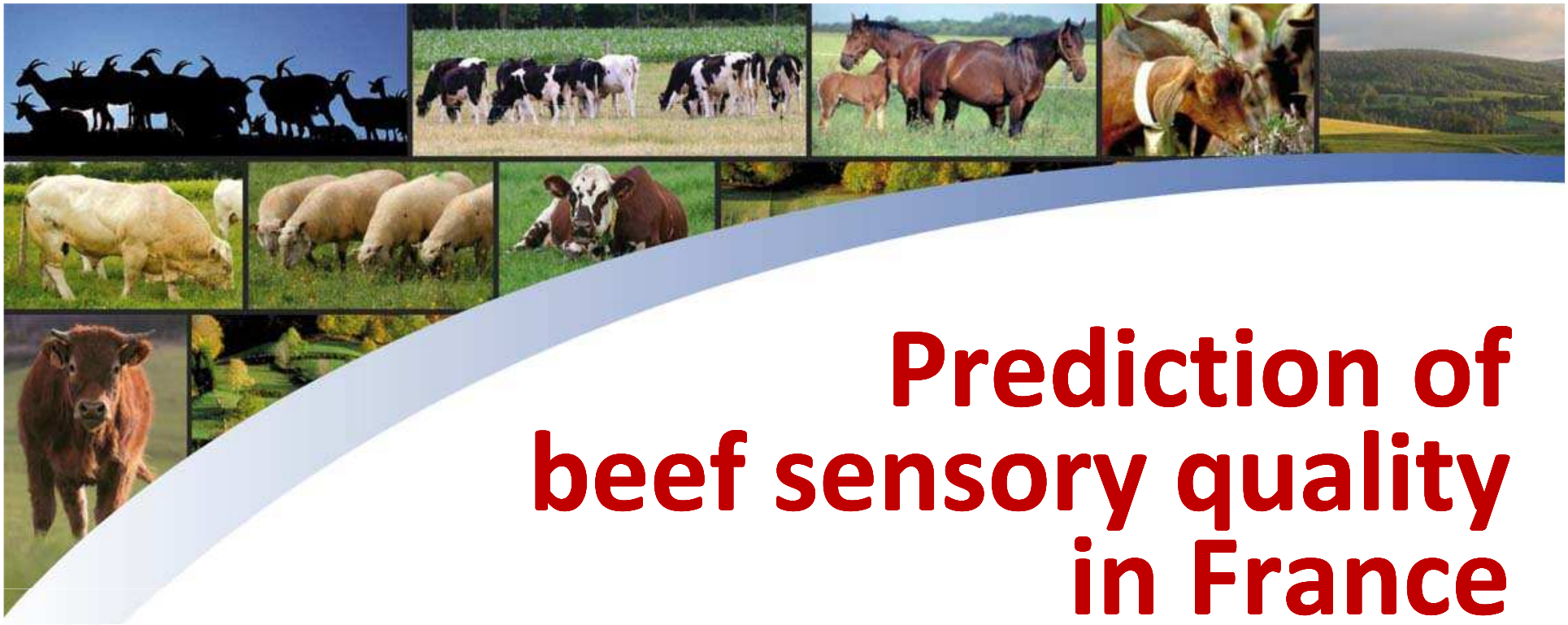


Prediction of beef sensory quality in France

Isabelle LEGRAND

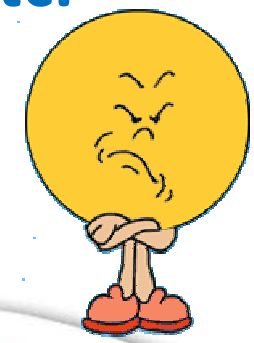
S. CHRIKI, L. JOURNAUX, J.F. HOCQUETTE,
B. PICARD, D. PETHICK, R. POLKINGHORNE

18th October 2012

www.idele.fr Beef meat quality and safety – European and Polish perspectives conference - POLAND

Context - Beef sensory quality

- **Great and uncontrolled variability**
  - **Beef quality depending on differences in muscle characteristics (muscle fibre types, collagen content, lipid content, etc.)**
  - **Differences due to various factors: genetics, muscle type, breed and sex, etc.**
- **Consumer's dissatisfaction**



Develop a meat quality predicting model

- **Test how the Meat Standards Australia (MSA) system may work in France**
- **Know how muscle biochemical traits may explain variability in quality scores**
  - Include laboratory meat analysis in order to increase the model efficiency
  - Within ProSafeBeef

Improvement in beef safety and quality across Europe

Prediction of beef eating quality using the Meat Standards Australia (MSA) system

?

