Meta-analysis of beef sensory quality

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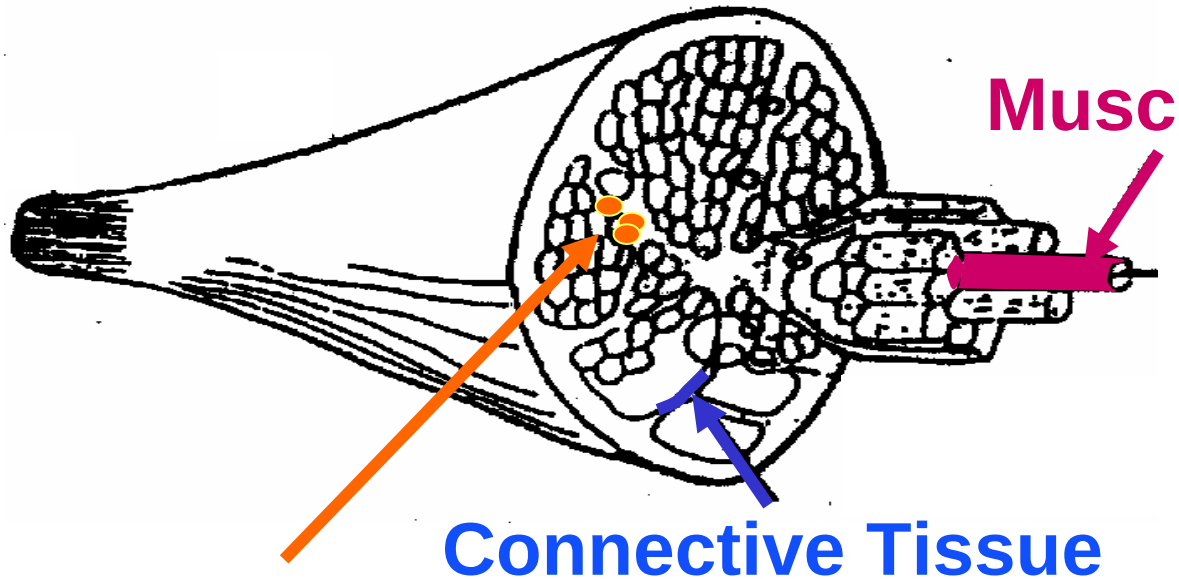
Muscle characteristics and beef quality

