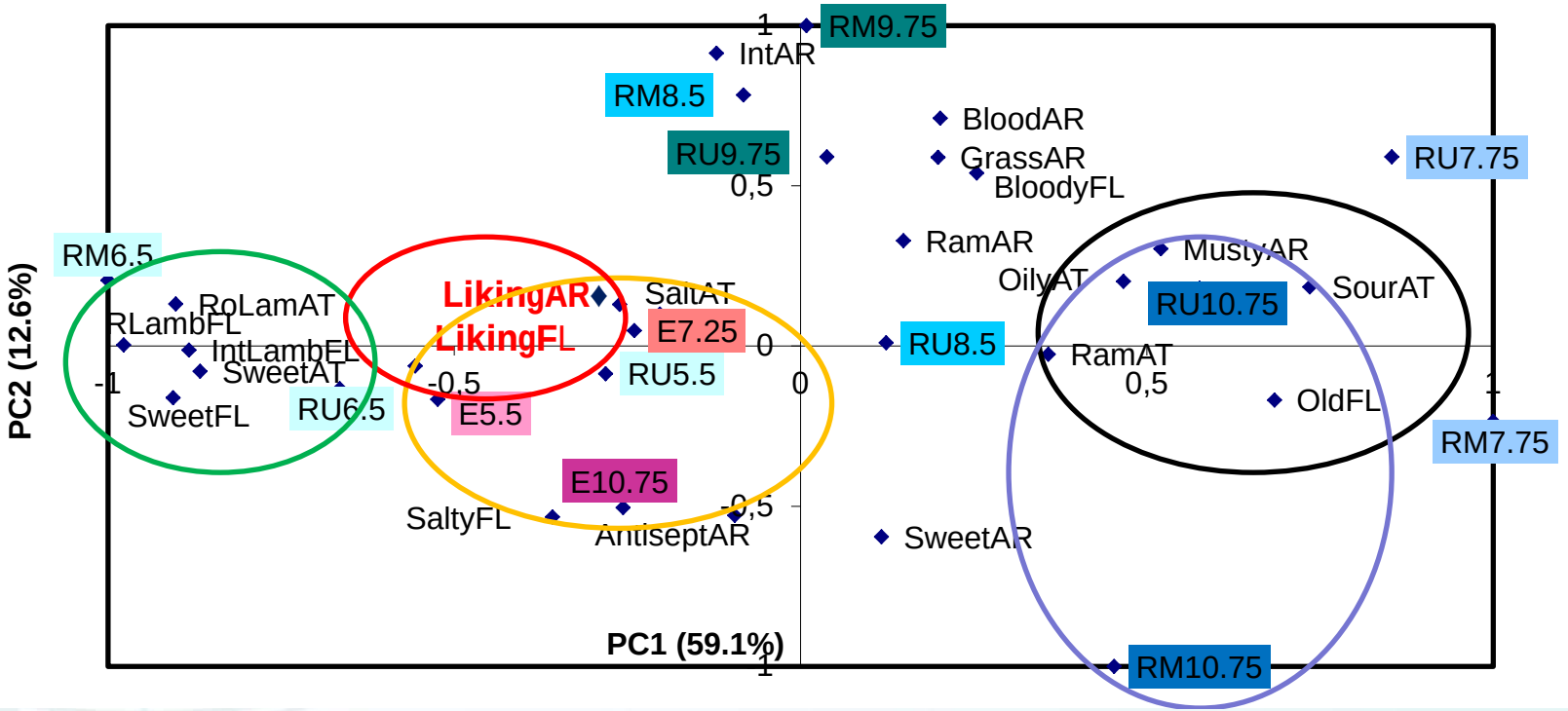