Meat Standards Australia (MSA)

- Prediction model for eating quality of beef muscles (1996)
- Predicts meat quality score MQ out of 100 points
- Predicts 4 « satisfaction levels »
- From animals and their carcasses characteristics

MSA system: 3 successive studies

- **1st study 2007/08: Perception in France and perspectives for the French beef sector**

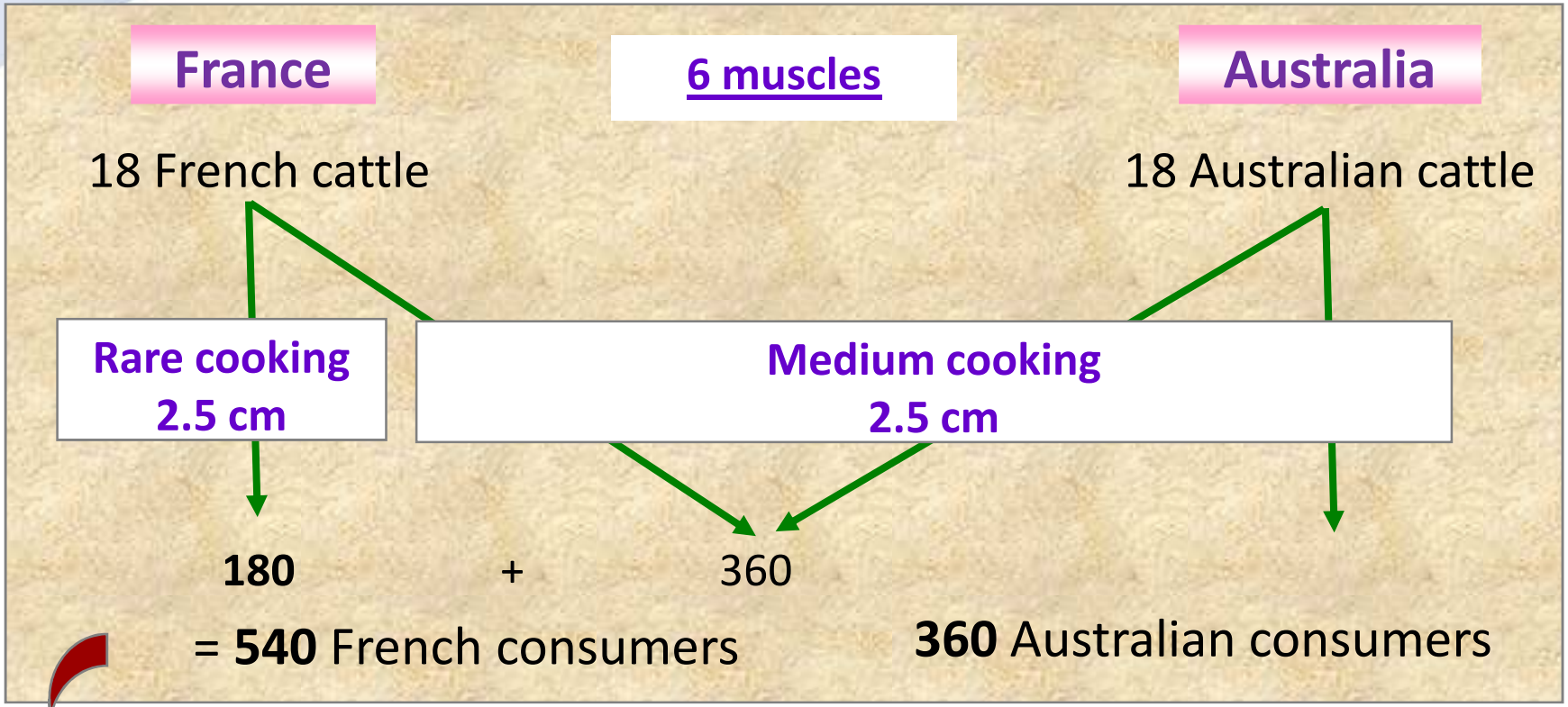
  Hocquette et al., 2011, Animal Production Science, 51, 30-36