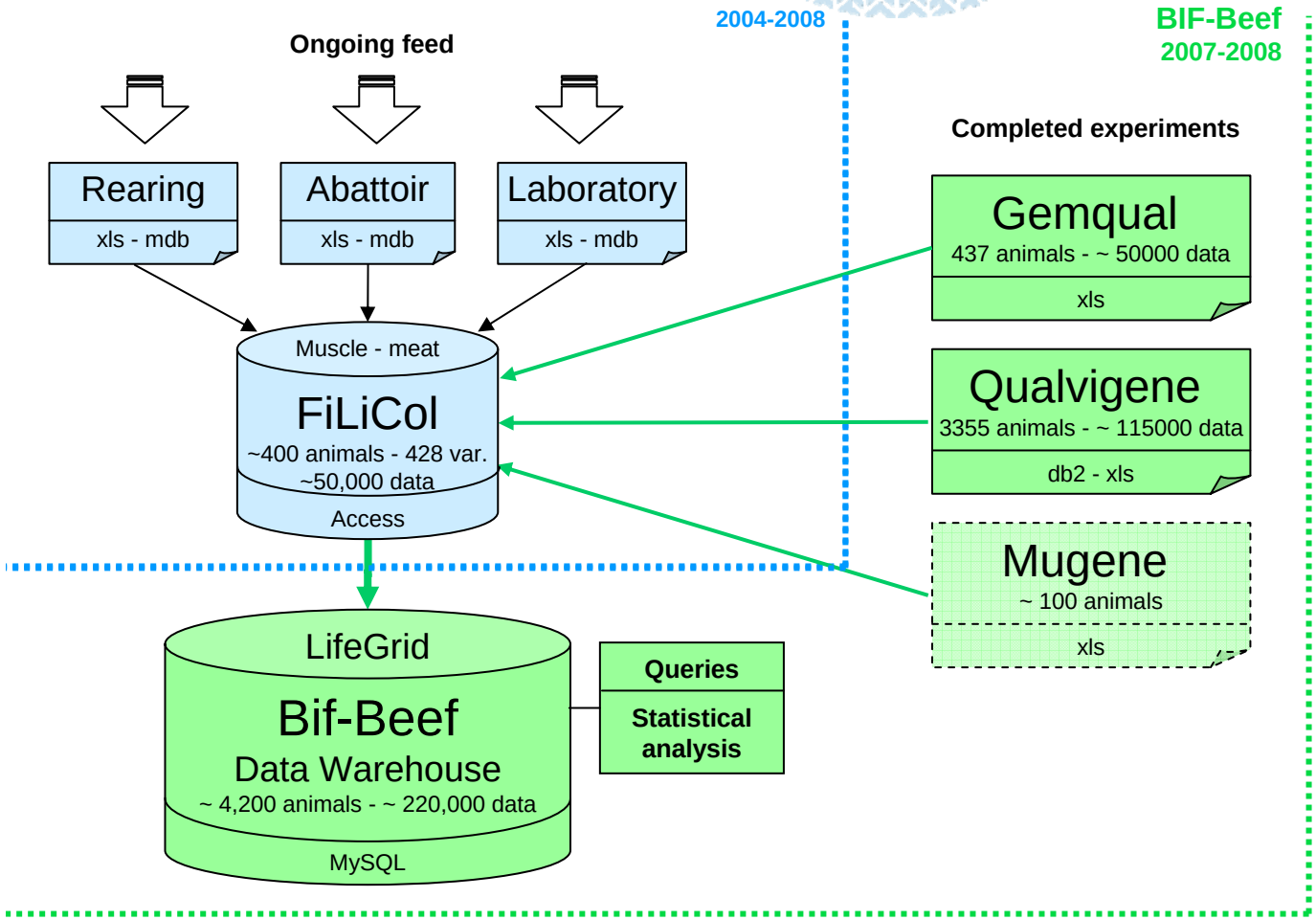


FLAVOUR

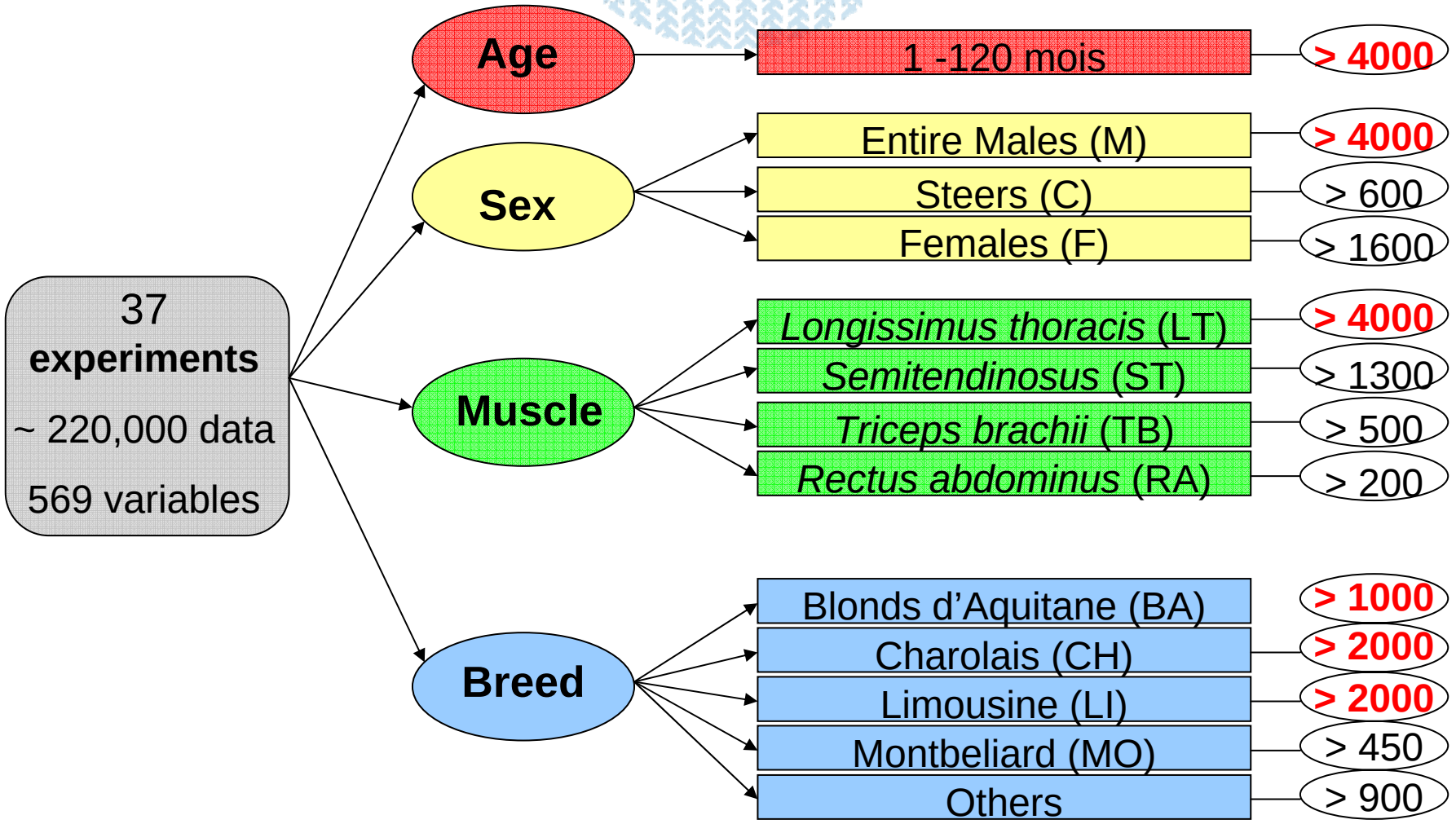
TENDERNESS

Nutritional Value

Data Warehouse, Integrative Biology and Beef Meat



The Whole Data Base



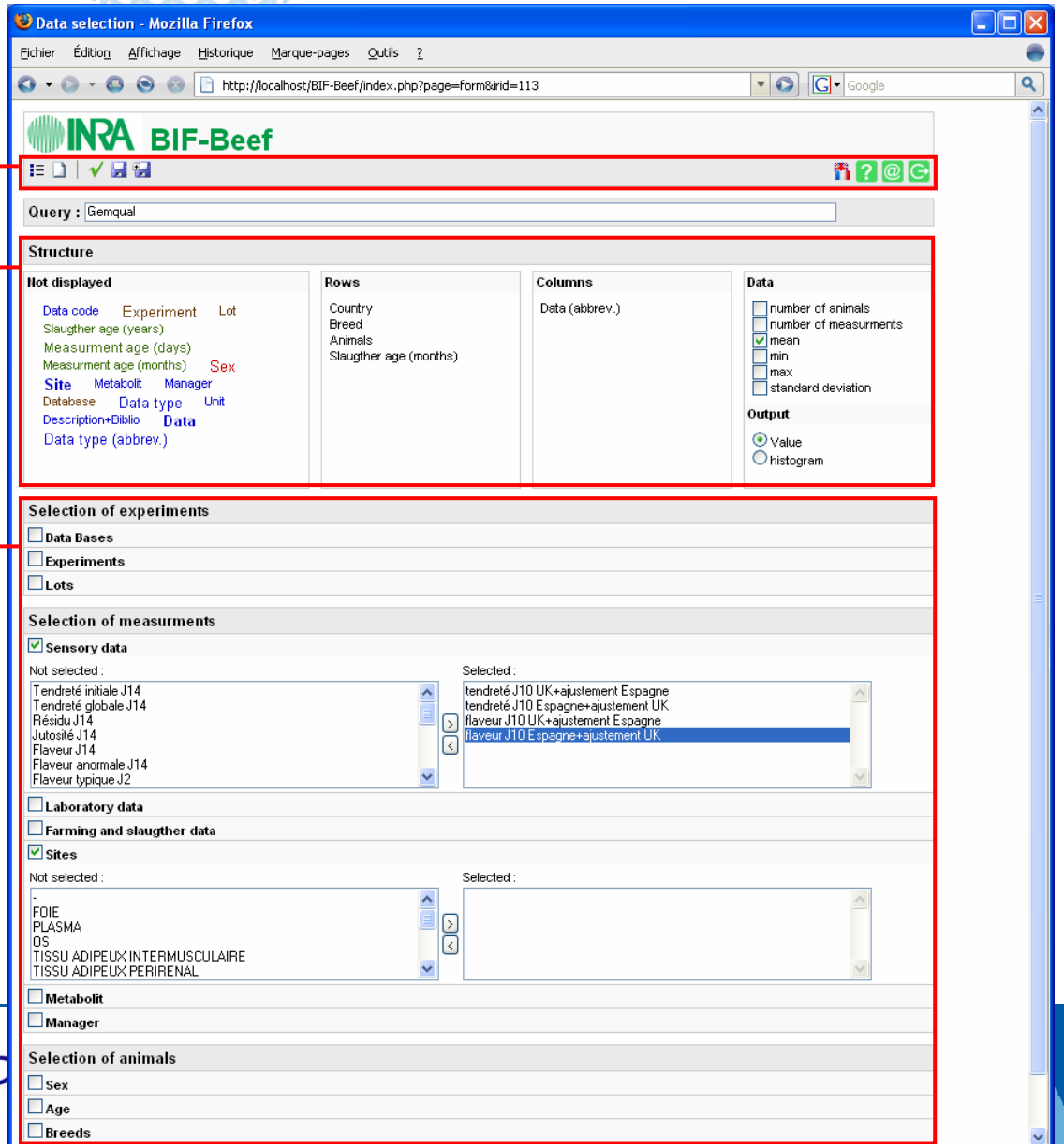
Extracting data : Query definition

Tools bar

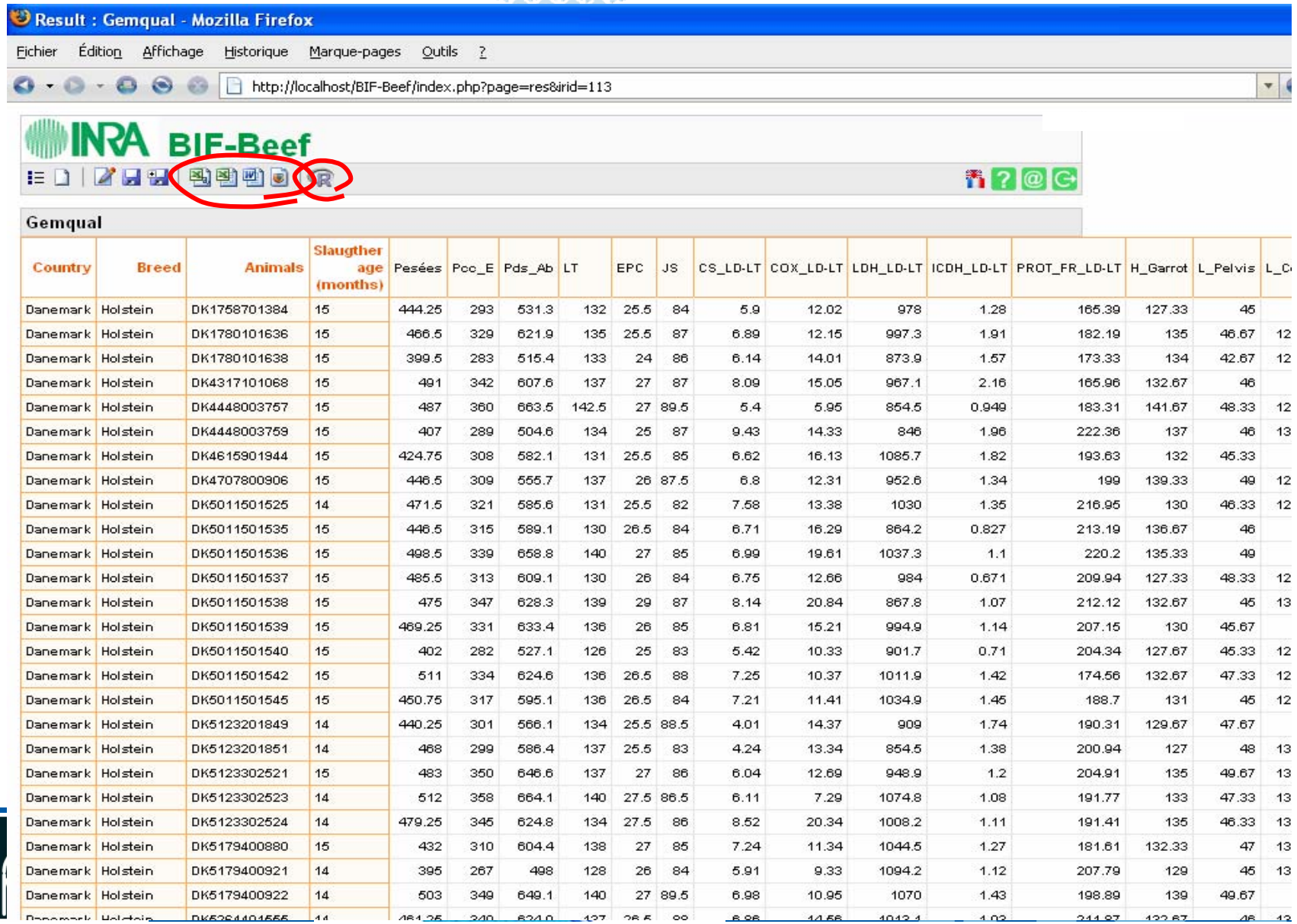
Table frame

Selection of

- experiments
- variables
- animals



Extracting data: Result



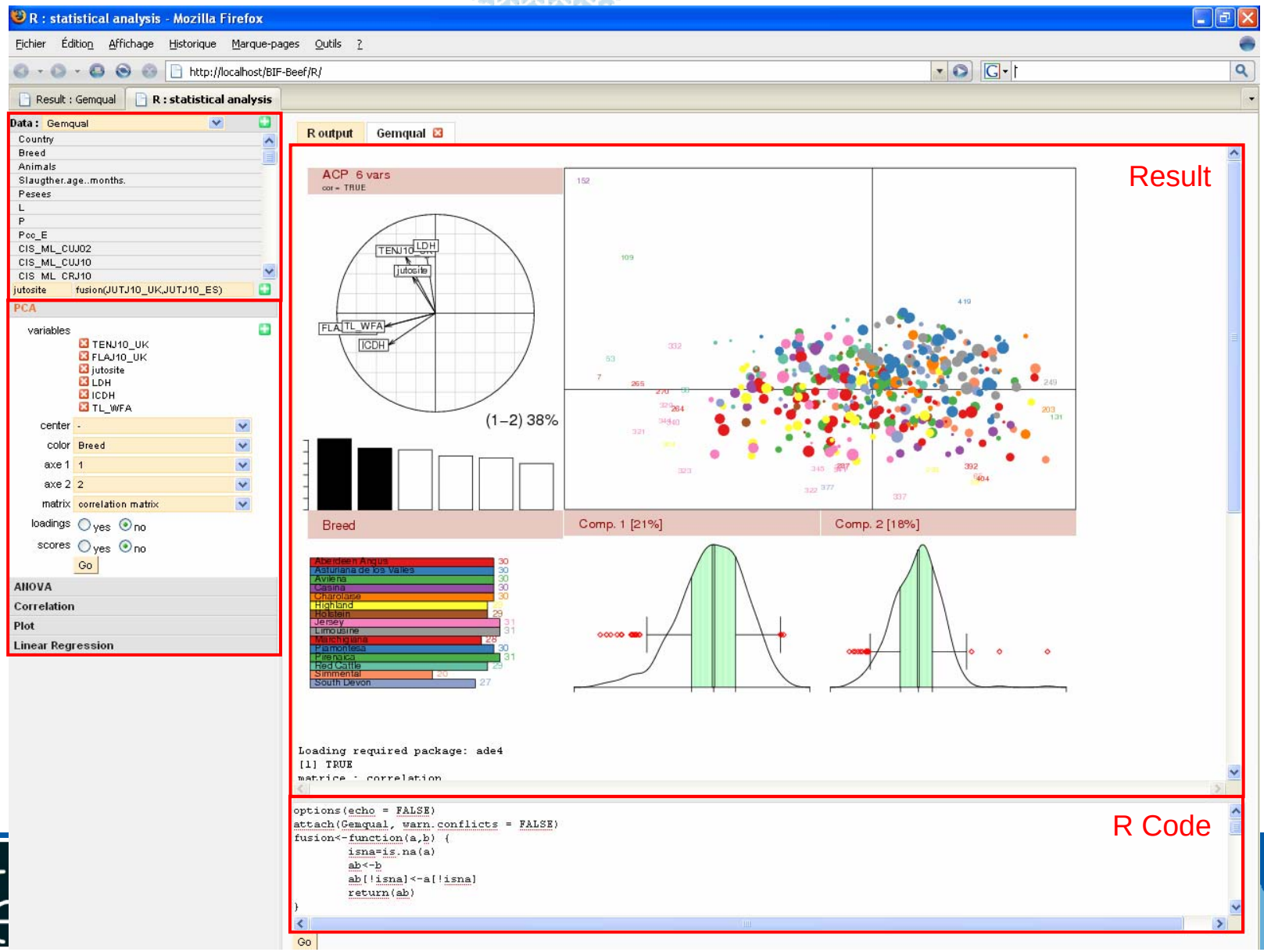
Gemqual

Country	Breed	Animals	Slaugther age (months)	Pesées	Pcc_E	Pds_Ab	LT	EPC	JS	CS_LD-LT	COX_LD-LT	LDH_LD-LT	ICDH_LD-LT	PROT_FR_LD-LT	H_Garrot	L_Pelvis	L_C
Danemark	Holstein	DK1758701384	15	444.25	293	531.3	132	25.5	84	5.9	12.02	978	1.28	165.39	127.33	45	
Danemark	Holstein	DK1780101636	15	466.5	329	621.9	135	25.5	87	6.89	12.15	997.3	1.91	182.19	135	46.67	12
