Sensory Profiling of Commercial Sirloin Steaks

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Aims

- **Customer Objectives:**

- To **externally** benchmark their current sirloin steak products with three of their competitors.

- To **internally** benchmark three of their own suppliers.

Experimental

- Customer to supply sirloin steak from six sources. Three from within their supply chain (A, B, C) and one from each of three competitors (X, Y, Z).
- Sensory profiling panel to be conducted over three week period.
- Texture analysis for Warner Brazler Shear force.

Sensory Methodology

- Assessment was conducted by a trained profiling panel.
- The trained profiling panel generated a list of 31 sensory attributes over two training sessions. These encompassed aroma, appearance, texture, flavour and aftertaste.
- Panellists used a 0 -100 line scale to score the increasing intensity of each attribute.

Instron analysis

- Two steaks from different packs from each source for each session were selected to measure the Warner Bratzler Shear Force.
- Steak samples were also measured for cooking loss on each panel day.
- WBSF was measured by analysing 10 replicate cores from each cooked steak.

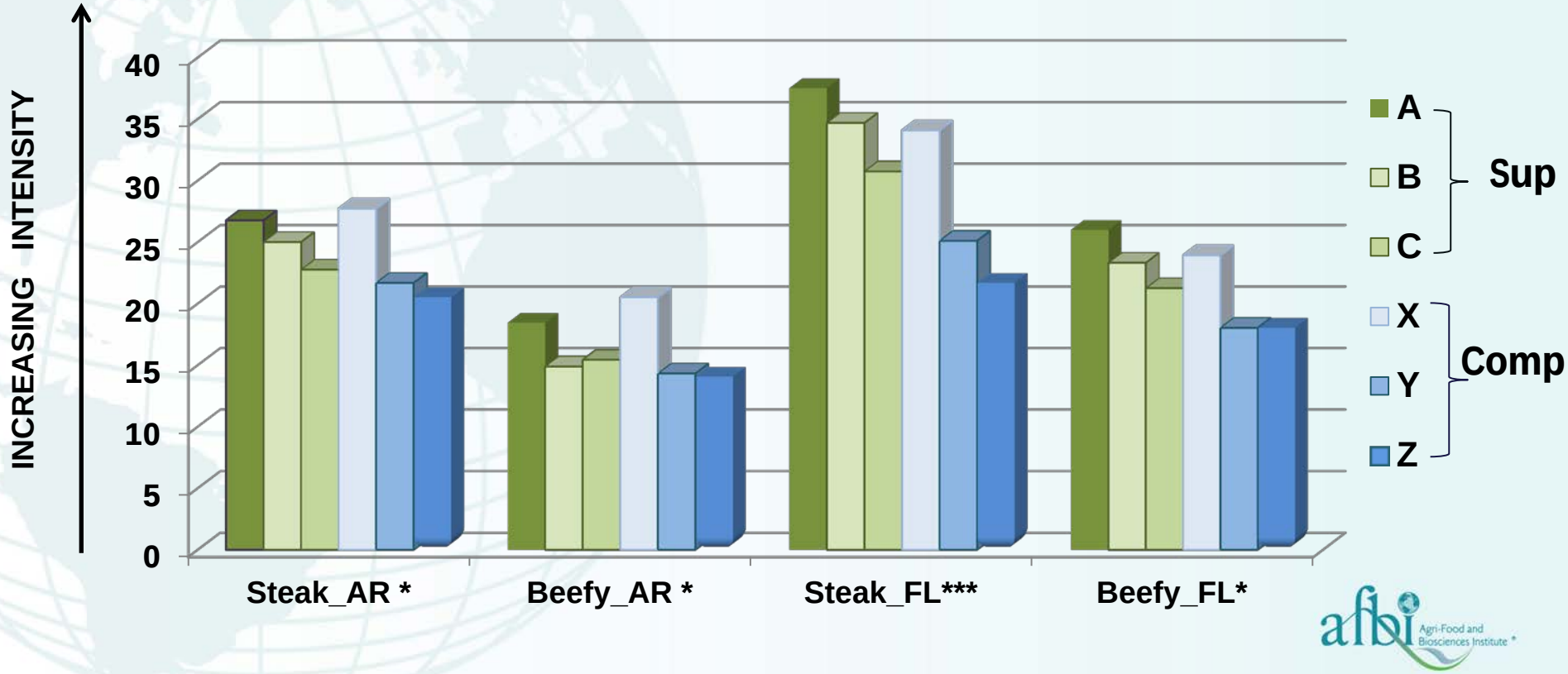
Instrumental Results

	WBSF(kg Force)	Thickness (mm)	pHu	Cooking loss (%)
Supplier A	4.00^{ab}	19.3^{bcd}	5.62	26.6
Supplier B	4.20^{ab}	16.0^{a}	5.47	28.2
Supplier C	4.39^{bc}	16.5^{ab}	5.52	27.8
Competitor X	4.29^{abc}	18.0^{abc}	5.54	26.0
Competitor Y	3.75^{a}	20.2^{cd}	5.57	26.0
Competitor Z	4.88^{c}	21.8^{d}	5.58	24.6
Sig (source)#	P<0.05	P<0.05	P<0.001	ns

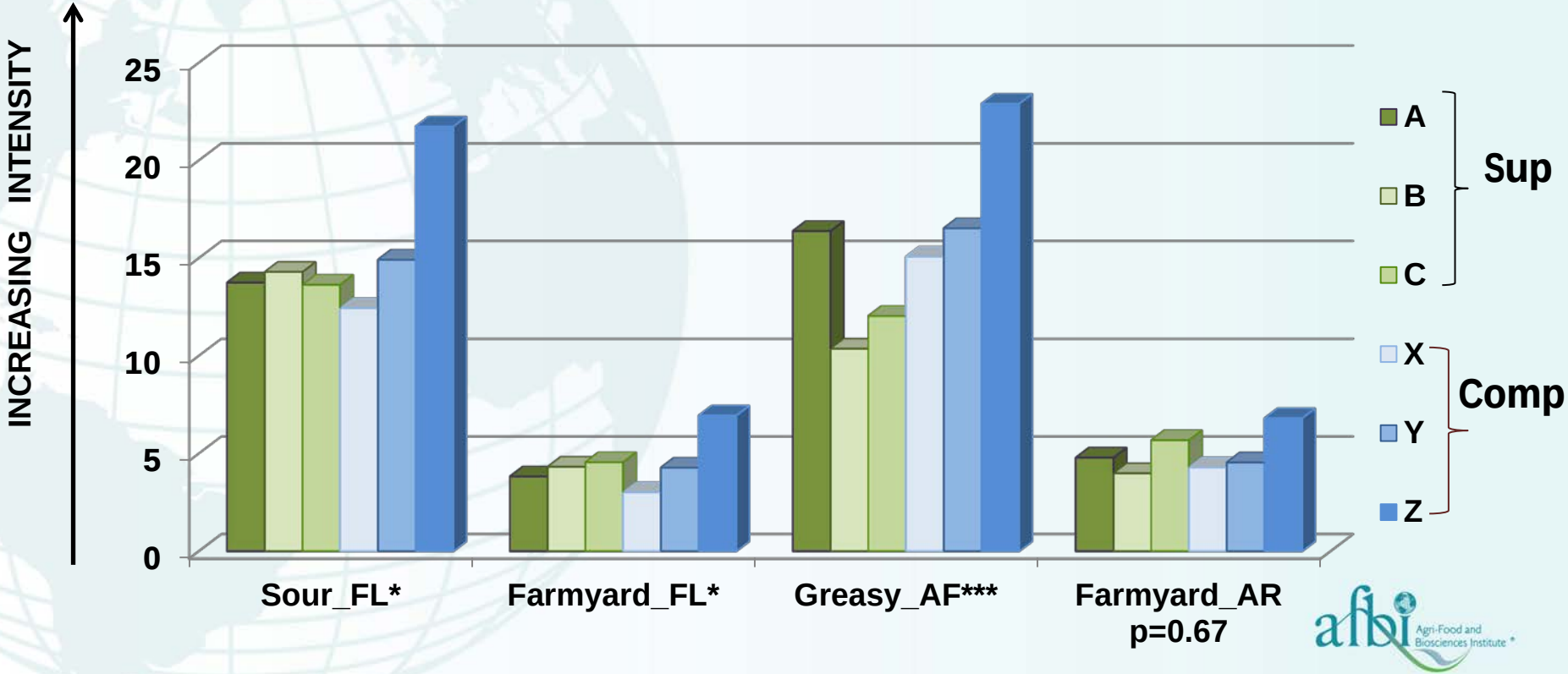
Instrumental Conclusions

- Steaks from competitor Z were significantly *“more tough”.*
- There was variation in the thickness of the steaks.
- This was also recognised during the sensory training and suitable adjustments made to the cooking protocol.

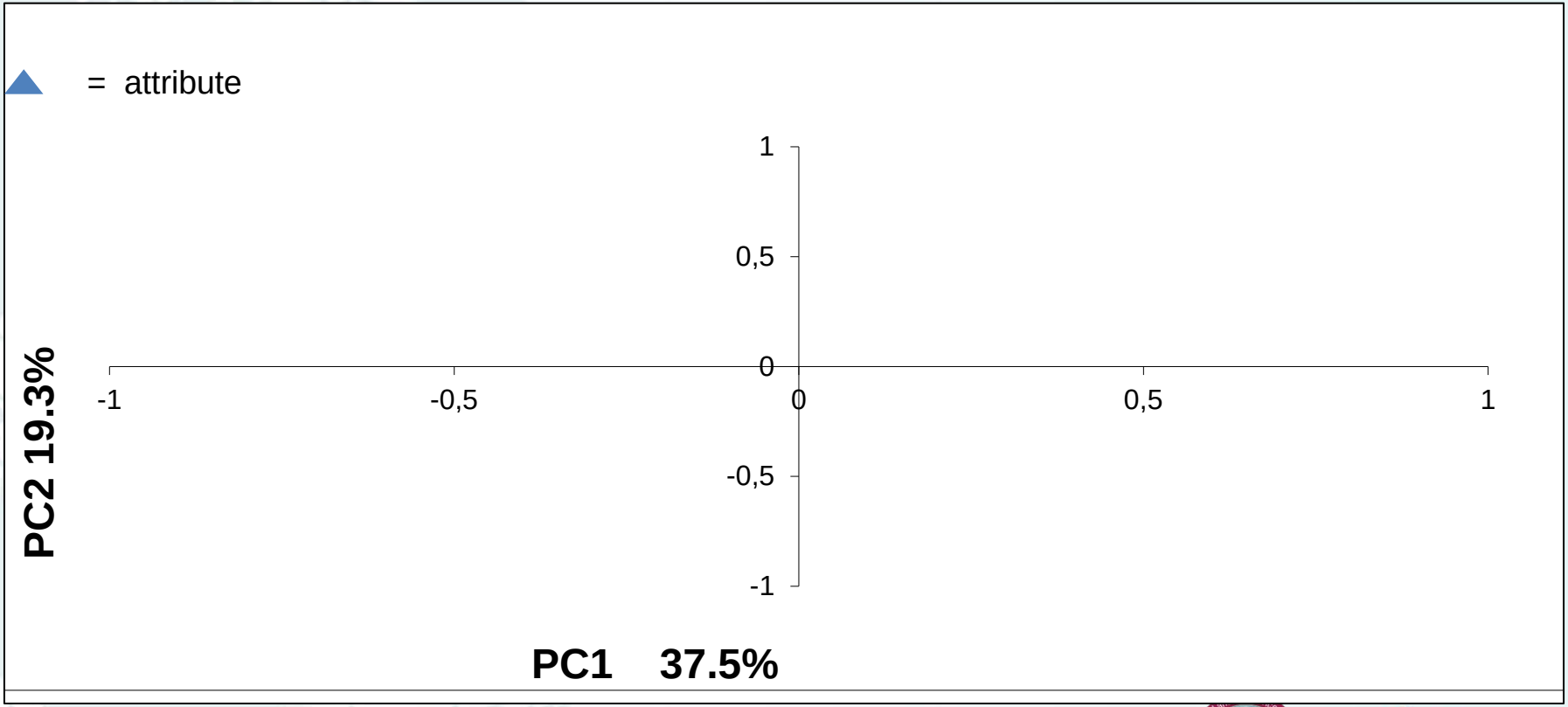
Effect of source on possible "positive" attributes
(, *** = significant differences at P<0.05, P<0.001, respectively)*



Effect of source on possible "negative" attributes
(, *** = significant differences at P<0.05, P<0.001, respectively*