- **2nd study 2009/10 (PREDICT-BEEF): MSA system adaptability to French market, a French and Australian experiment**

  Legrand et al., 2011, Animal, In Press

- **3rd and current study 2012/14 (PREDICT-BEEF 2): MSA system adaptability to European market, a French and Polish experiment**

Previous protocol of the second study (French & Australian tests)

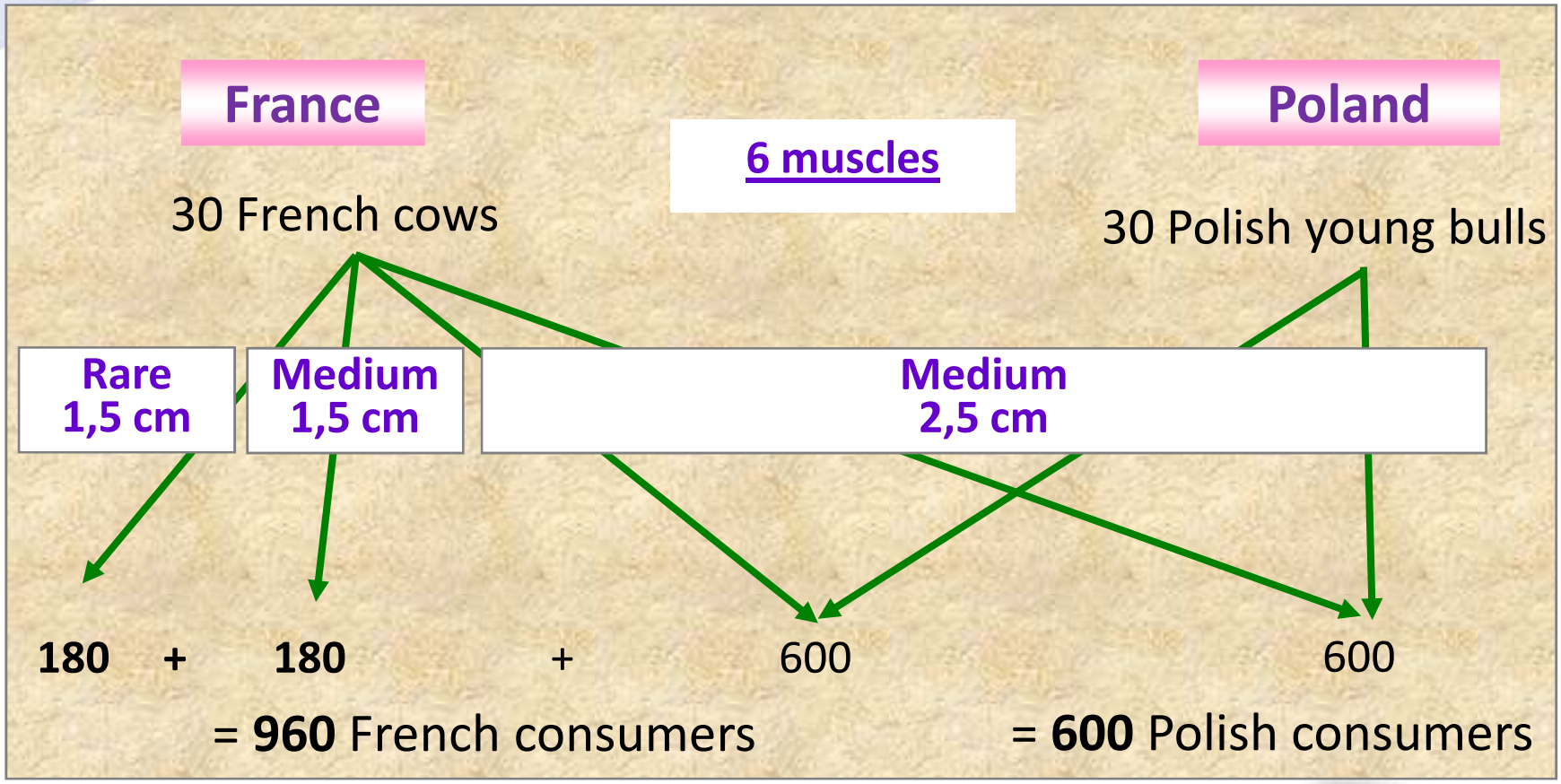


Meat samples for biochemical analysis (part 2)