Danemark	Holstein	DK1780101638	15	399.5	283	515.4	133	24	86	6.14	14.01	873.9	1.57	173.33	134	42.67	12
Danemark	Holstein	DK4317101068	15	491	342	607.6	137	27	87	8.09	15.05	967.1	2.16	165.96	132.67	46	
Danemark	Holstein	DK4448003757	15	487	360	663.5	142.5	27	89.5	5.4	5.95	854.5	0.949	183.31	141.67	48.33	12
Danemark	Holstein	DK4448003759	15	407	289	504.6	134	25	87	9.43	14.33	846	1.96	222.36	137	46	13
Danemark	Holstein	DK4615901944	15	424.75	308	582.1	131	25.5	85	6.62	16.13	1085.7	1.82	193.63	132	45.33	
Danemark	Holstein	DK4707800906	15	446.5	309	555.7	137	26	87.5	6.8	12.31	952.6	1.34	199	139.33	49	12
Danemark	Holstein	DK5011501525	14	471.5	321	585.6	131	25.5	82	7.58	13.38	1030	1.35	216.95	130	46.33	12
Danemark	Holstein	DK5011501535	15	446.5	315	589.1	130	26.5	84	6.71	16.29	864.2	0.827	213.19	136.67	46	
Danemark	Holstein	DK5011501536	15	498.5	339	658.8	140	27	85	6.99	19.61	1037.3	1.1	220.2	135.33	49	
Danemark	Holstein	DK5011501537	15	485.5	313	609.1	130	26	84	6.75	12.66	984	0.671	209.94	127.33	48.33	12
Danemark	Holstein	DK5011501538	15	475	347	628.3	139	29	87	8.14	20.84	867.8	1.07	212.12	132.67	45	13
Danemark	Holstein	DK5011501539	15	469.25	331	633.4	136	26	85	6.81	15.21	994.9	1.14	207.15	130	45.67	
Danemark	Holstein	DK5011501540	15	402	282	527.1	126	25	83	5.42	10.33	901.7	0.71	204.34	127.67	45.33	12
Danemark	Holstein	DK5011501542	15	511	334	624.6	136	26.5	88	7.25	10.37	1011.9	1.42	174.56	132.67	47.33	12
Danemark	Holstein	DK5011501545	15	450.75	317	595.1	136	26.5	84	7.21	11.41	1034.9	1.45	188.7	131	45	12
Danemark	Holstein	DK5123201849	14	440.25	301	566.1	134	25.5	88.5	4.01	14.37	909	1.74	190.31	129.67	47.67	
Danemark	Holstein	DK5123201851	14	468	299	586.4	137	25.5	83	4.24	13.34	854.5	1.38	200.94	127	48	13
Danemark	Holstein	DK5123302521	15	483	350	646.6	137	27	86	6.04	12.69	948.9	1.2	204.91	135	49.67	13
Danemark	Holstein	DK5123302523	14	512	358	664.1	140	27.5	86.5	6.11	7.29	1074.8	1.08	191.77	133	47.33	13
Danemark	Holstein	DK5123302524	14	479.25	345	624.8	134	27.5	86	8.52	20.34	1008.2	1.11	191.41	135	46.33	13
Danemark	Holstein	DK5179400880	15	432	310	604.4	138	27	85	7.24	11.34	1044.5	1.27	181.61	132.33	47	13
Danemark	Holstein	DK5179400921	14	395	267	498	128	26	84	5.91	9.33	1094.2	1.12	207.79	129	45	13
Danemark	Holstein	DK5179400922	14	503	349	649.1	140	27	89.5	6.98	10.95	1070	1.43	198.89	139	49.67	