Principal Component Analysis (PC1v PC2)



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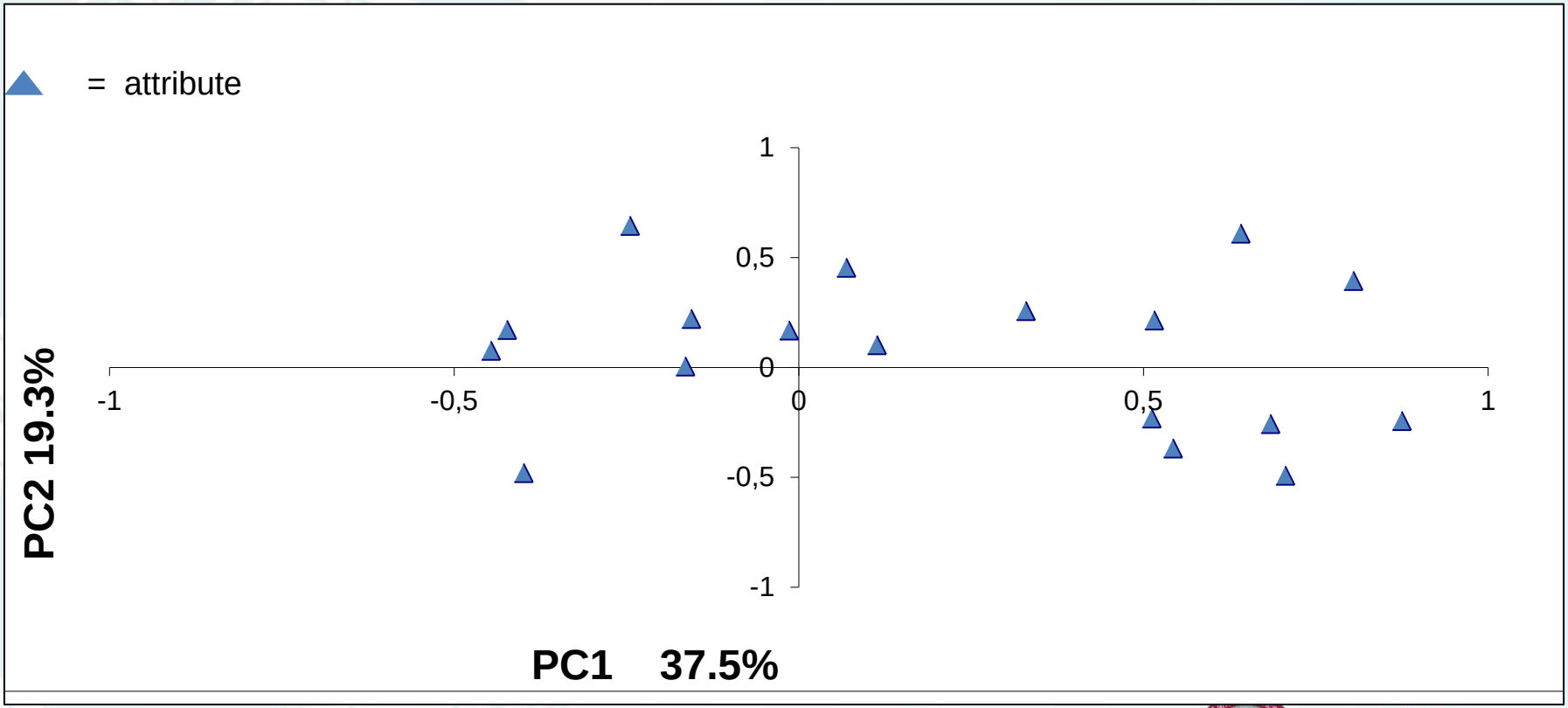

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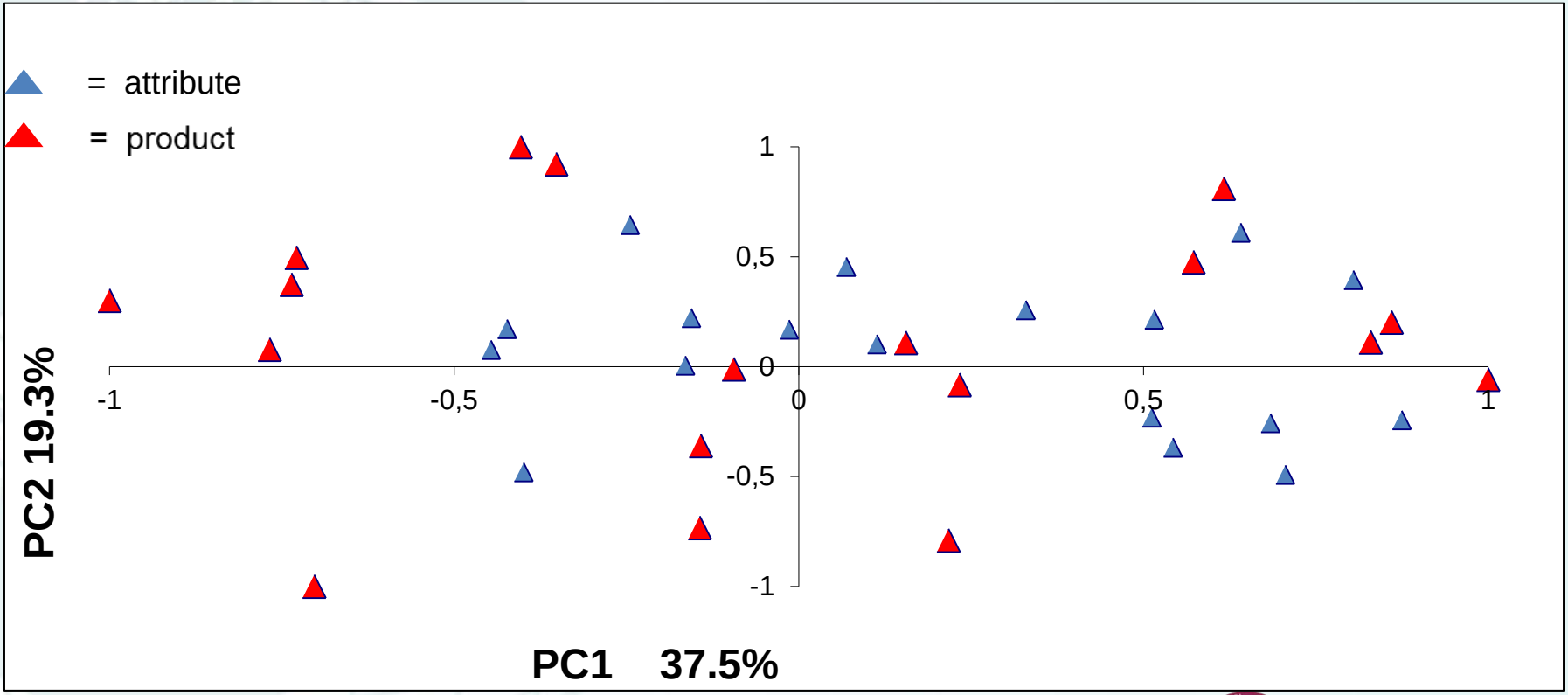

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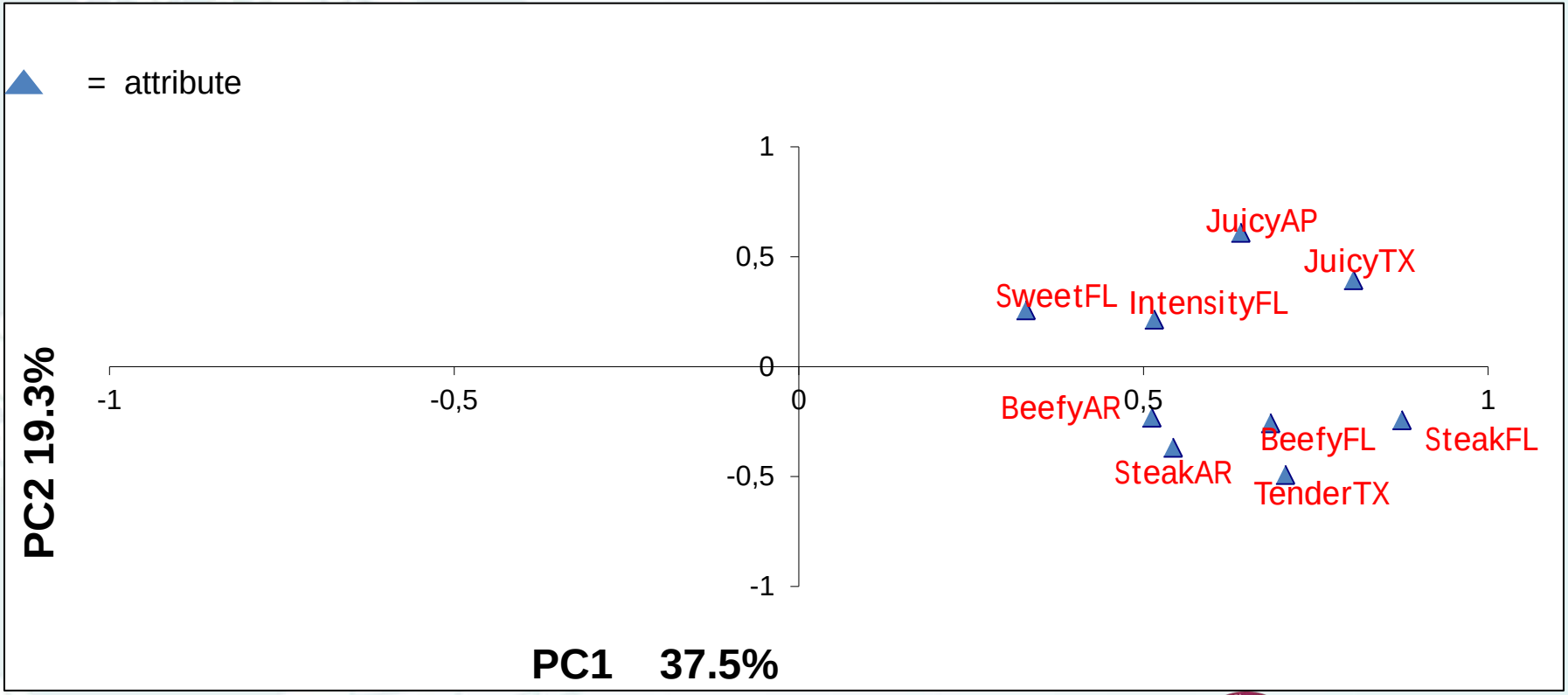

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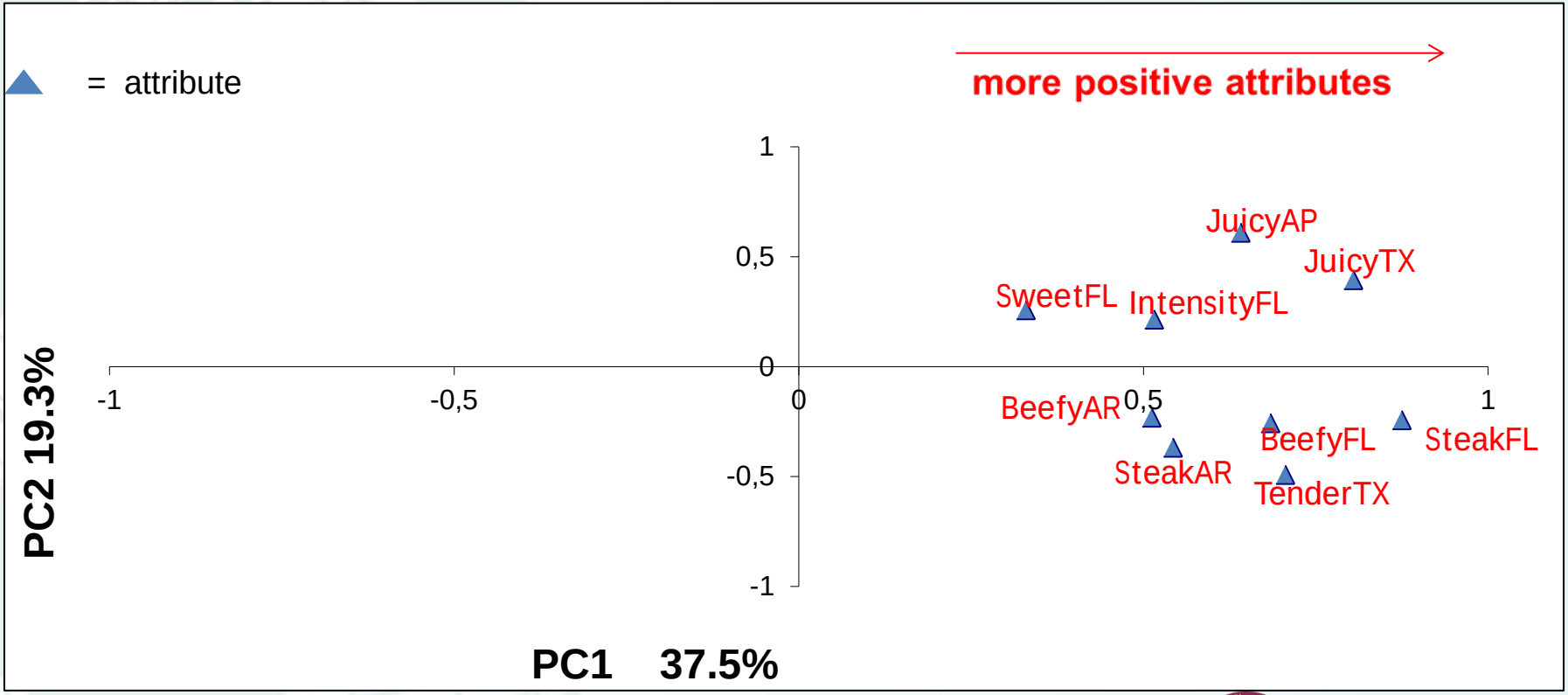