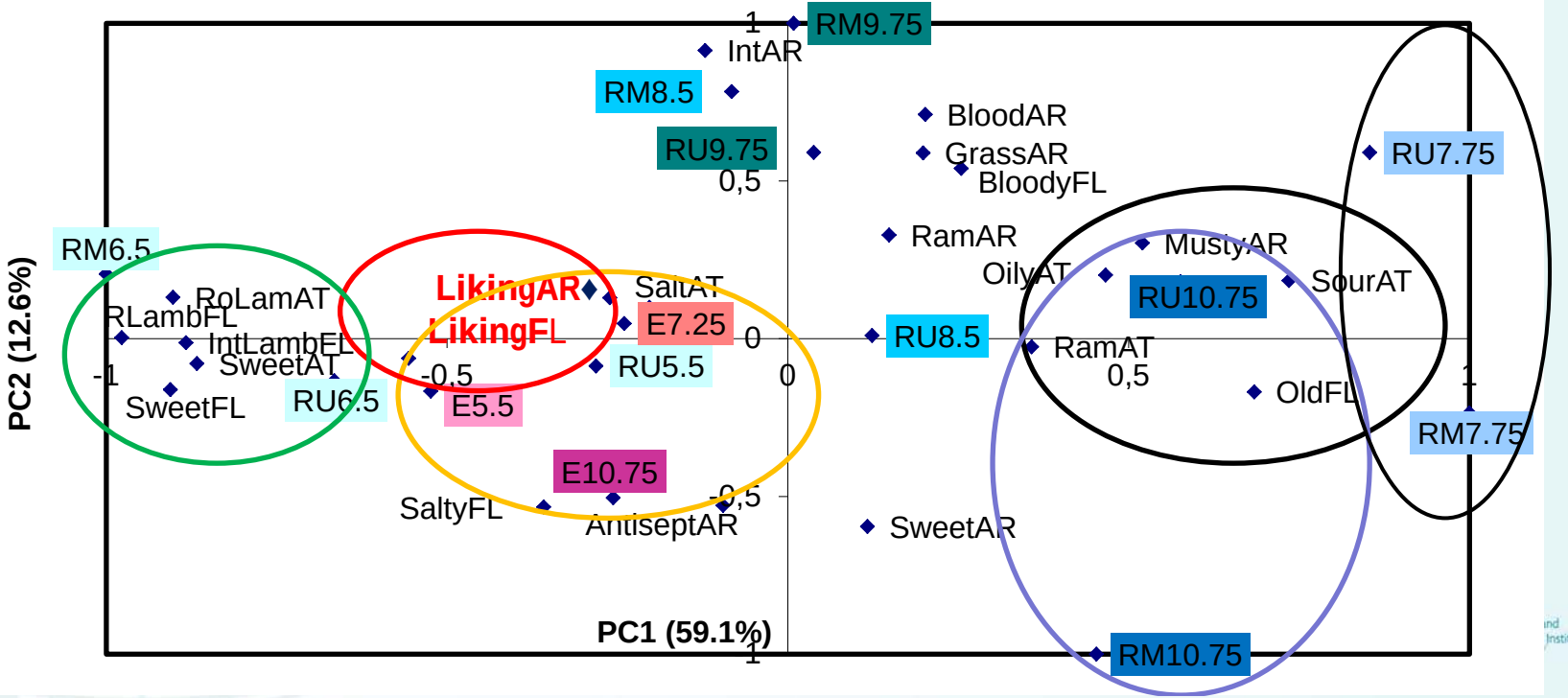