Data analysis

Data management

Parameters



Result

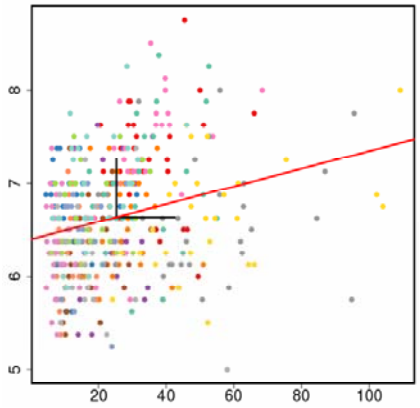
R Code

Difficulties associated with the fusion of pre-existing smaller databases

Example : shear forces

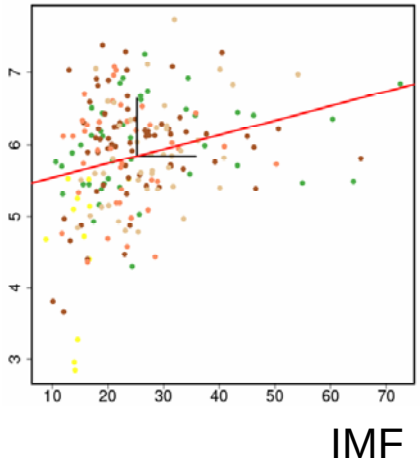
variable	measurement	cooking	ageing	base
WBJ14	**WB : Maximum load**	Grilled to 55°C internal temp.	14 days	QUALVIGENE
WBJ14nrj	**WB : Energy**	Grilled to 55°C internal temp.	14 days	QUALVIGENE
WBJ02	**WB : Maximum load on cooked meat 48h**	80°C waterbath to 78°C internal temp.	2 days	GEMQUAL
WBJ10	**WB : Maximum load on cooked meat 10d**	80°C waterbath to 78°C internal temp.	10 days	GEMQUAL
cisJ14	**Shear force**	raw	14 days	FILICOL
cisJ10	**Shear force : maximum load on raw meat 10d**	raw	10 days	GEMQUAL

An example of application: relationships between flavour and intramuscular fat content (IMF)



***
R=0.27

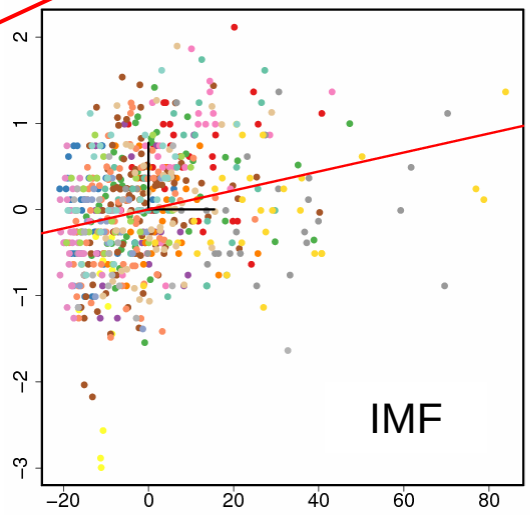
Gemqual
(437 young bulls **from 15 breeds**)



***
R=0.27

FiLiCol
(201 **young bulls, steers or heifers from 6 breeds**)