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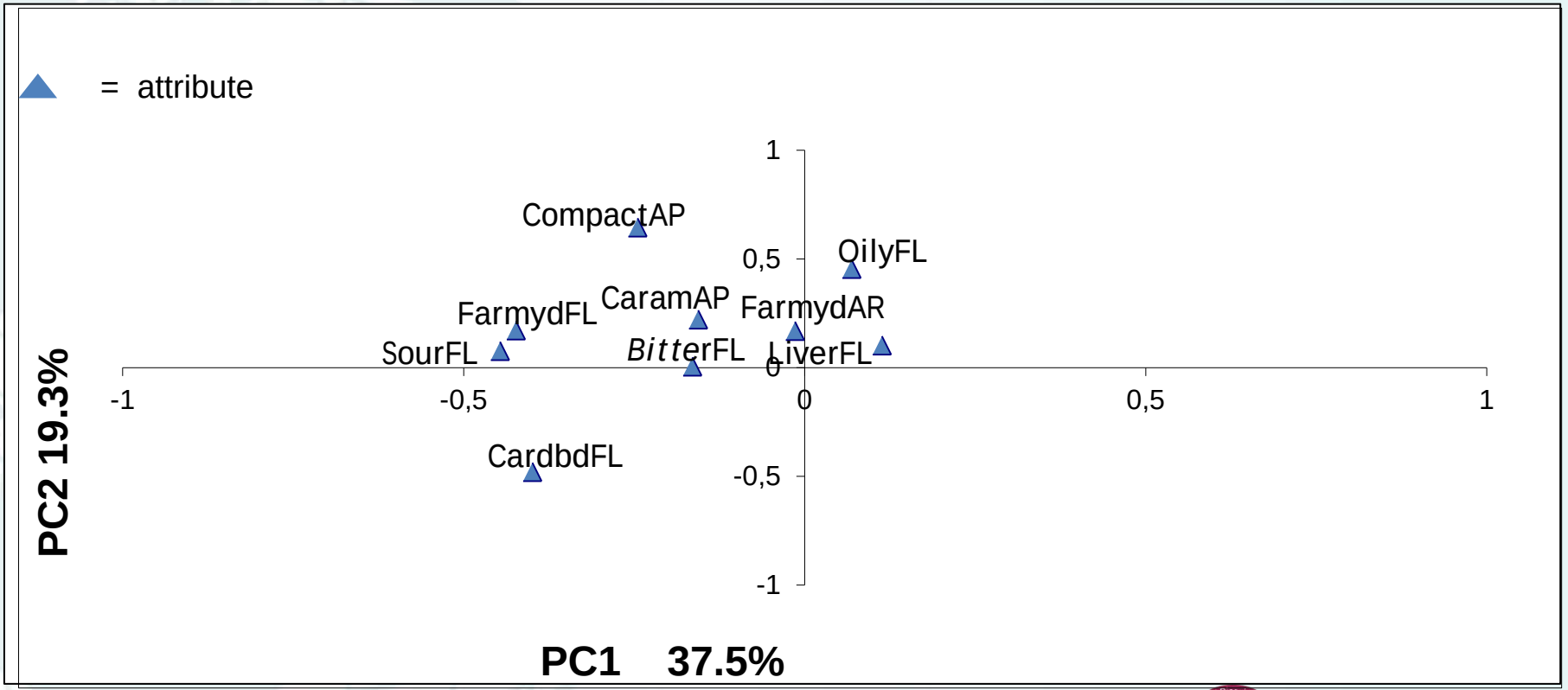

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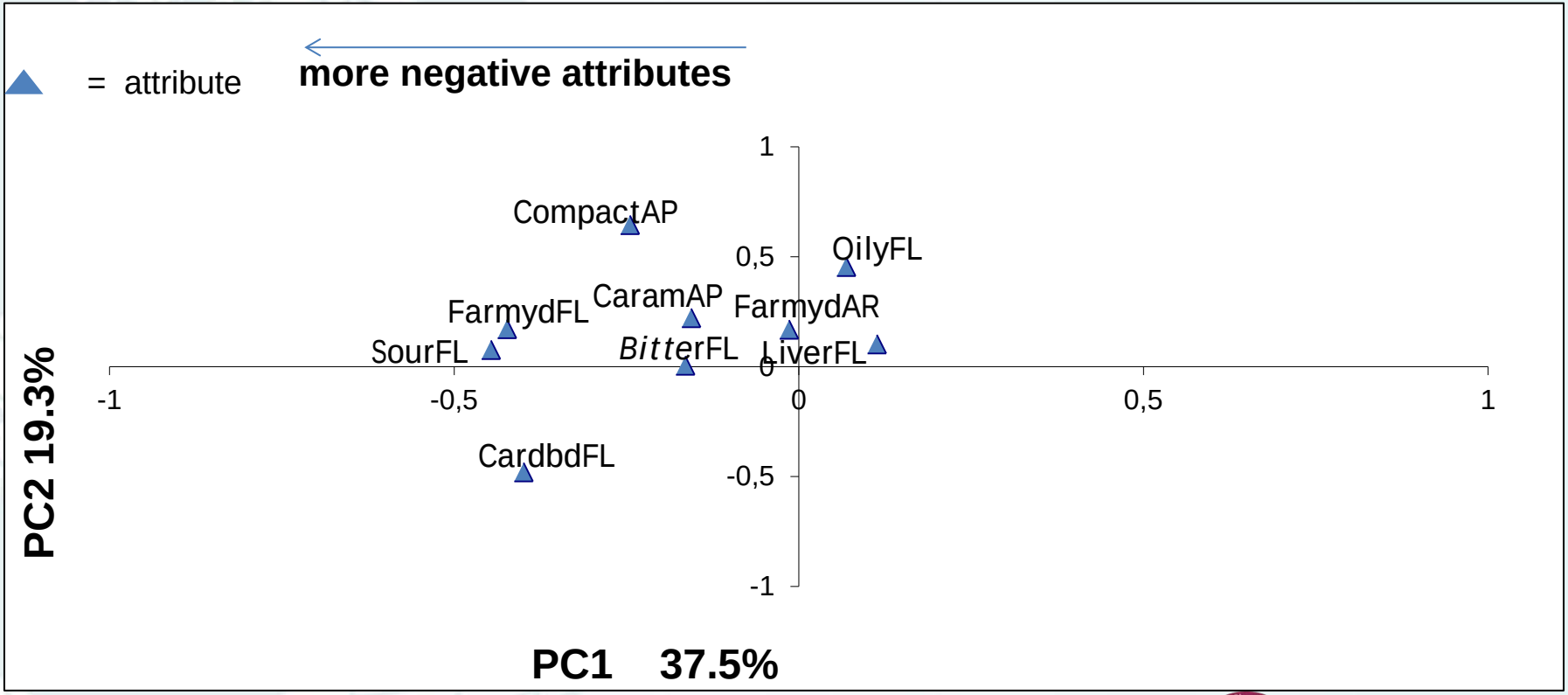

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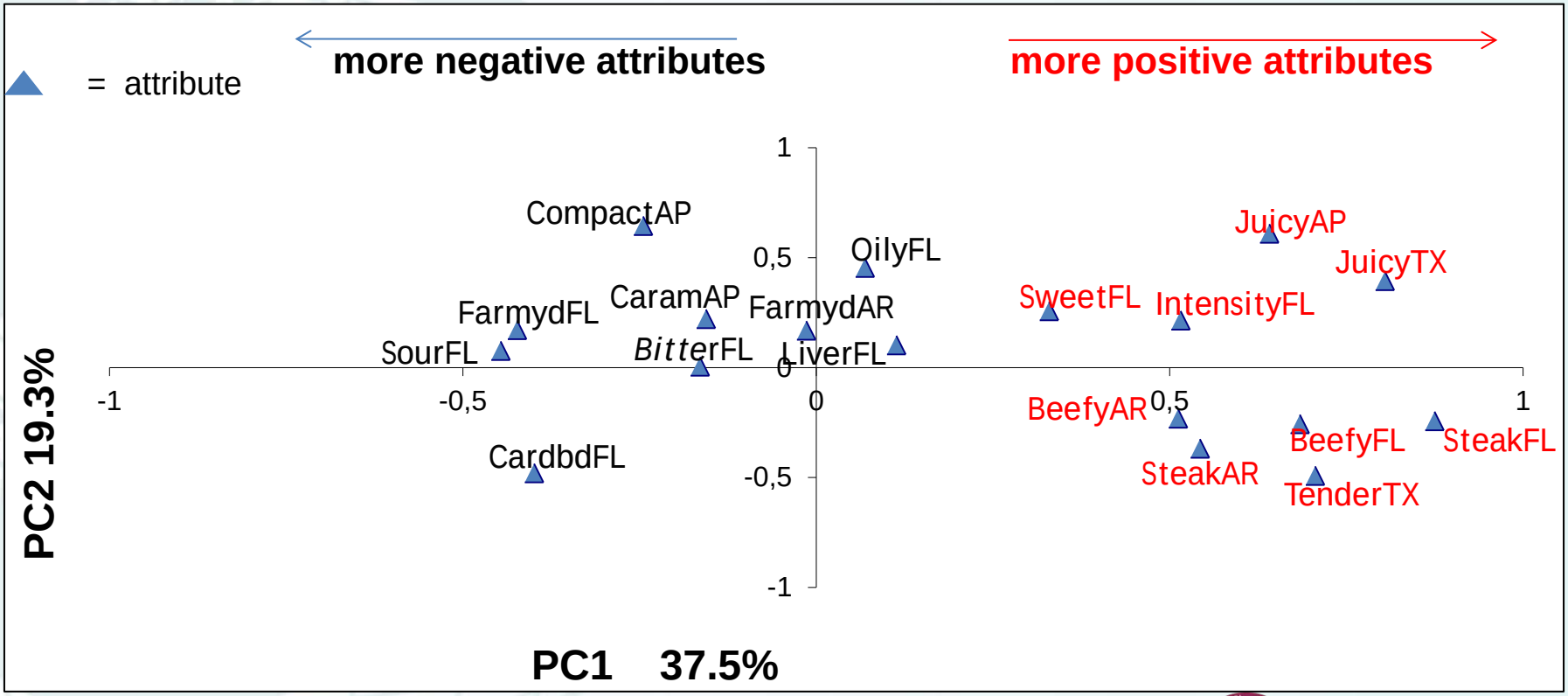