MSA prediction – Conclusion of studies 1 & 2

1. The MSA programme represents the 1st elaborate system to predict the eating quality of a beef cut according to the length of ageing and the cooking method
2. It has been proven to be efficient in many countries as Japan, Korea, USA, Ireland, South Africa…
3. Good results were also found with French beef meats and French consumers
4. But this trans-chain approach raises questions regarding the organization of the beef chain in France, and the French official quality labels
5. However some French private professional organizations are greatly interested in an MSA-like system

Current protocol of the third study (French & Polish tests)



Importance of the muscle biochemical traits to explain meat quality variability

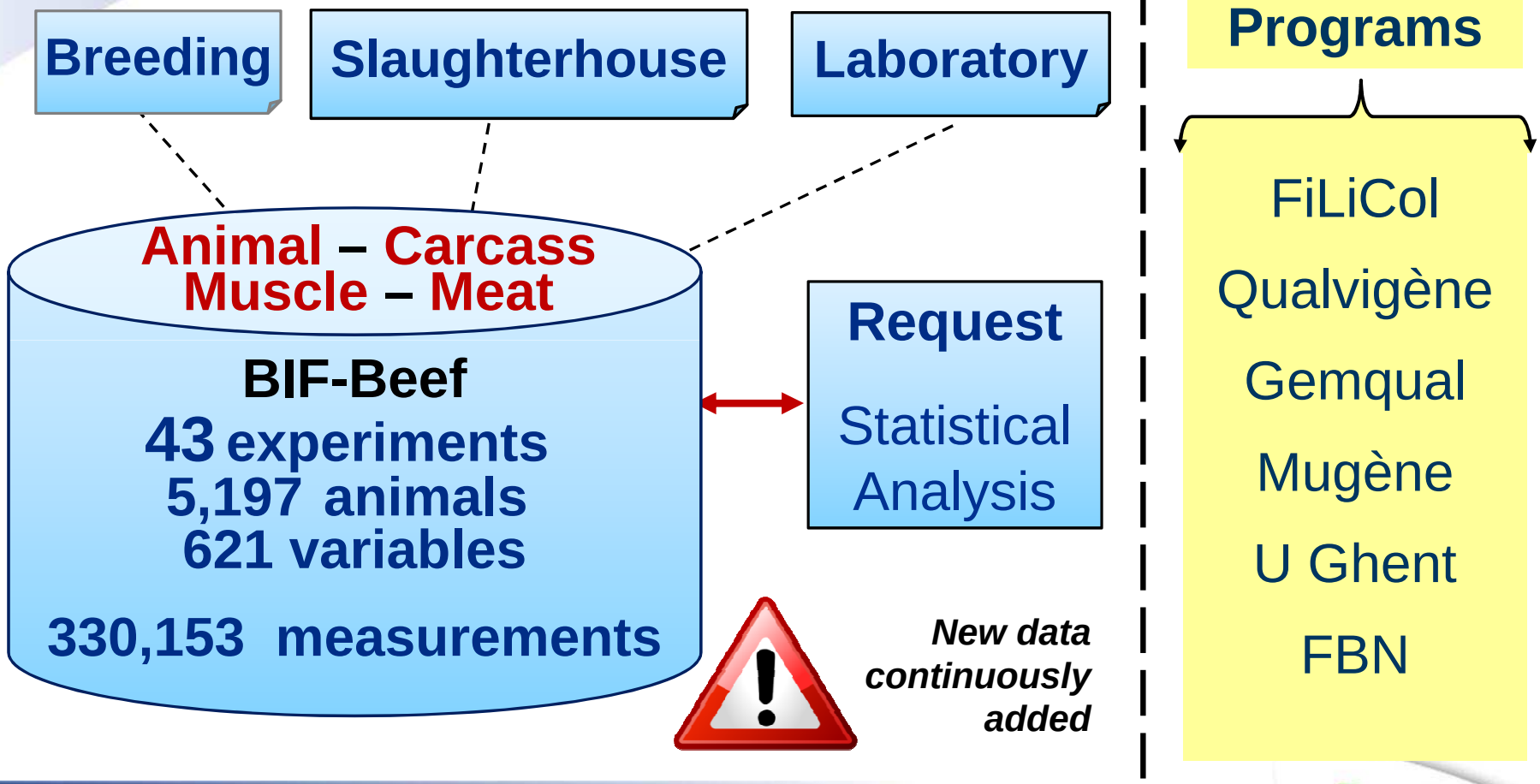
Part 1 of the muscular approach

- All biochemical data of the muscle tissue collected from a great number of experiments in a database called BIF-Beef (Integrated and Functional Biology of Beef)

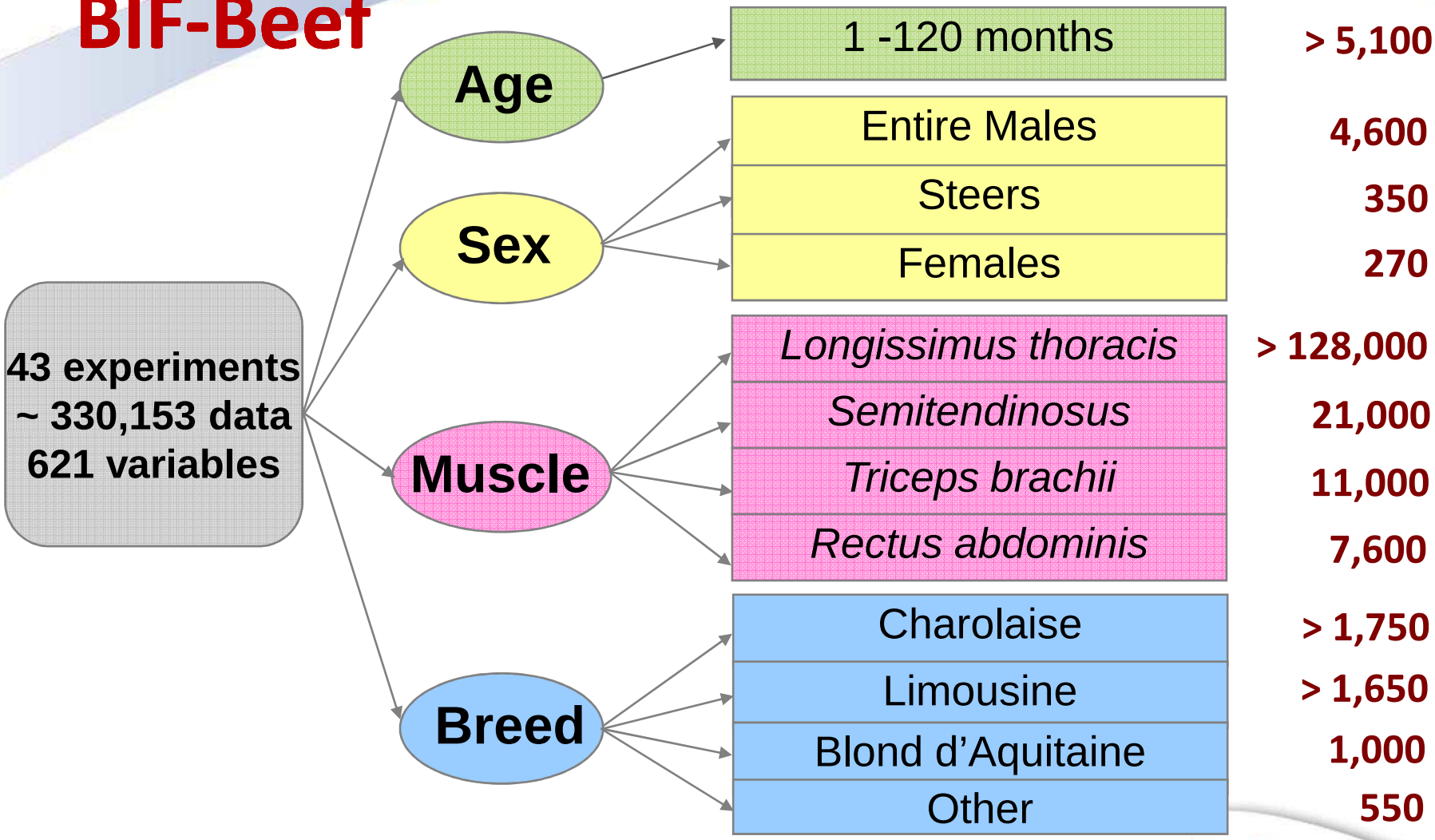
- **Objective:**
  to perform meta-analyses in order to relate muscle biochemical data to meat quality