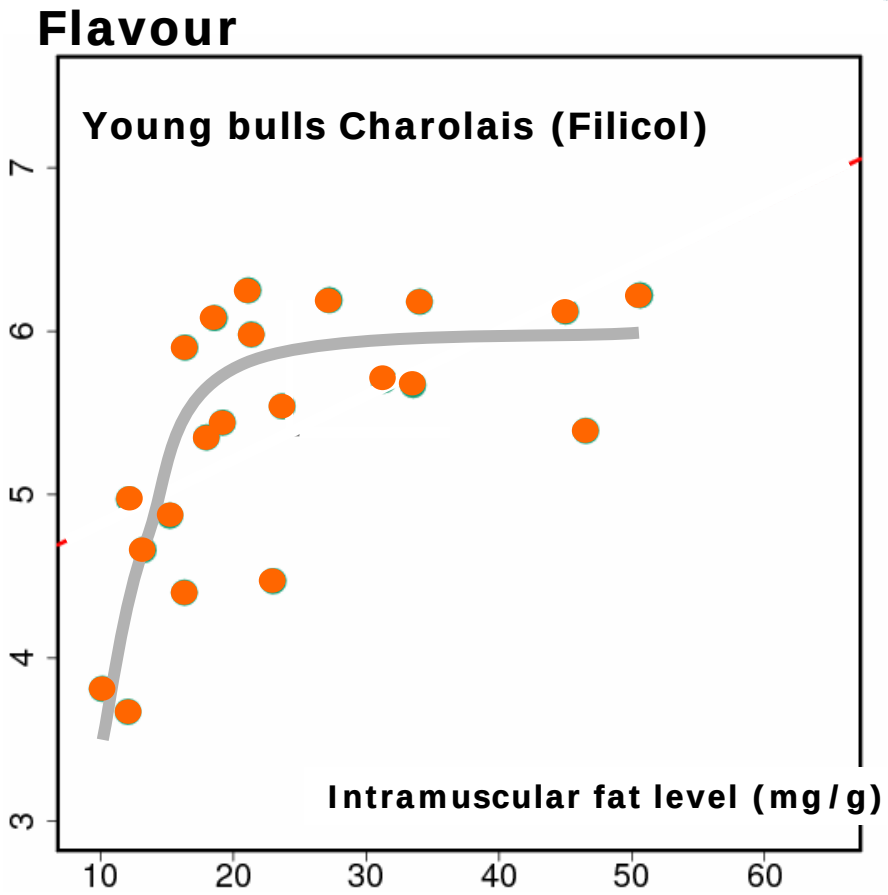
Data are centred

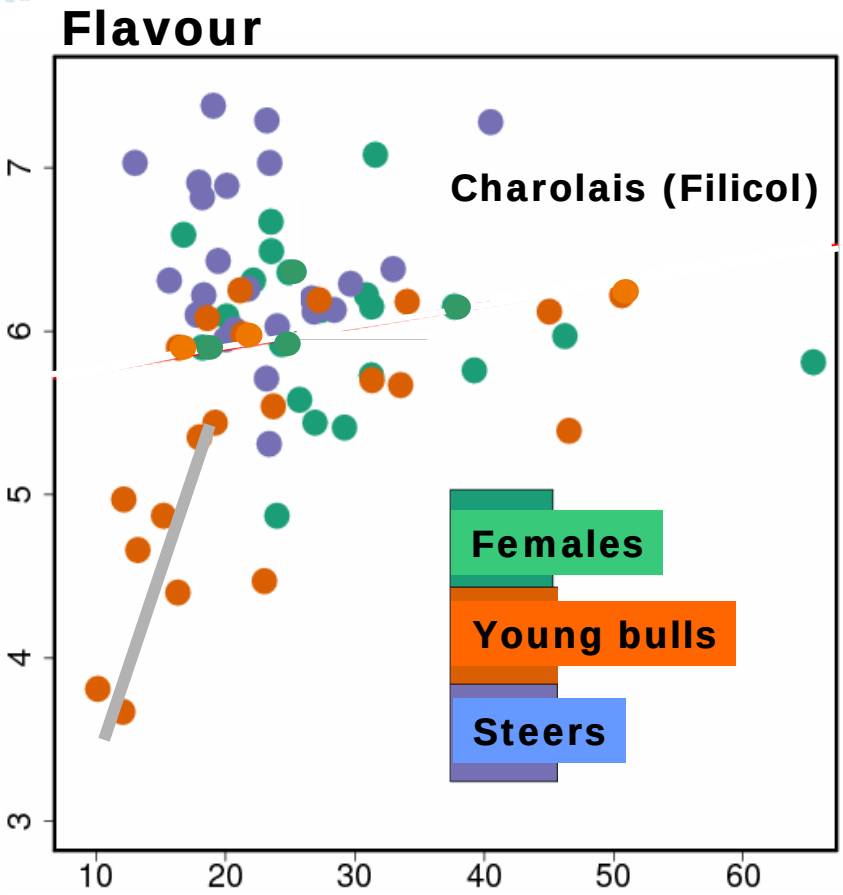


***
R=0.25

Breed and /or sex both induce variability in flavour and IMF content and hence a positive relationship between these two variables.

Relationships between flavour and intramuscular fat content (IMF) within the Charolais breed



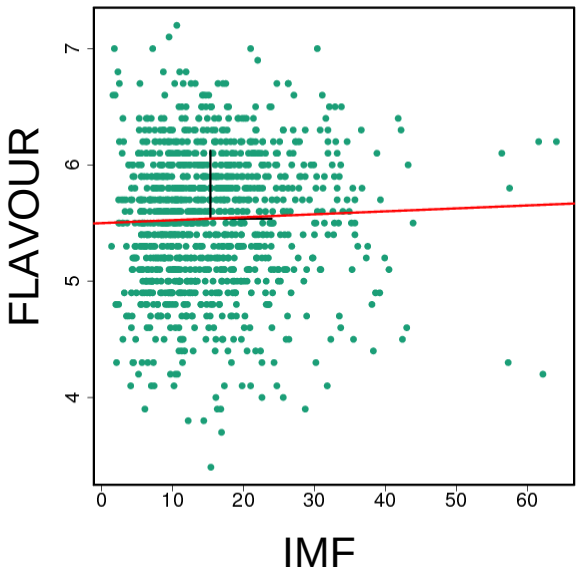


The positive relationship between flavour and IMF appears mainly for young bulls

Relationships between flavour and intramuscular fat content (IMF) in Charolais young bulls