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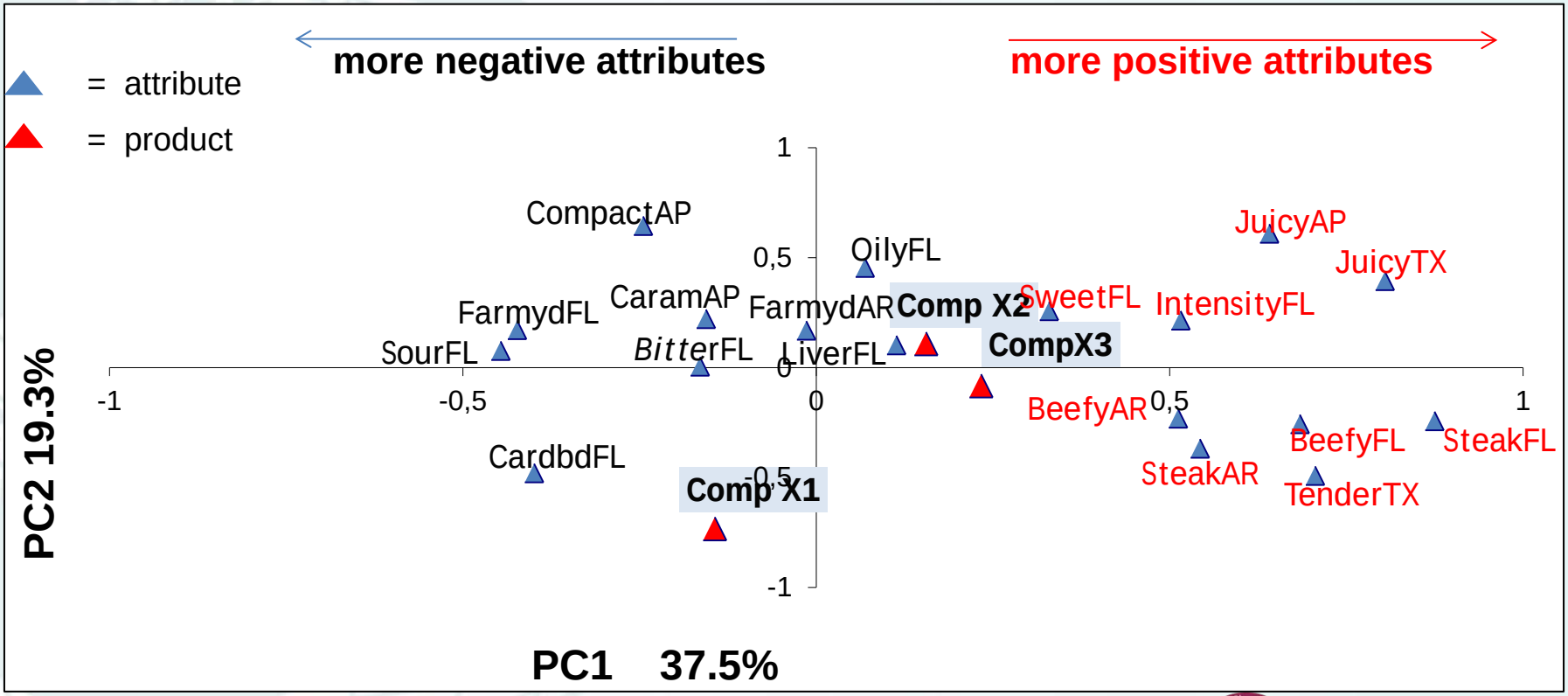

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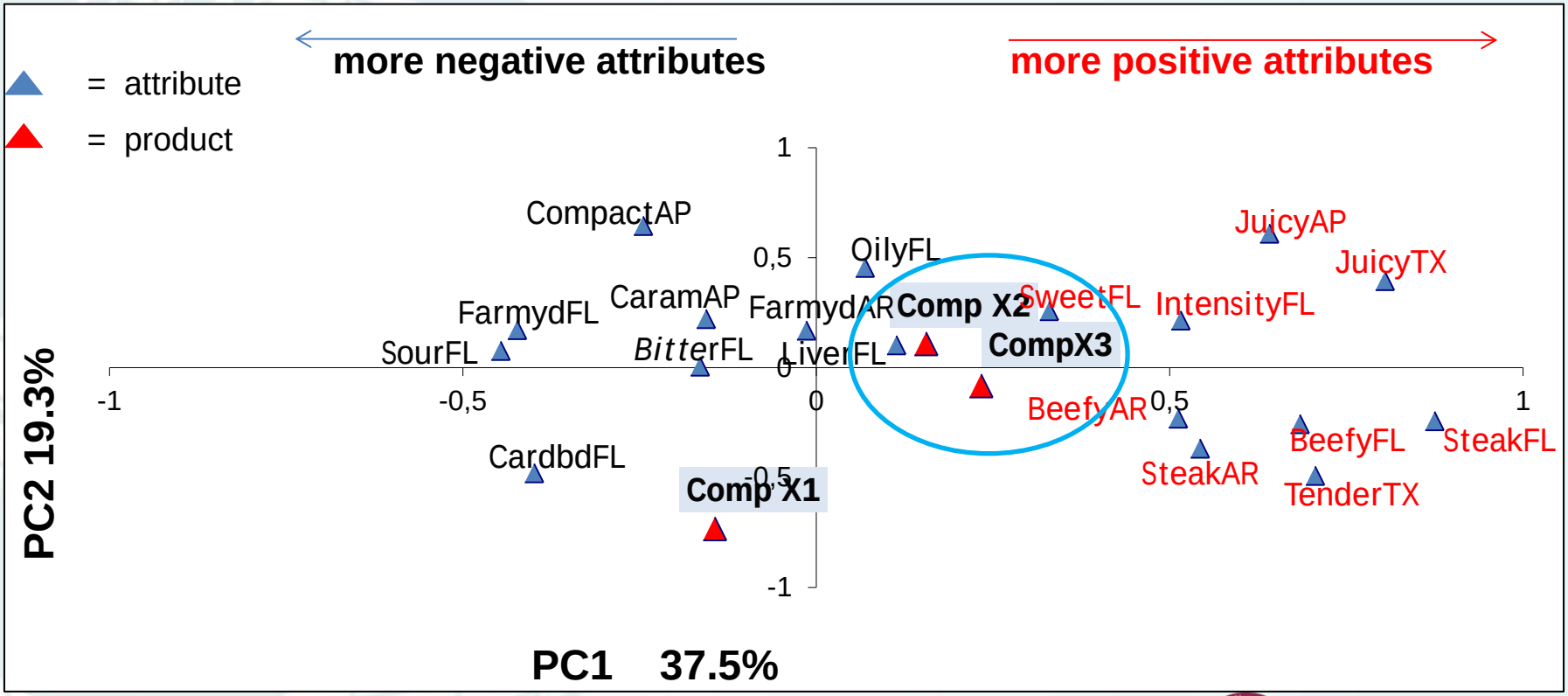

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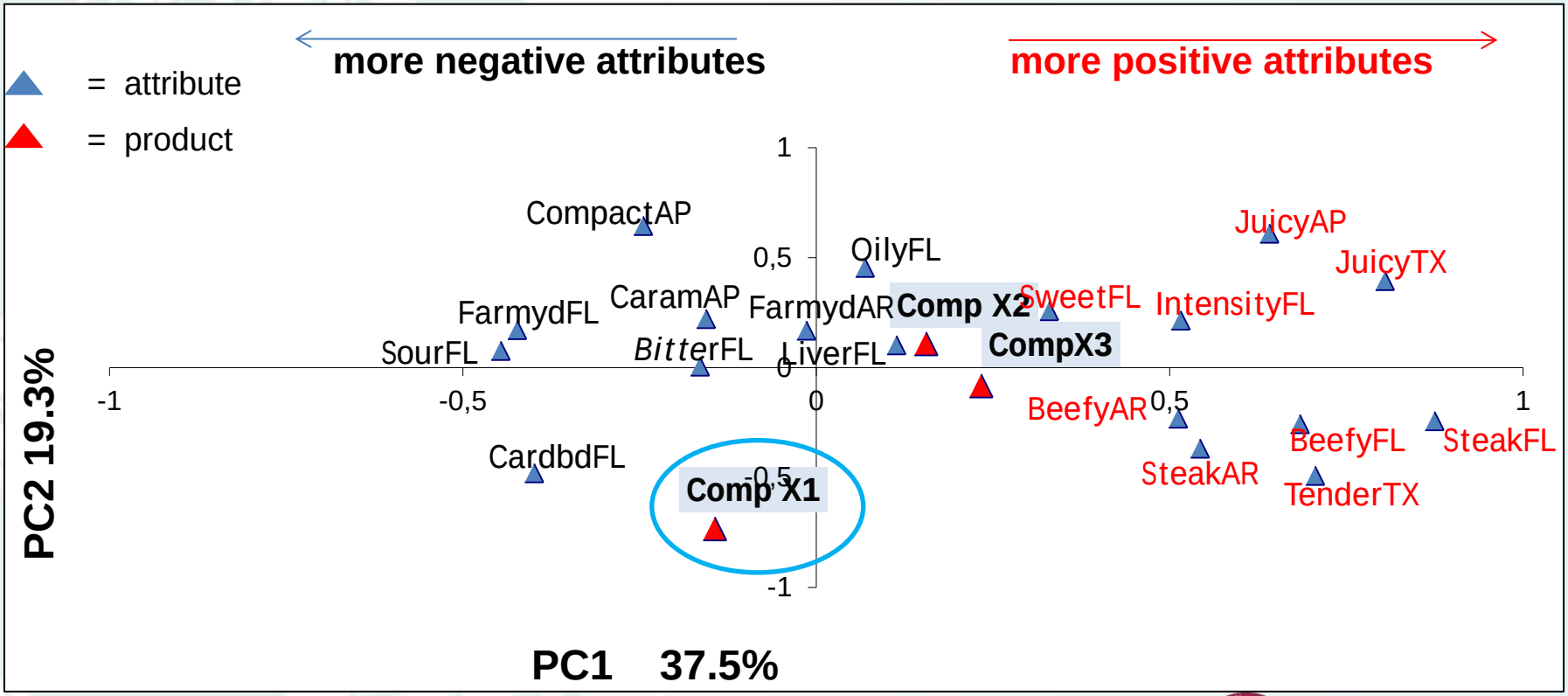

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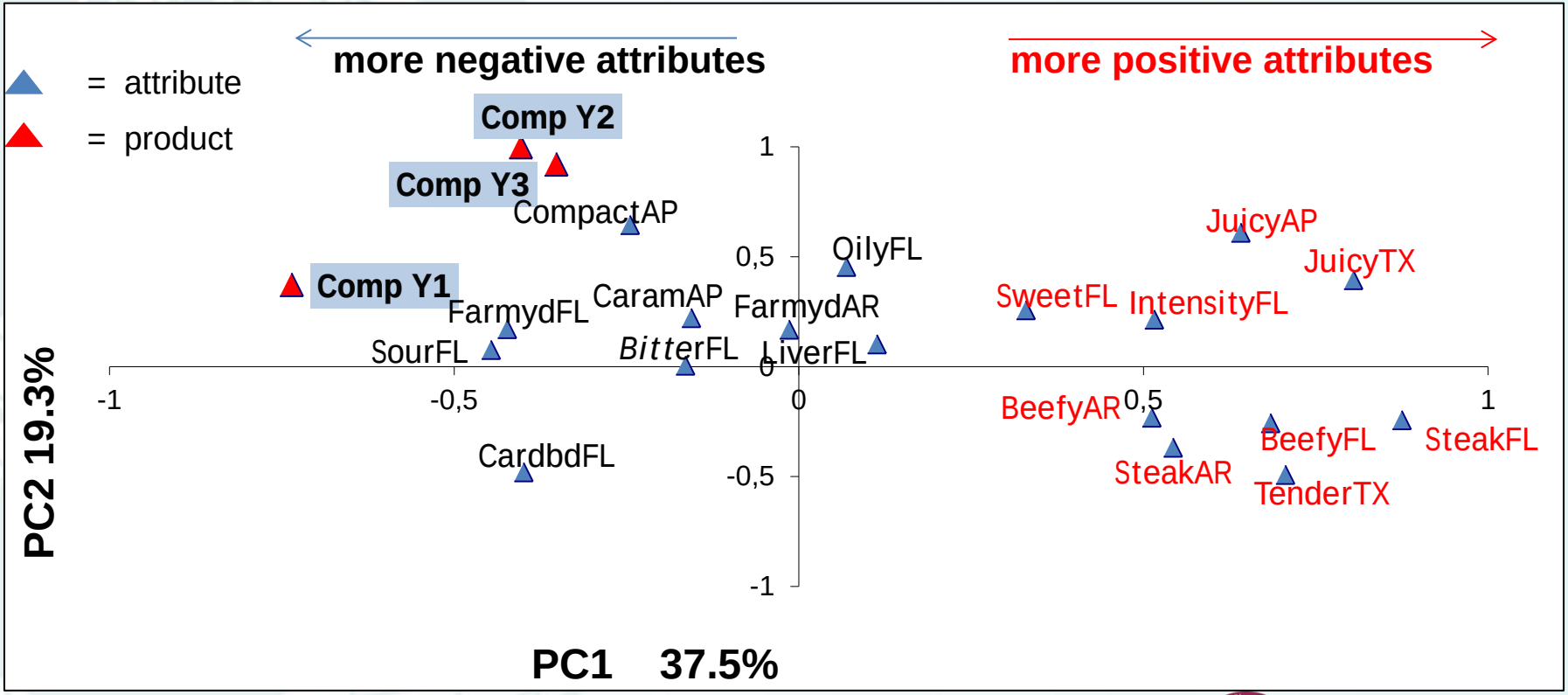