Origin of the database

Data warehouse BIF-Beef



Contenst of the whole Data base: BIF-Beef



Materials & methods

Available phenotype data related to muscle characteristics and beef quality gathered

Selected data extracted

META-ANALYSIS

Variability in beef quality predicted and explained through muscle biochemical traits

Materials & methods

4,037 striploin (*M. longissimus thoracis*) samples from young bulls of similar age (15 months)

with a specific focus on

21 Charolais young bulls ranging from 15 to 26 months

Trained panellists

Some results: relationship between IMF and flavour (trained panellist)

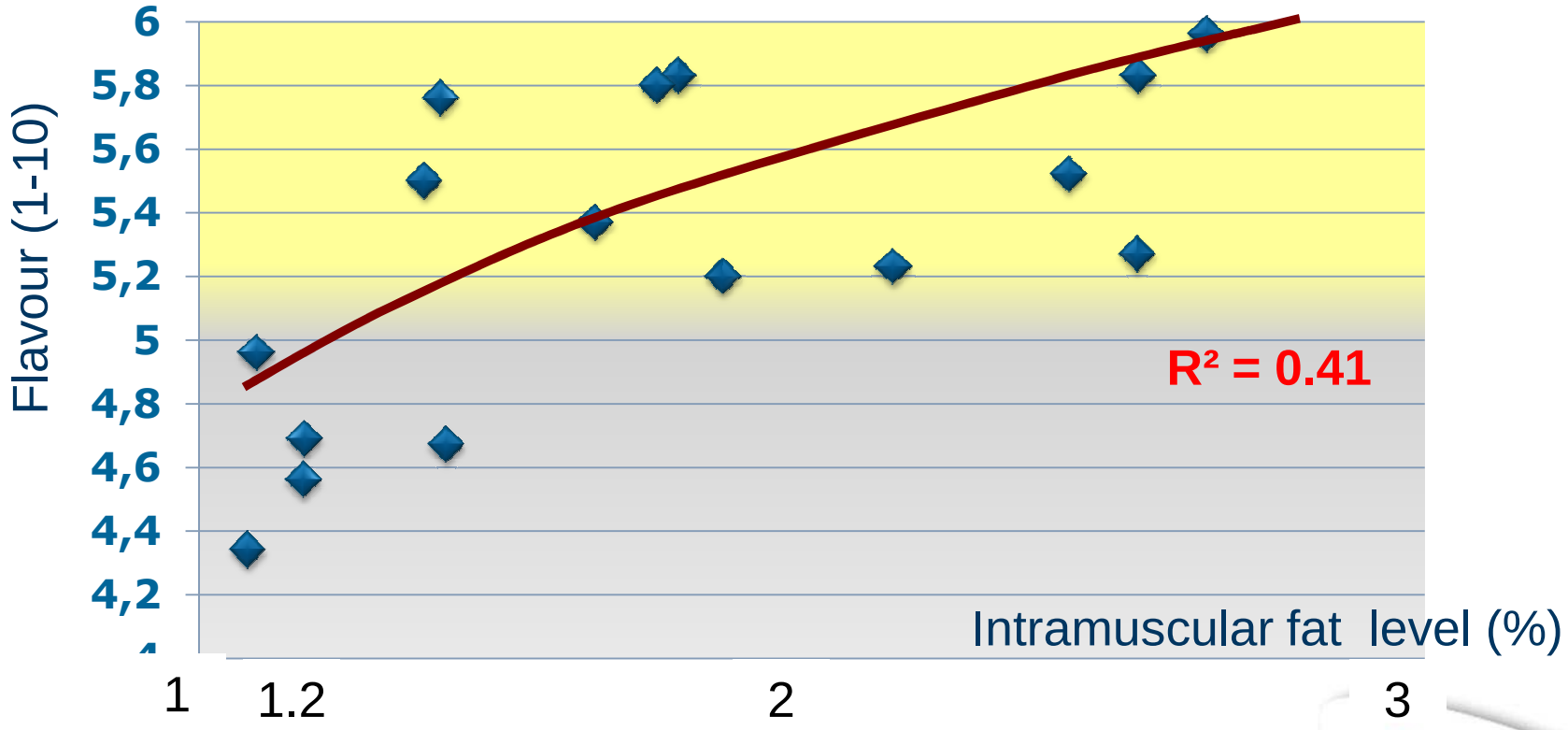
- Low but significant partial correlation between flavour and intramuscular fat level (0.11***)