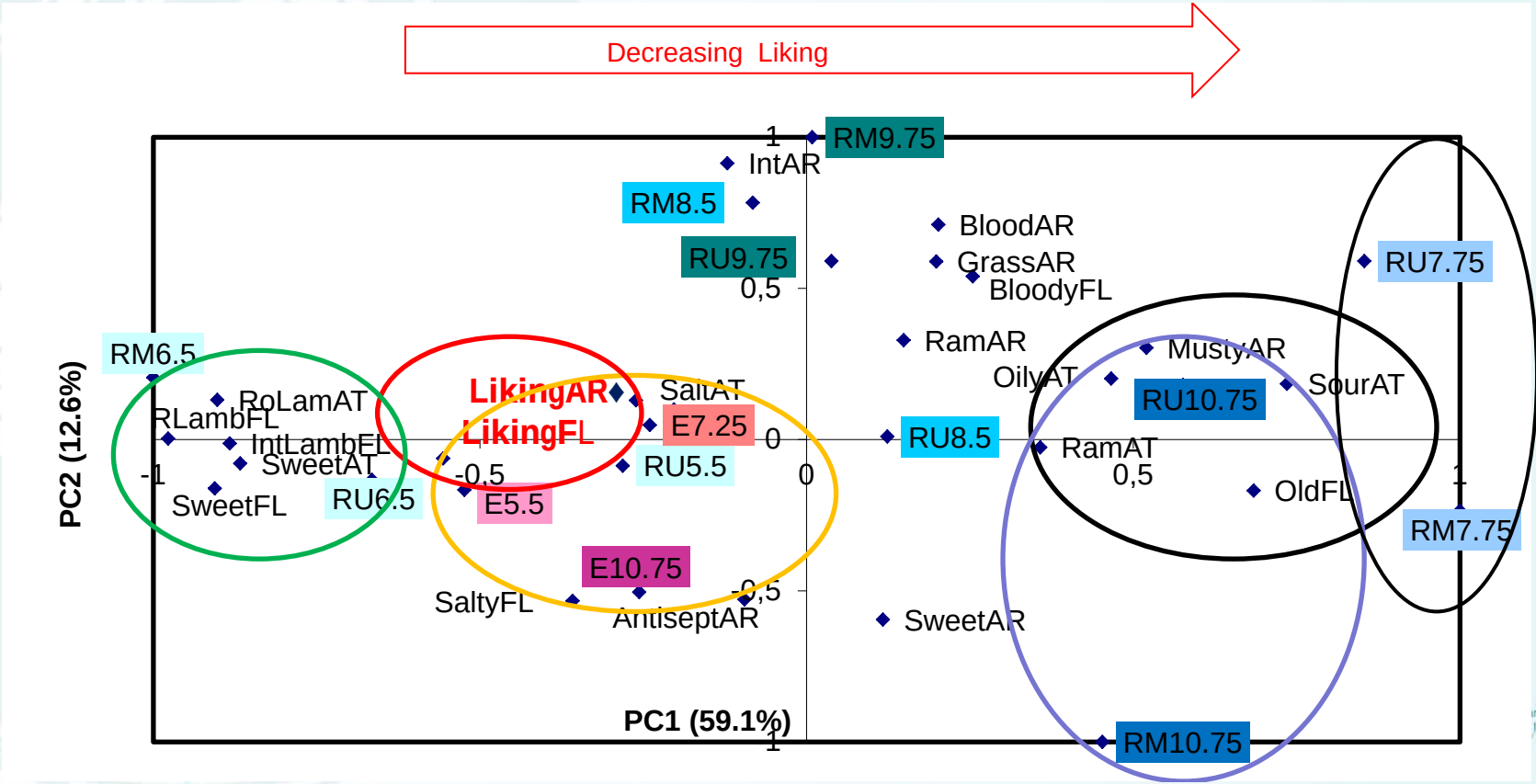