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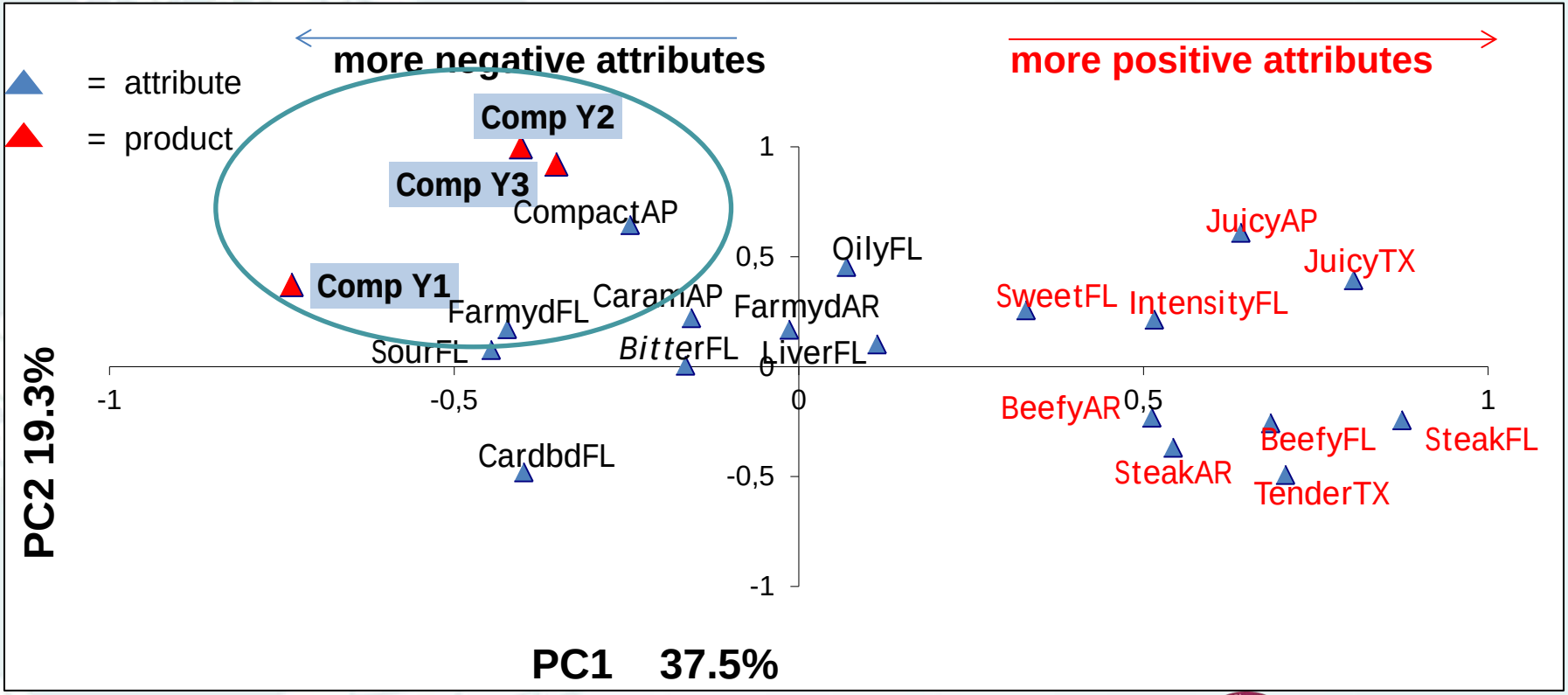

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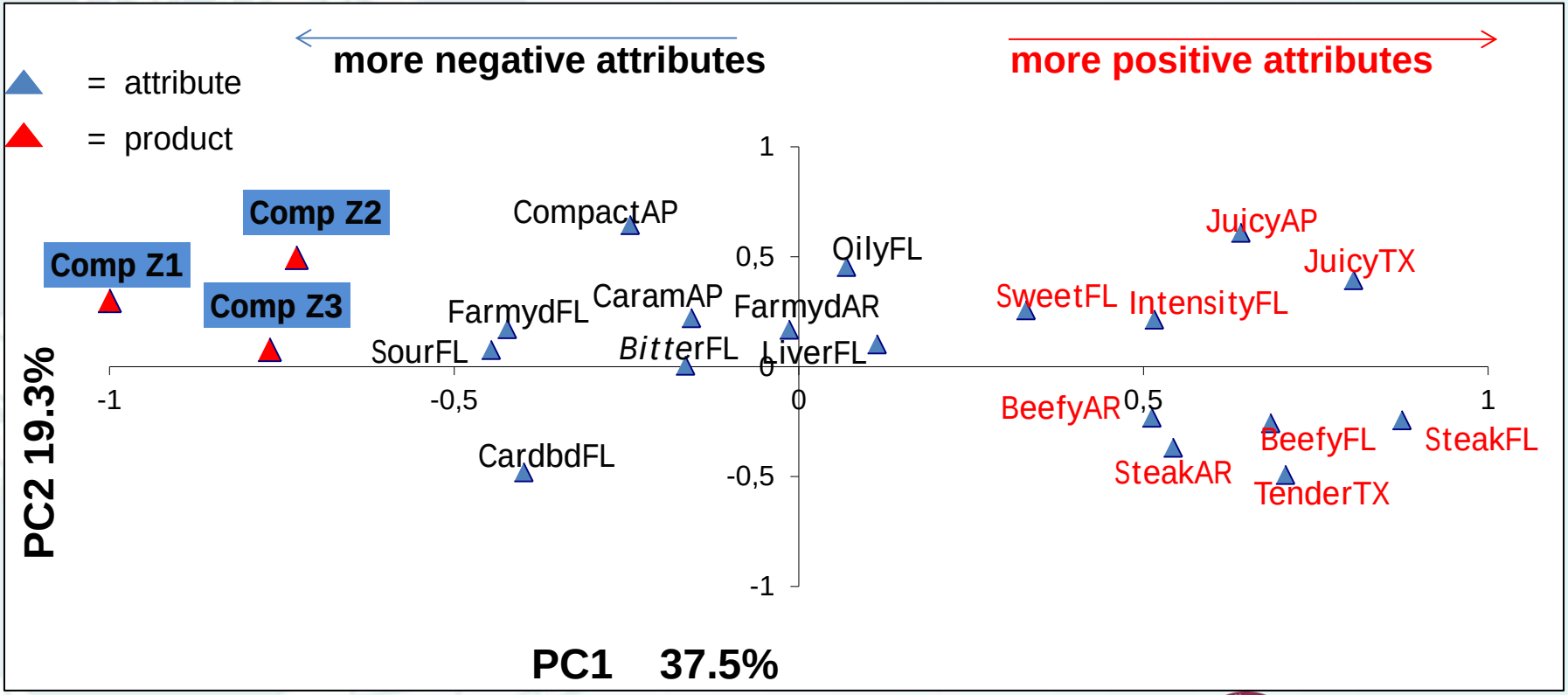

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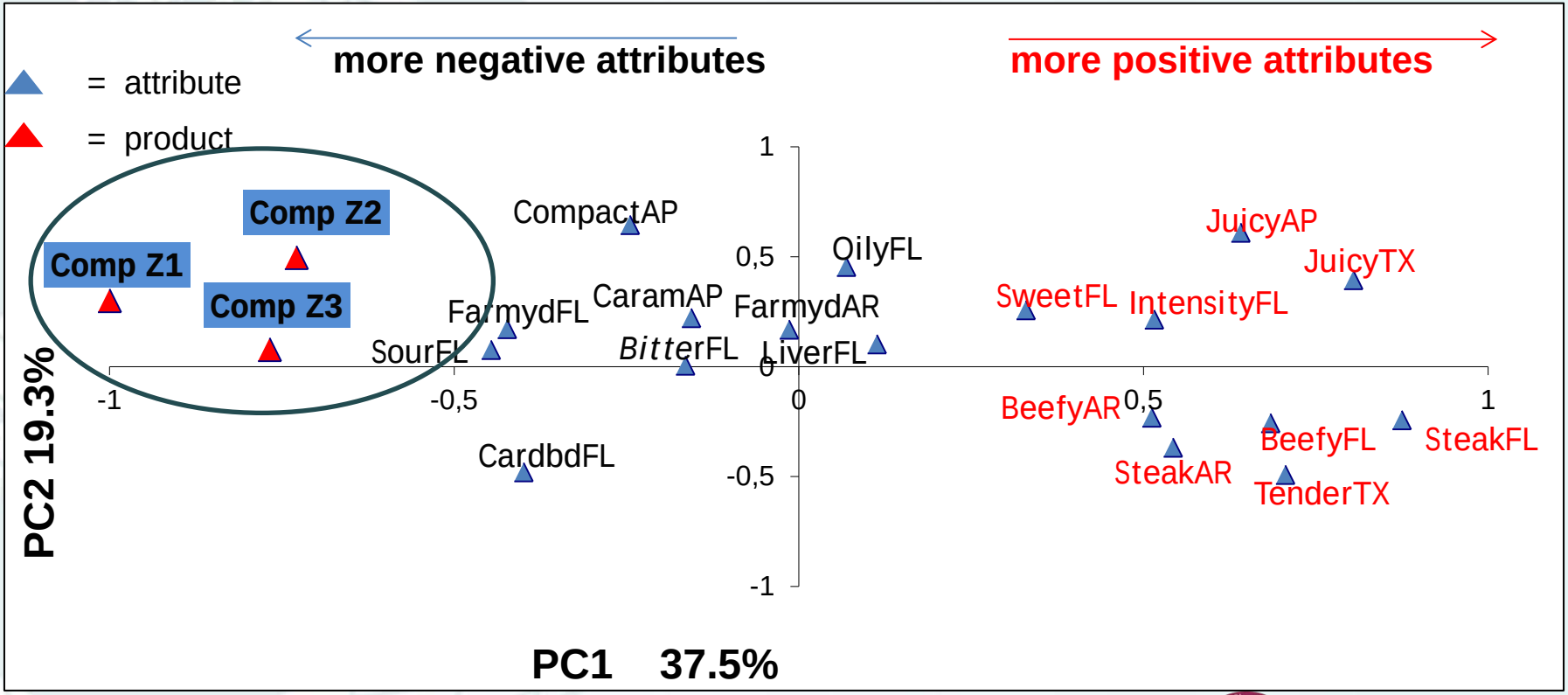

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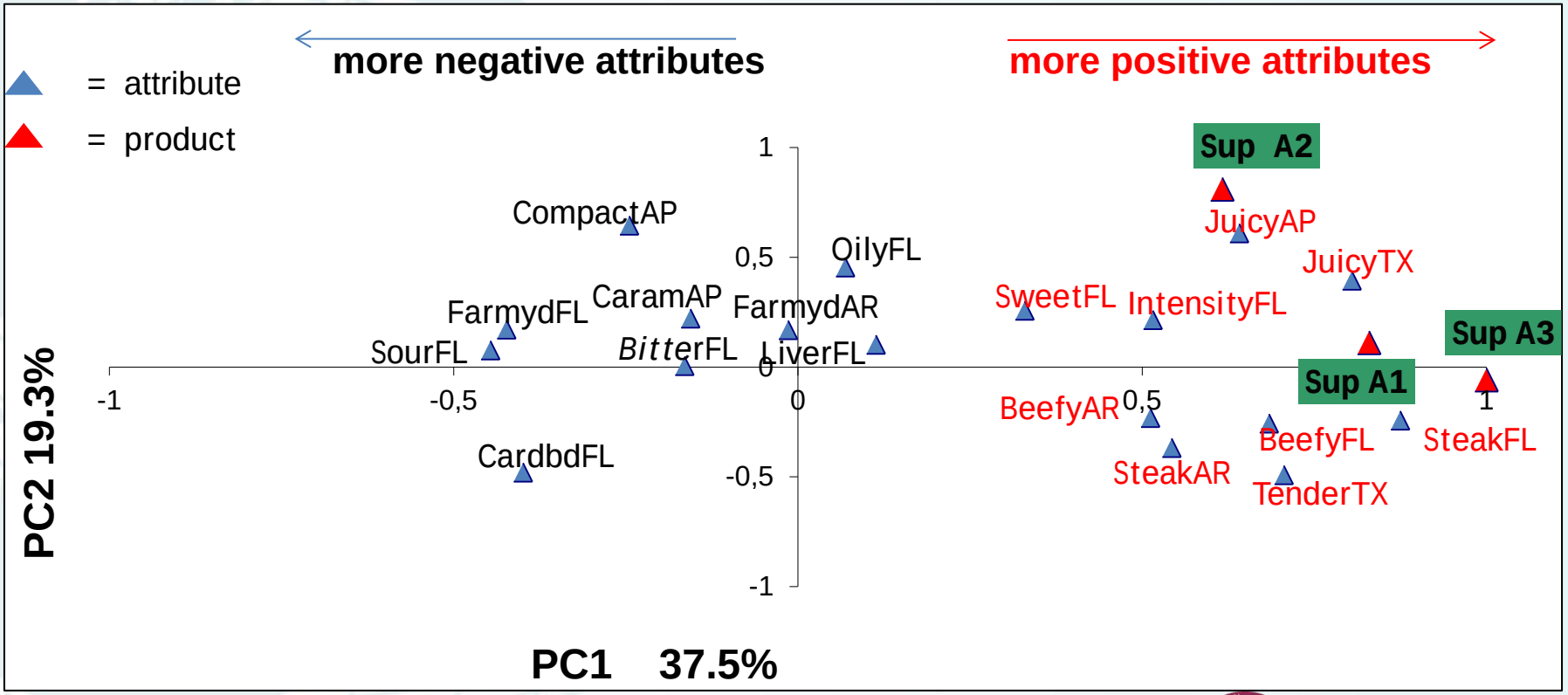