- Thus, differences in intramuscular fat level with this homogenous population of young bulls may explain less than 2% of the variation in flavour

Hocquette et al., 2011, Animal Production Science, 51, 975–981

Relationship IMF / flavour (trained panellist)

- With 21 Charolais young bulls which differ in age (15-26 months)



Part 2 of the muscular approach

- **Sensory analysis recorded, according to the Meat Standards Australia guidelines, to relate MSA quality scores to muscle biochemical data**

Materials & methods

108 cuts from 6 different muscles

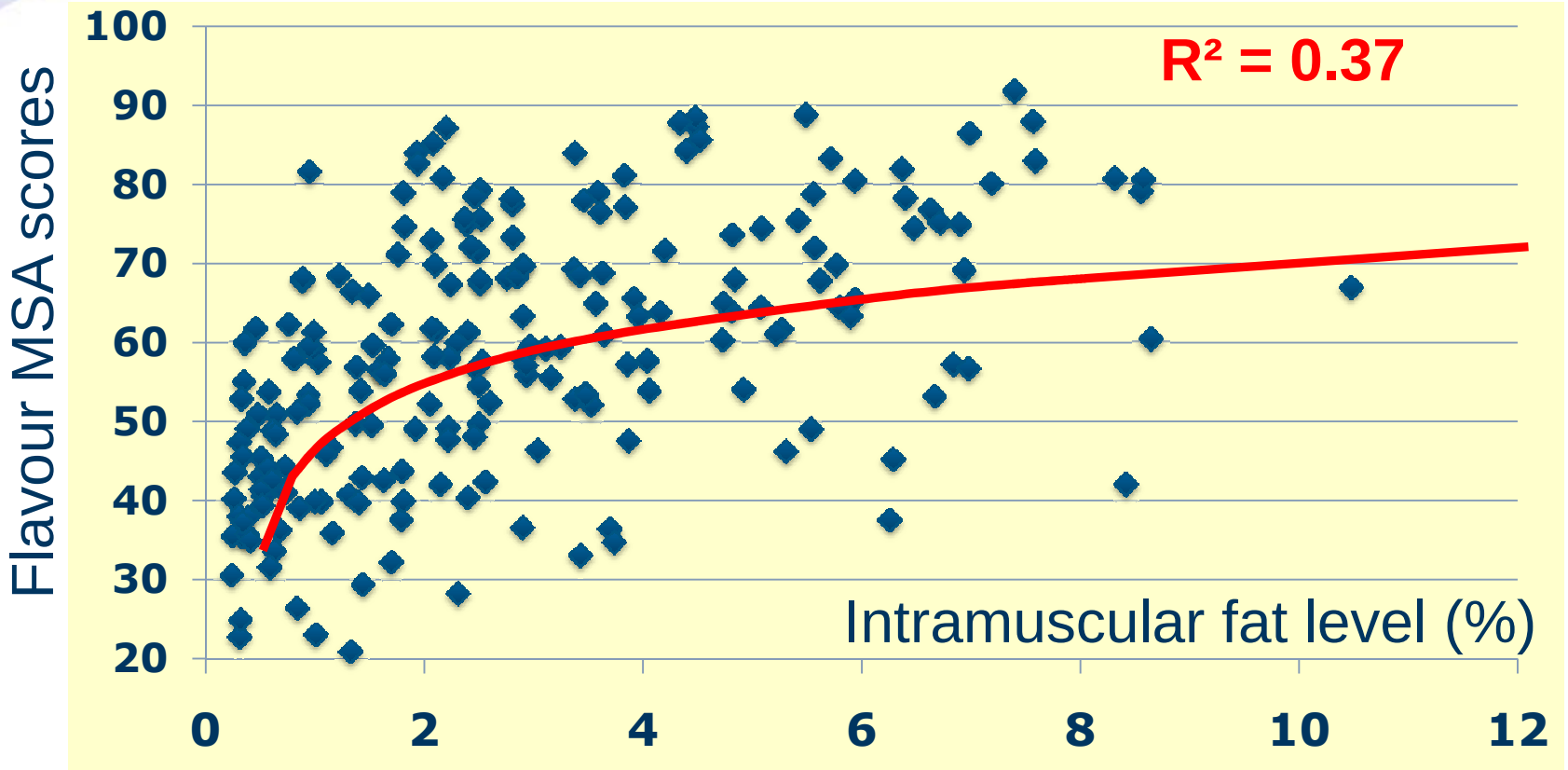
[Outside (*M. biceps femoris*)
Topside (*M. semimembranosus*)
Striploin (*M. longissimus thoracis*),
Rump (*M. gluteus medius*)
Oyster blade (*M. infraspinatus*)
Tenderloin (*M. psoas major*)]