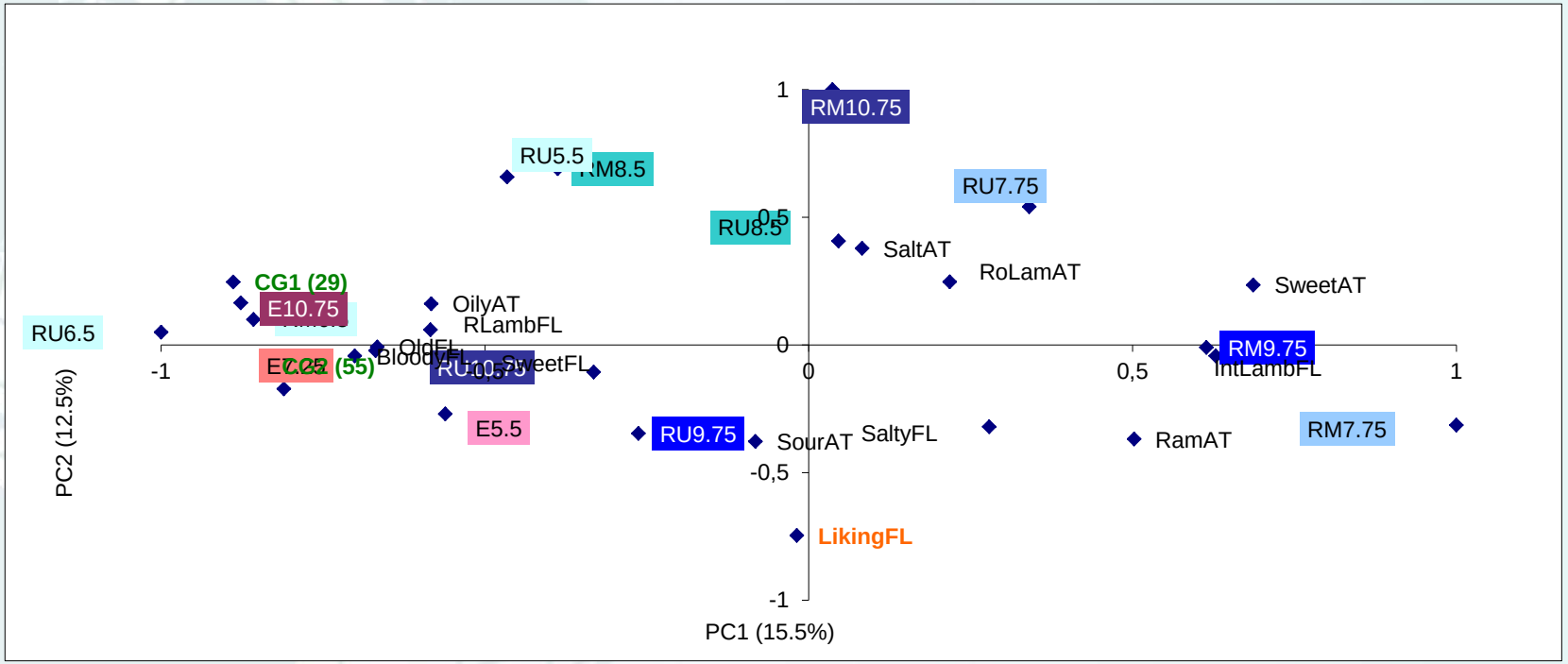
External preference map- Aroma, Flavour and Aftertaste