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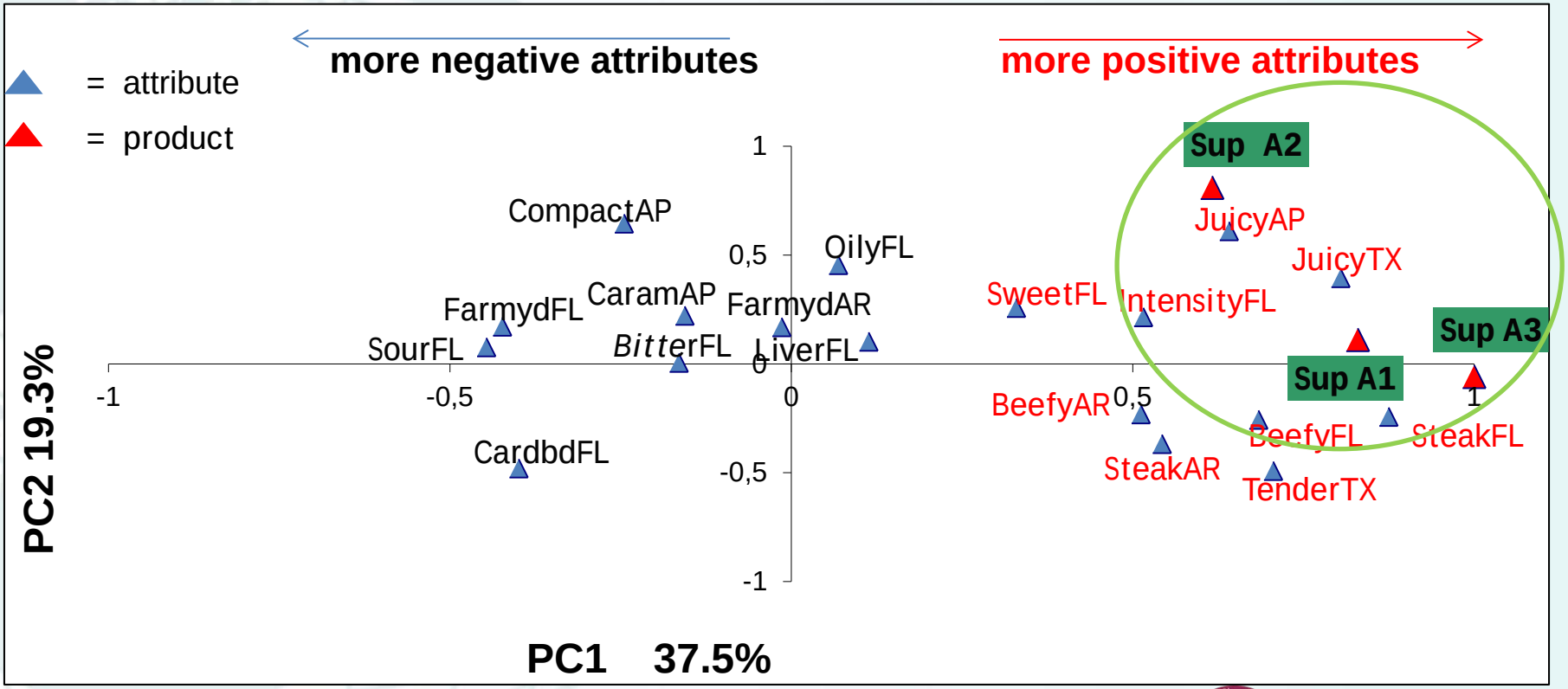

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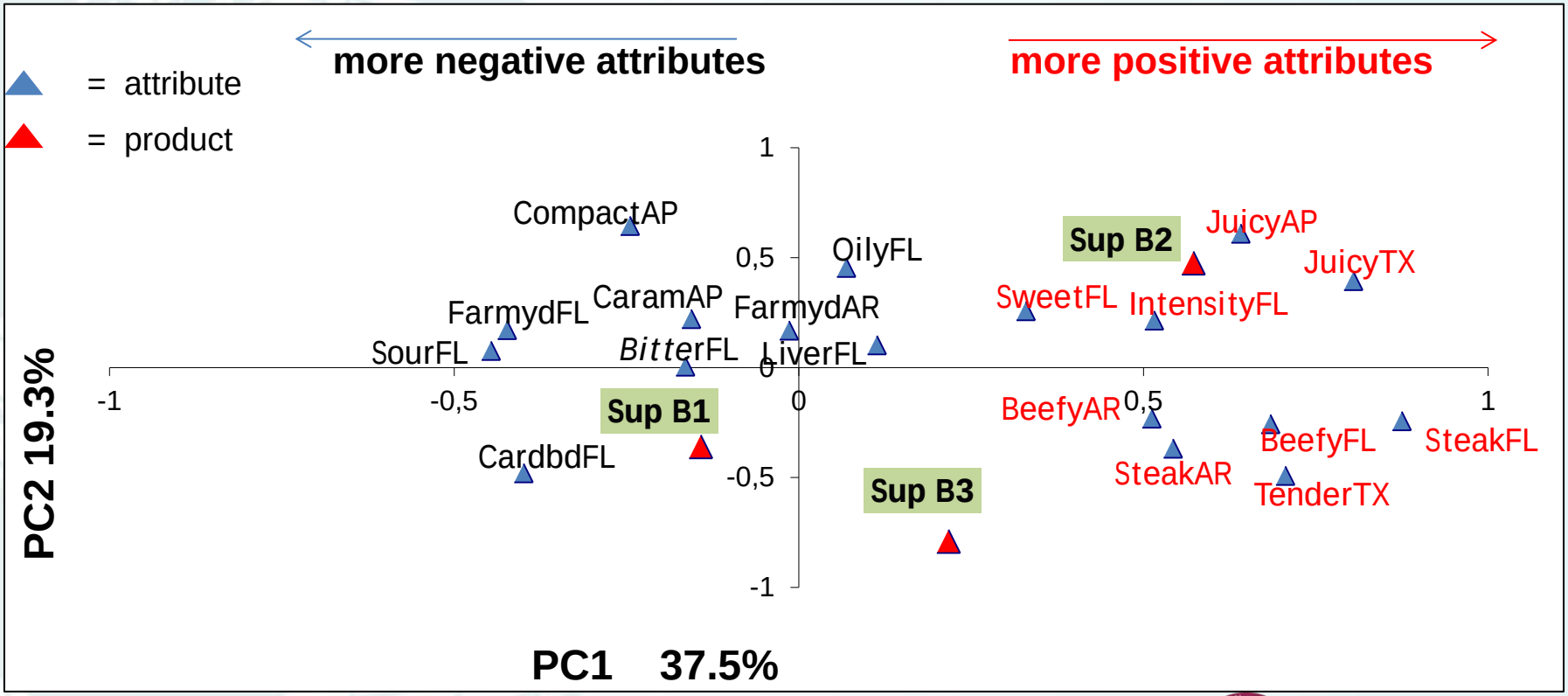

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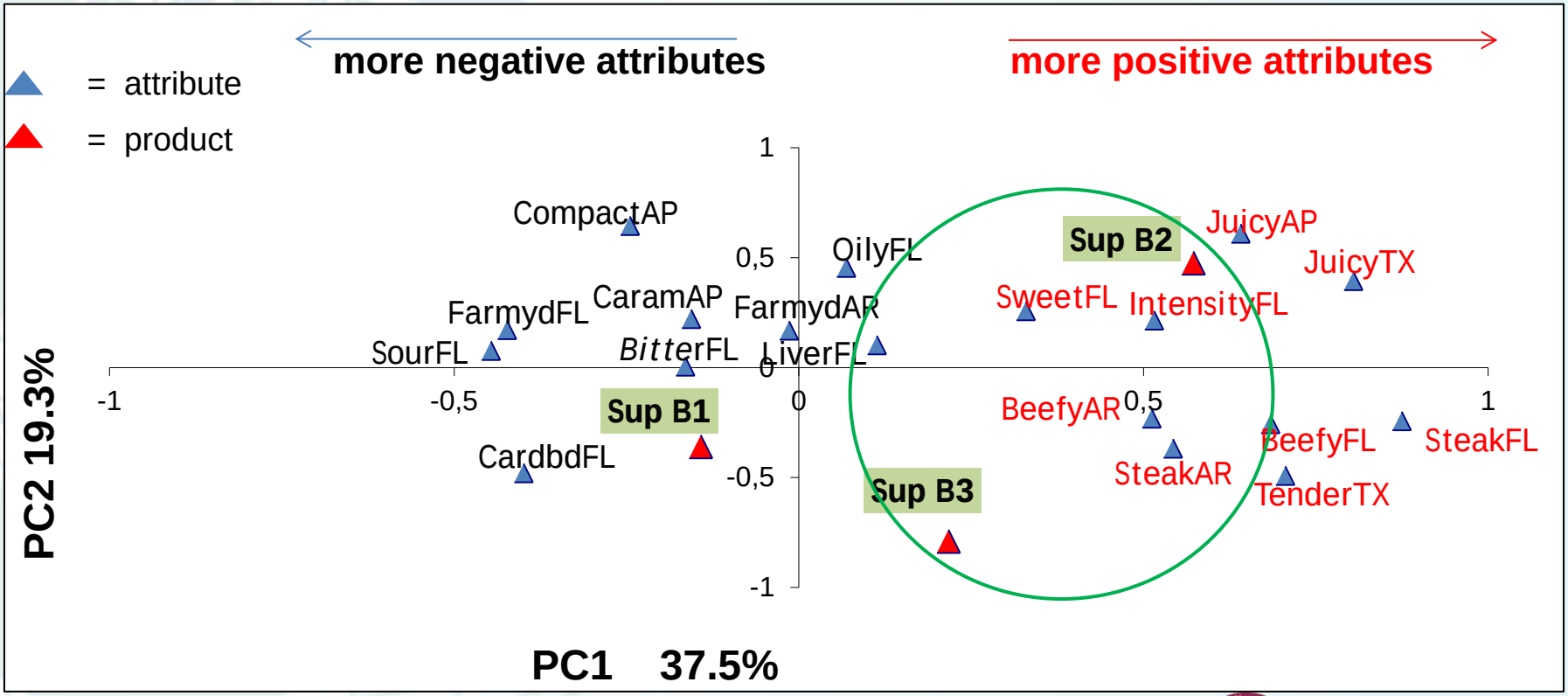