Qualvigene :
R = 0.04

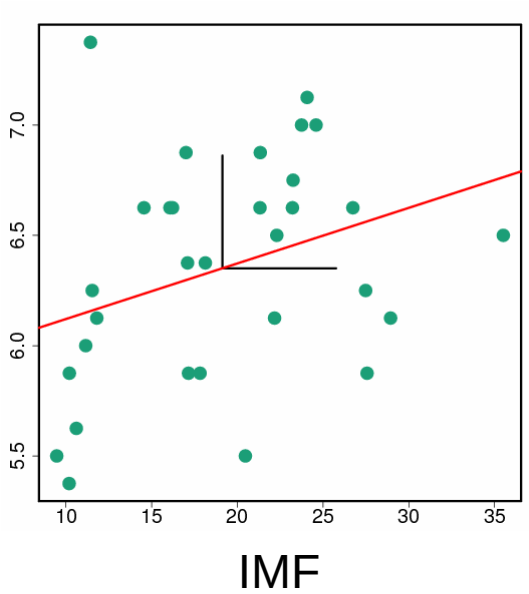
NS



1111 Charolais young bulls of the same age (14-17 months)

Gemqual :
R = 0.33

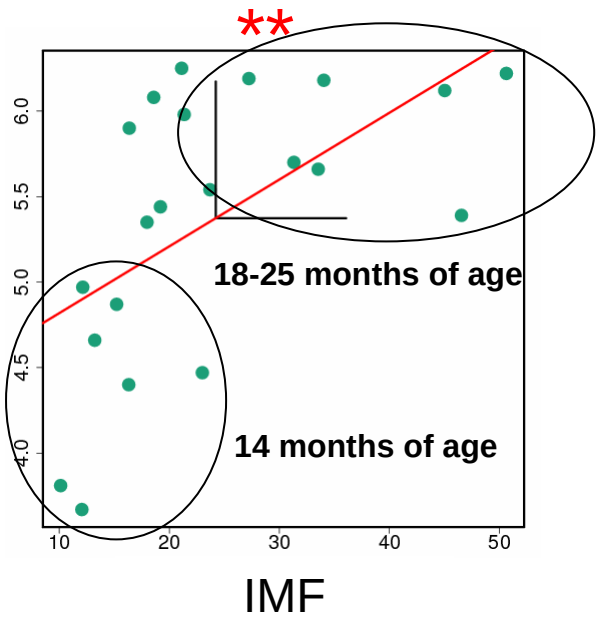
t



31 Charolais young bulls of the same age (14-17 months)

FiLiCol :
R = 0.58

**

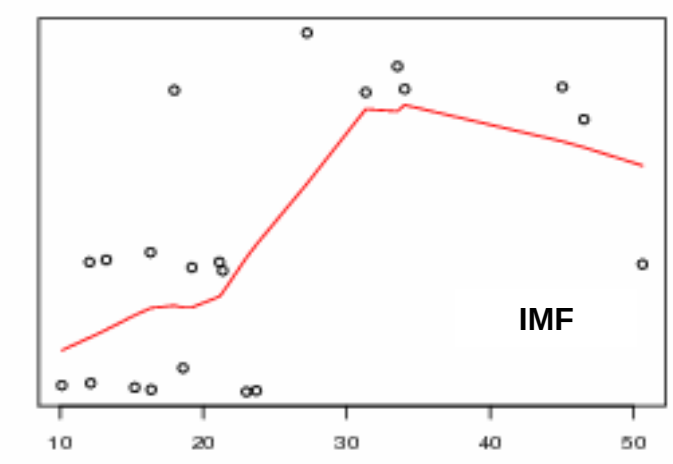


21 Charolais young bulls **of various ages** (14-25 months)

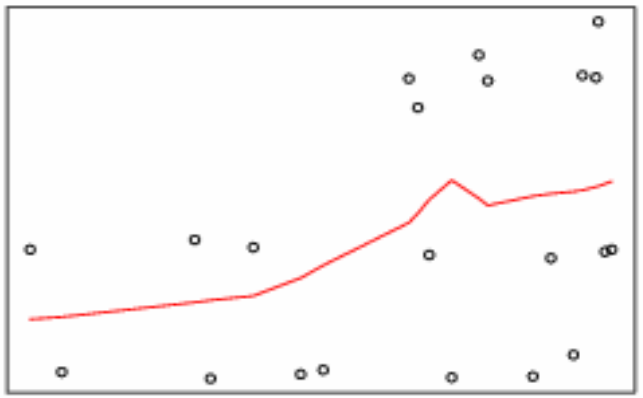
Age induces variability in flavour and IMF and hence a positive relationship between these two variables

Relationships between flavour and intramuscular fat content (IMF) in Charolais young bulls

AGE

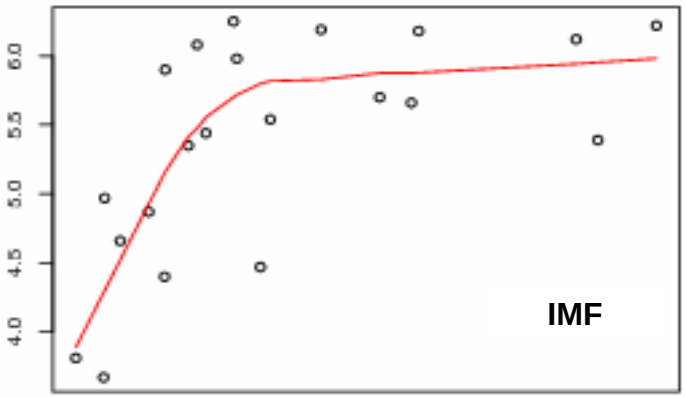


AGE



FLAVOUR

FLAVOUR



Age does induce increase in both flavour and intramuscular fat level

Conclusions

There is no relationship between intramuscular fat level and flavour of beef in homogeneous populations of beef cattle.

However, age, breed or sex induce variability in flavour and intramuscular fat level.

Therefore, flavour may be related to intramuscular fat content in heterogeneous populations of cattle (which vary for breed or age).

Future of the project

Next steps :

- To analyse other types of relationships
- To merge the database with others
- To open the database to new partners
- To identify laws between variables from the literature
- To setup experiments to complete the database and underline new laws
- To set up a repository of measures: a restricted number of variables the definition of which would be accepted in Europe or in the world