sampled from 18 animals of different ages, breeds and sexes

(3 young bulls + 15 cows)

Untrained consumers

Some results: Relationship IMF / flavour MSA scores (untrained consumers)



Relationship between MSA scores and biochemical muscle data

- Other significant correlations: R^2 ($P<0.05$)

- Soluble / total collagen (solubility indicator)

  with MSA tenderness score: $R^2 = 0.33$

  with MSA overliking score: $R^2 = 0.29$

  with MSA palatability score: $R^2 = 0.30$

0.3 Tenderness + 0.3 Flavour + 0.1 Juiciness + 0.3 Overliking

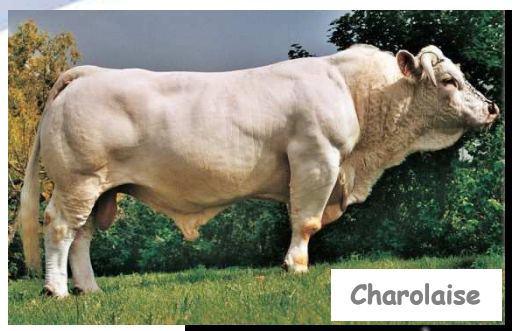
Muscular approach - conclusions

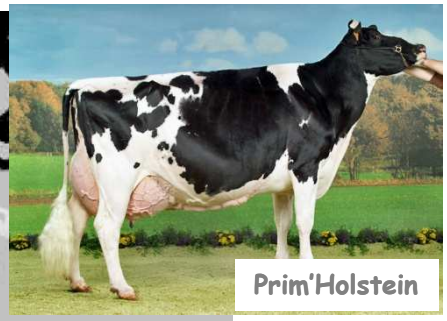
- **One of the first studies which related biochemical parameters of the muscle tissue to quality scores determined by untrained consumers**

- **Importance of intramuscular fat level for beef flavour and of collagen solubility for tenderness confirmed by untrained consumers, in accordance with observations with trained panellists**

- **Possibility to improve a predictive model of beef quality from muscle and biochemical traits combined with muscle structure and genomic biomarkers (not presented)**

Thank you for your attention


Charolaise


Prim'Holstein


Salers


Normande


Blonde d'Aquitaine


Montbéliarde


Limousine

INRA
Institut National de la Recherche Agronomique

INSTITUT DE L'ELEVAGE

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