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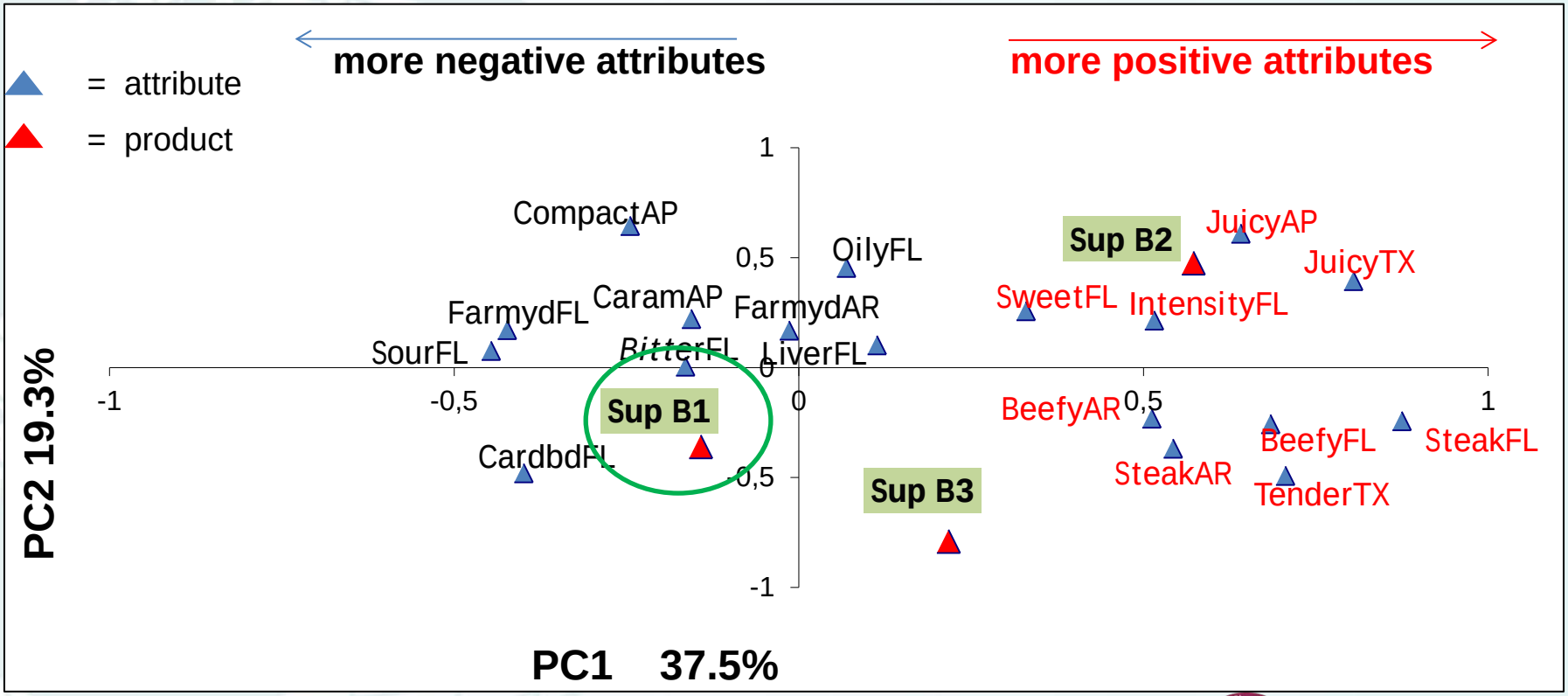

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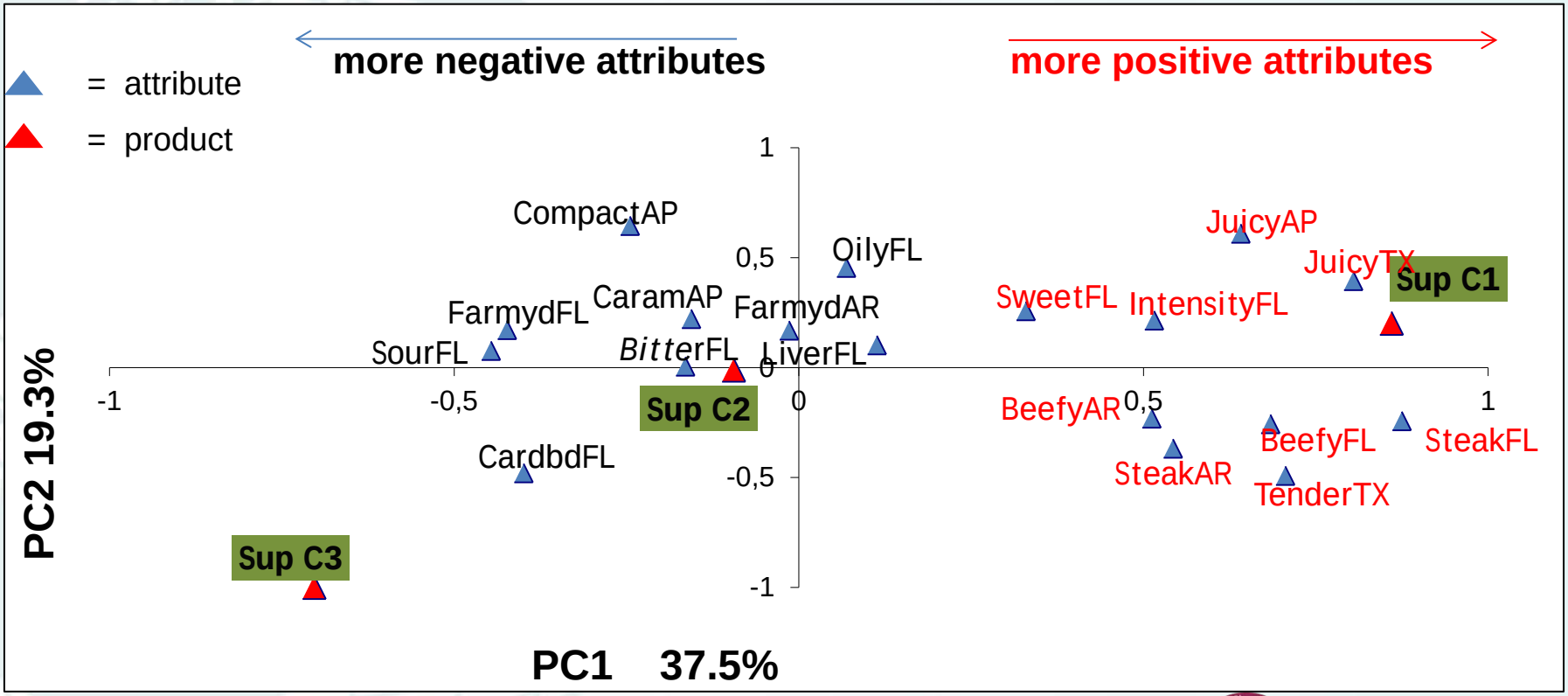

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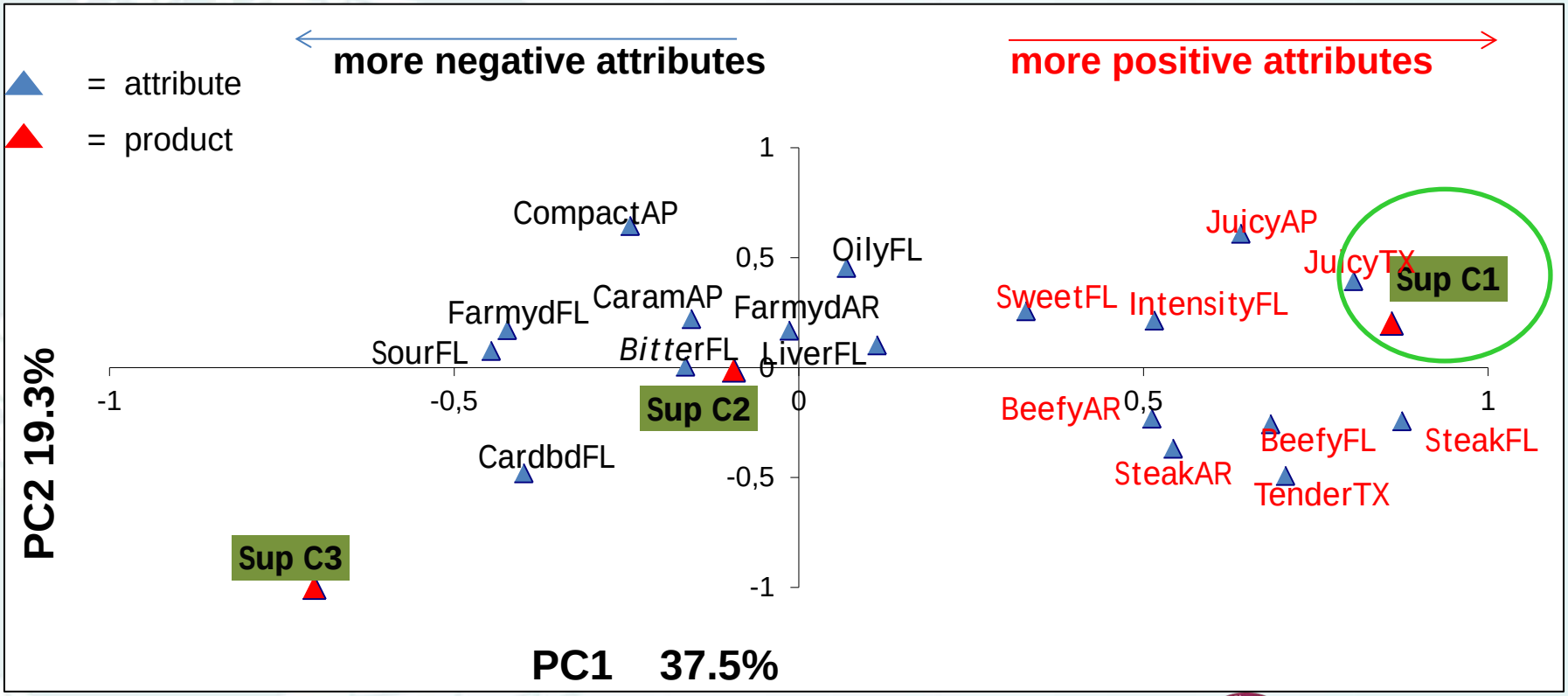

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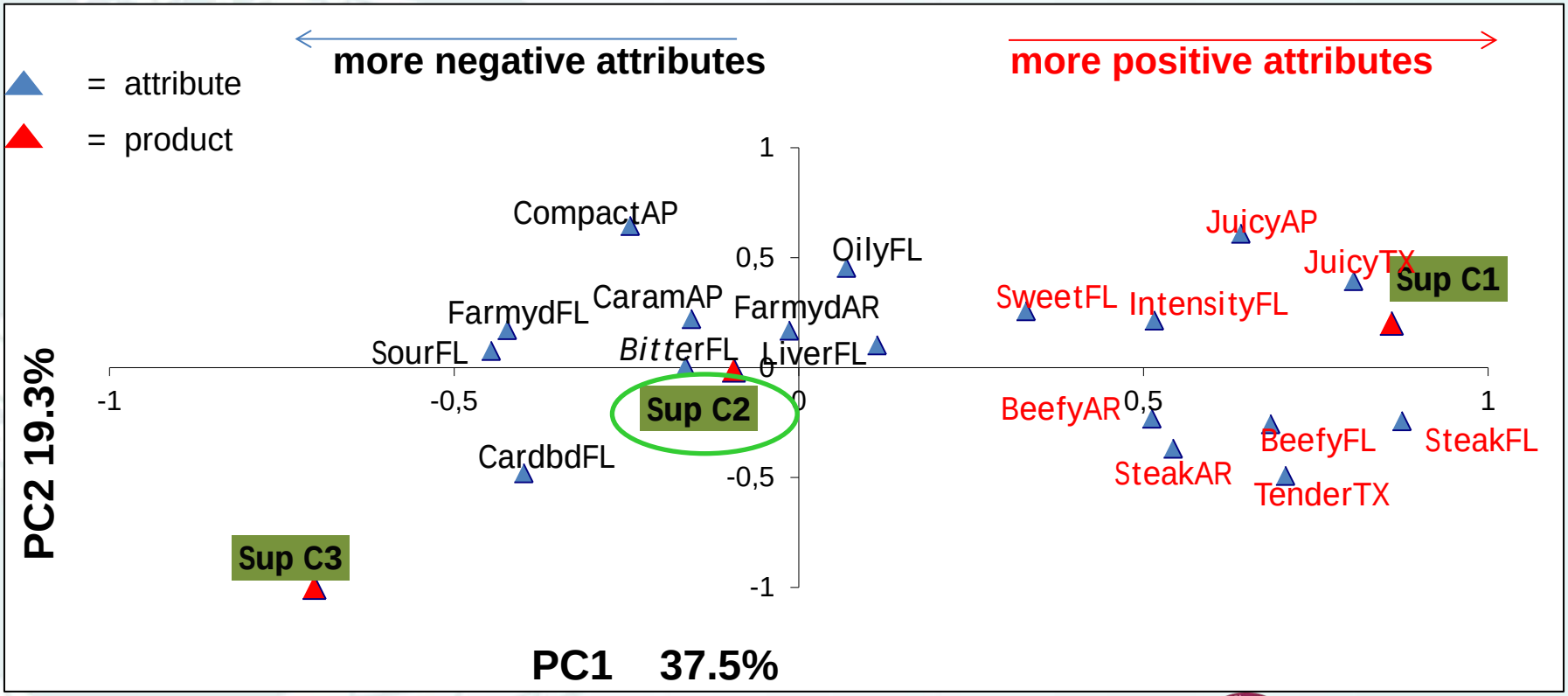