External preference map- Aroma, Flavour and Aftertaste



Internal preference map – Flavour only



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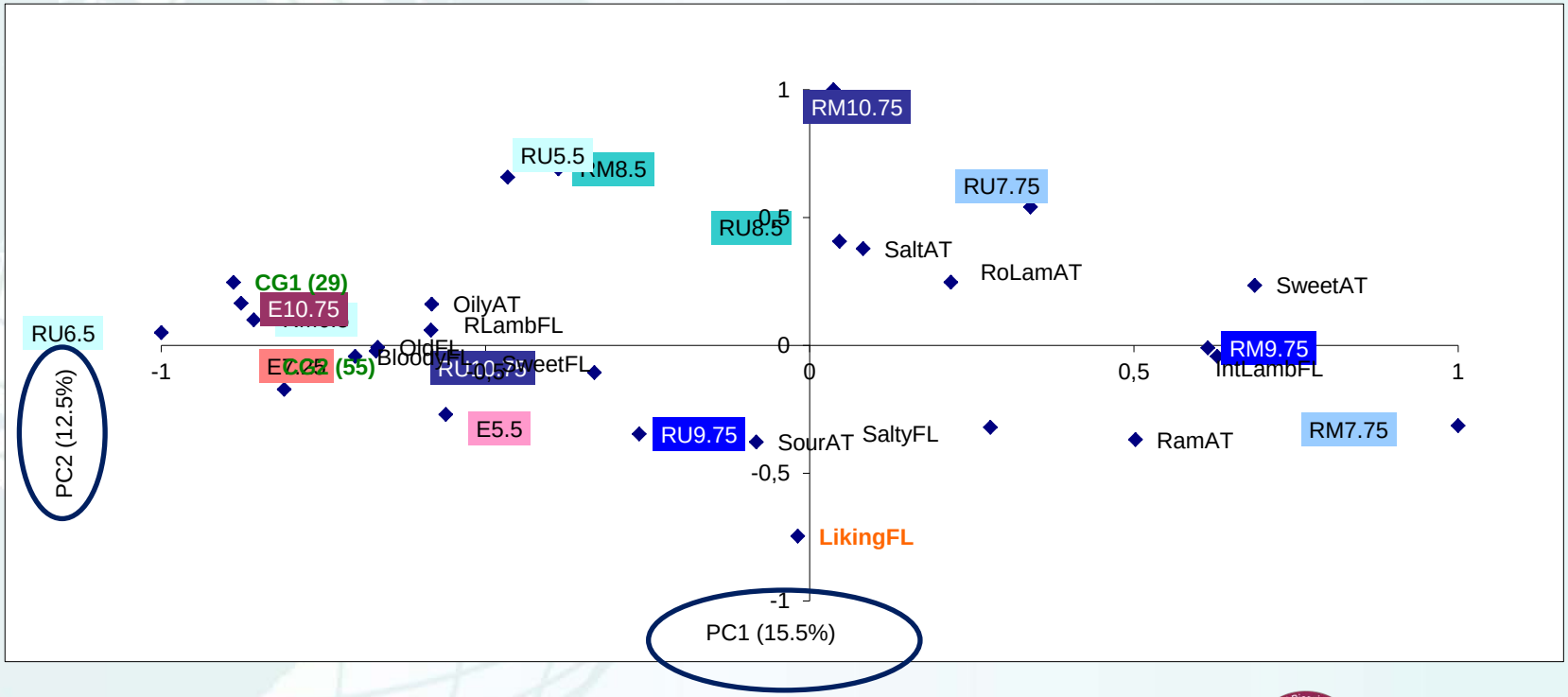

Conclusions

- Lambs killed at 7.75 months was significantly less acceptable than the other kill dates.
- At both 7.75 and 10.75 months slaughter dates ewes more acceptable than unmixed rams.
- Ewe and young ram lamb were most liked, most tender and most roast lamb flavour.
- No evidence of effect of RU versus RM.
- Treatments grouped by kill date.
- Liking of texture and flavour grouped together with Overall liking

- Finally I would like to thank Dunbia and InvestNI for their support of this project.

Descriptors of compounds or material used for training profiling panellists in specific attributes

Descriptors	Compound or material used	Concentration in minced lamb (ng/g)	Attribute
Sheep, woolly, animal,	ethyl octanoic acid	10-1000	Sheep pen aroma
Piggy, slurry	skatole	200-20000	Slurry aroma
Mothballs	indole	20000	Mothball aroma
Hospital, disinfectant	4-iso-propylphenol/ cresol	1000/10-1000	Antiseptic aroma
Muttony, strong sheepy	4-methyloctanoic acid	1000	Ram aroma *
Sweaty,body odour	4-methylbutanoic acid	1000	Sweaty aroma
Cheesy/ over ripe cheese	3-methylbutanoic acid	1000	Cheesy aroma
Liver/undercooked meat	4-methylnonanoic acid	5000	Liver flavour
Older lamb or sheep, boiled lamb, sheepskin	thiophenol	20	Old flavour