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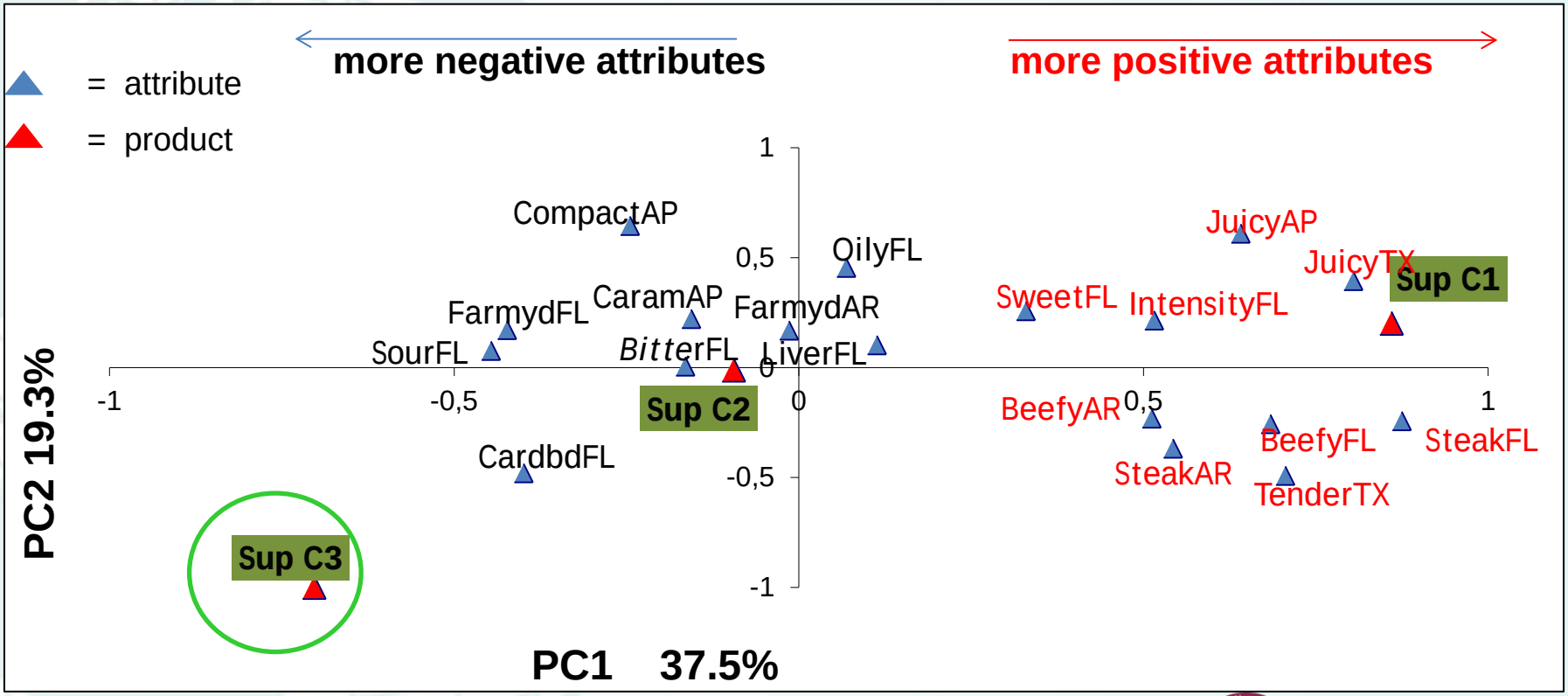

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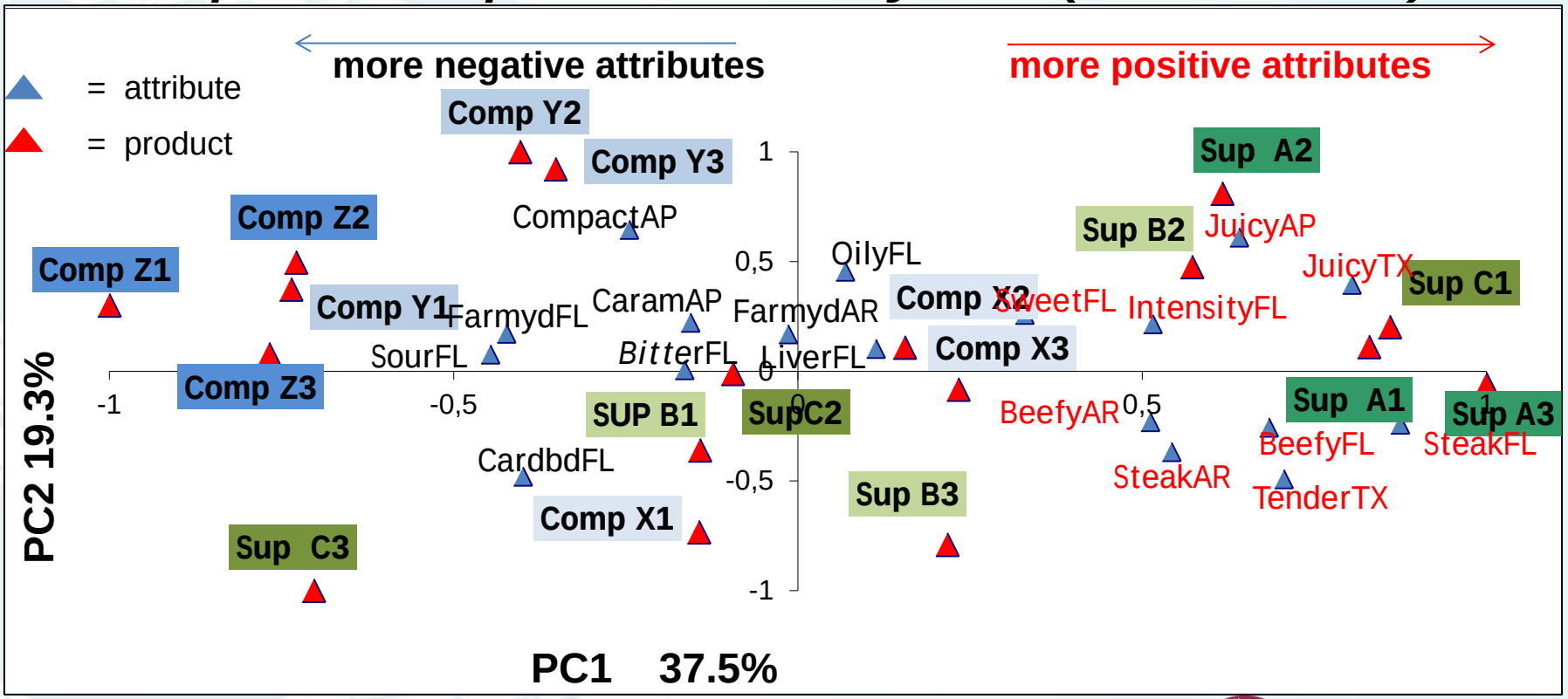

Conclusions:

- There were significant differences between the customer's product and their competitors.
- There were significant differences within the customer's own suppliers.
- The quality of the meat from one supplier varied significantly over a 3 week sampling period.

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List of attributes generated by the trained assessors and agreed descriptions

Group	Attribute	Definition	Abbreviation
Aroma	Intensity of aroma	Overall intensity of aroma	IntAR
	Steak aroma	Aroma of grilled beef steak	SteakAR
	Sweet aroma	Sweet aroma	SweetAR
	Beefy aroma	Species aroma characteristic of beef as opposed to lamb or pork	BeefyAR
	Liver aroma	Aroma reminiscent of cooked liver	LiverAR
	Oily aroma	Aroma of new vegetable oil	OilyAR
	Farmyard aroma	Aroma reminiscent of animal slurry	FmYdAR
Appearance - external	Caramelised appearance	Browned external appearance	CarAP
Appearance - internal	Juicy appearance	Visible juices inside the meat after cutting	JuicyAP
	Pink appearance	Pink colour of undercooked meat	PinkAP
	Compact appearance	Compact appearance of cut surface (not open)	CompAP
Flavour	Intensity of flavour	Overall intensity of flavour	IntFL
	Steak flavour	Flavour of grilled beef steak	SteakFL
	Beefy flavour	Species flavour characteristic of beef as opposed to lamb or pork	BeefyFL
	Sour flavour	Taste elicited by acids	SourFL
	Sweet flavour	Taste elicited by sugar	SweetFL
	Bitter flavour	Taste elicited by caffeine	BitterFL
	Oily flavour	Flavour of new vegetable oil	OilyFL
	Cardboard flavour	Flavour reminiscent of cardboard	CardbFL
	Bloody flavour	Flavour associated with undercooked meat	BloodFL
	Liver flavour	Flavour of cooked liver	LiverFL
	Farmyard flavour	Flavour reminiscent of animal slurry	FmYdFL

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List of attributes generated by the trained assessors and agreed descriptions (contd)

Group	Attribute	Definition	Abbreviation
Texture	Tender texture	Soft and easy to chew before swallow	TenderTX
	Juicy/succulent texture	Juice in mouth after first chew	JuicyTX
	Cohesive texture	Forms a ball in the mouth after chewing	CohesTX
	Crumbly texture	Sample separates into bits in the mouth after chewing	CrumbTX
	Dry texture	Dry sensation in the mouth during chewing	DryMoTX
Aftertaste	Intensity of aftertaste	Overall intensity of aftertaste	IntAT
	Dry aftertaste	Dry sensation in the mouth after swallowing	DryMoTX
	Greasy aftertaste	Greasy sensation in the mouth	GreasAT
	Metallic aftertaste	Aftertaste reminiscent of iron and metallic	MetAT

Profiling results (ANOVA)

Attribute	Attribute code	A	B	C	X	Y	Z	Sig (source)#
Steak aroma	SteakAR	26.8[b]	25.0[ab]	22.8[ab]	27.7[b]	21.7[a]	*20.5*[a]	P<0.05
Beefy aroma	BeefyAR	18.4[ab]	14.9[a]	15.4[a]	20.5[b]	14.3[a]	14.1[a]	P<0.05
Caramelised appearance	CaramAP	27.1[b]	23.5[ab]	19.3[a]	26.6[b]	28.1[b]	28.8[b]	P<0.05
Juicy appearance	JuicyAP	46.4[c]	35.4[ab]	34.2[ab]	33.5[a]	41.9[bc]	31.6[a]	P<0.001
Pink appearance	PinkAP	31.6[c]	26.6[bc]	21.2[b]	20.9[b]	7.6[a]	7.9[a]	P<0.001
Steak flavour	SteakFL	37.5[d]	34.7[cd]	30.7[bc]	34.1[cd]	25.1[ab]	21.7[a]	P<0.001
Beefy flavour	BeefyFL	26.0[b]	23.3[ab]	21.2[ab]	23.9[b]	18.0[a]	18.0[a]	P<0.05
Sour flavour	SourFL	13.8[a]	14.3[a]	13.6[a]	12.4[a]	14.9[a]	21.7[b]	P<0.05
Farmyard flavour	FarmydFL	3.8[a]	4.3[a]	4.6[a]	3.0[a]	4.3[a]	6.9[b]	P<0.05
Tenderness	TenderTX	54.5[b]	52.9[b]	53.8[b]	52.9[b]	39.8[a]	45.7[a]	P<0.001
Juicy texture	JuicyTX	47.1[b]	39.8[ab]	*38.7*[a]	39.1[a]	40.1[ab]	33.5[a]	P<0.05
Dry texture$	***DryTX***	17.2[a]	***24.8[abc]***	***31.0[c]***	***25.1[bc]***	***21.6[ab]***	***28.7[bc]***	*P<0.05*
Greasy aftertaste	GreasyAT	16.4[b]	10.36[a]	12.0[ab]	15.1[ab]	16.5[b]	22.9[c]	P<0.001