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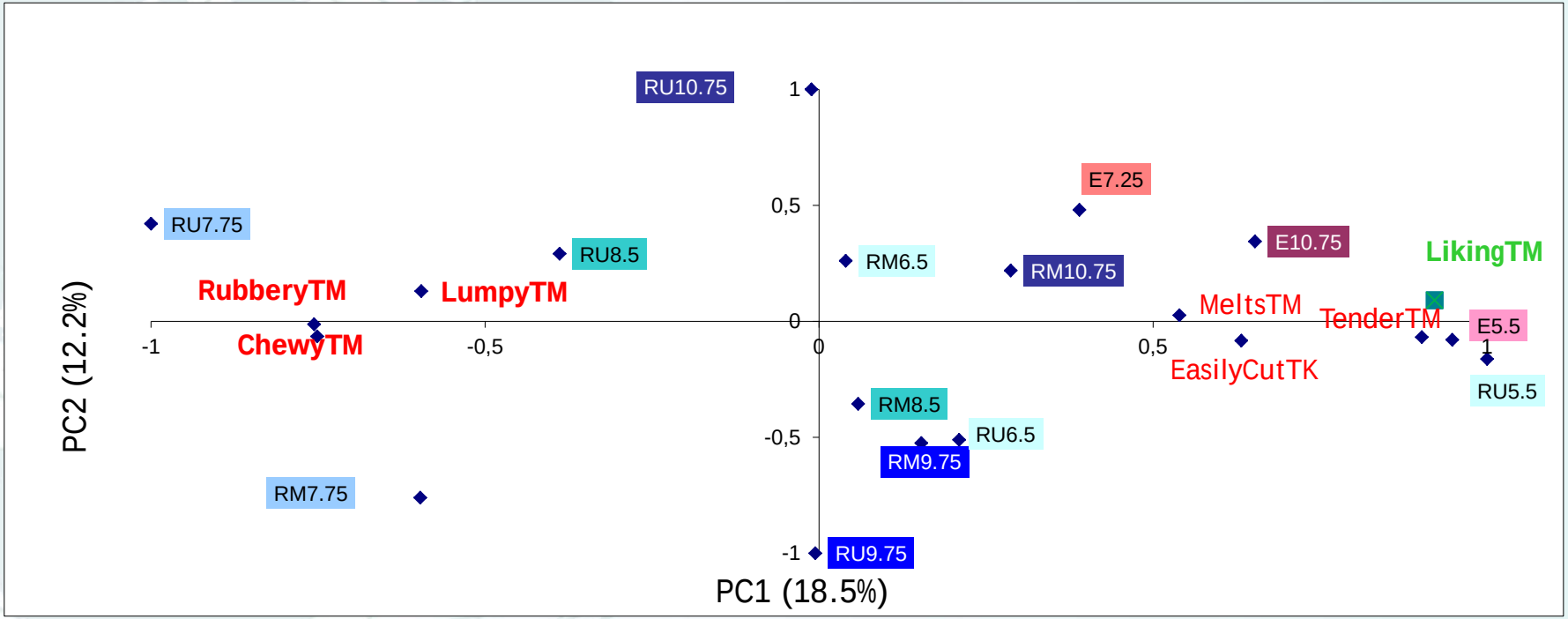
Internal preference map - texture liking



Statistical Model 2: Comparison of unmixed rams with ewes

Sex	Mixing	Age at slaughter (months)						
		5.5	6.5	7.25	7.75	8.5	9.75	10.75
Rams	Mixed		RM		RM	RM	RM	RM
Rams	Unmixed	RU	RU		RU	RU	RU	RU
Ewes	n/a	Ewe		Ewe				Ewe

Internal preference map - flavour liking