



A comparison of steers and heifers of the Charolais and Limousin breed

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Introduction

- **Major variation in type of beef animals presented for slaughter each day which leads to a variation in carcass parameters which could have implications for meat quality**
- **Previous research indicated that there were relationships between carcass parameters and meat quality but these may have been confounded by breed differences (Lively *et al.*, 2006)**
- **Are the relationships between carcass parameters and meat quality breed effects?**
- **Charolais and Limousin progeny account for 65% of beef animals slaughtered in Northern Ireland (APHIS, 2008)**

Objectives

- 1. Examine the effect of gender and sire breed on animal performance, carcass characteristics and meat quality**
- 2. Explore relationships between carcass parameters and meat quality**

Materials and Methods

- **427 spring born continental animals**
 - **289 Charolais**
 - **138 Limousin**
 - **120 heifers**
 - **307 steers**
- **Animals were finished indoor during their second winter on a range of diets**
- **All animals subject to same slaughter procedure and post slaughter treatment (carcasses tender stretched and meat aged 7 days)**

Assessments

- **Carcass**
 - weight
 - conformation
 - fat classification
 - eye muscle area
 - marbling score
 - composition (lean, fat & bone)

- **Meat quality (*longissimus dorsi*)**
 - ultimate pH
 - sarcomere length
 - cooking loss
 - Warner Bratzler shear force
 - colour



RESULTS

Effect of sire breed on carcass parameters

	Charolais	Limousin	SED	Sire breed
Carcass weight (kg)	325	326	2.3	NS
Dressing proportion (g/kg)	536	544	2.2	***
Conformation	3.1	3.0	0.04	NS
Fat classification	3.6	3.8	0.07	*
Eye muscle area (cm²)	68.6	71.1	1.09	**
Marbling score	2.19	1.95	0.159	NS

Effect of sire breed on carcass composition

	Charolais	Limousin	SED	Sire Breed
Lean (g/kg)	584	594	4.8	*
Fat (g/kg)	225	230	5.5	NS
Bone (g/kg)	183	172	2.5	***

Effect of sire breed on meat quality

	Charolais	Limousin	SED	Sire breed
Ultimate pH	5.53	5.54	0.011	NS
Sarcomere length (μm)	2.58	2.60	0.039	NS
Cooking loss (g/kg)	280	272	2.8	***
Warner Bratzler shear force (kg/cm²)	2.65	2.65	0.052	NS

Effect of sire breed on meat colour

	Charolais	Limousin	SED	Sire breed
L*	39.5	39.9	0.60	NS
a*	25.0	25.9	0.49	NS
b*	16.6	16.9	0.32	NS
Chroma	30.0	30.9	0.56	NS
Hue	33.9	33.5	0.38	NS

Effect of gender on carcass parameters

	Heifer	Steer	SED	Gender
Carcass weight (kg)	317	335	2.9	***
Dressing proportion (g/kg)	534	546	2.9	***
Conformation	3.1	3.0	0.06	NS
Fat classification	3.9	3.5	0.09	***
Eye muscle area (cm²)	70.0	69.7	1.20	NS
Marbling score	2.00	2.15	0.105	NS

Effect of gender on carcass composition

	Heifer	Steer	SED	Gender
Lean (g/kg)	586	592	4.8	NS
Fat (g/kg)	240	215	5.5	***
Bone (g/kg)	169	186	2.5	***

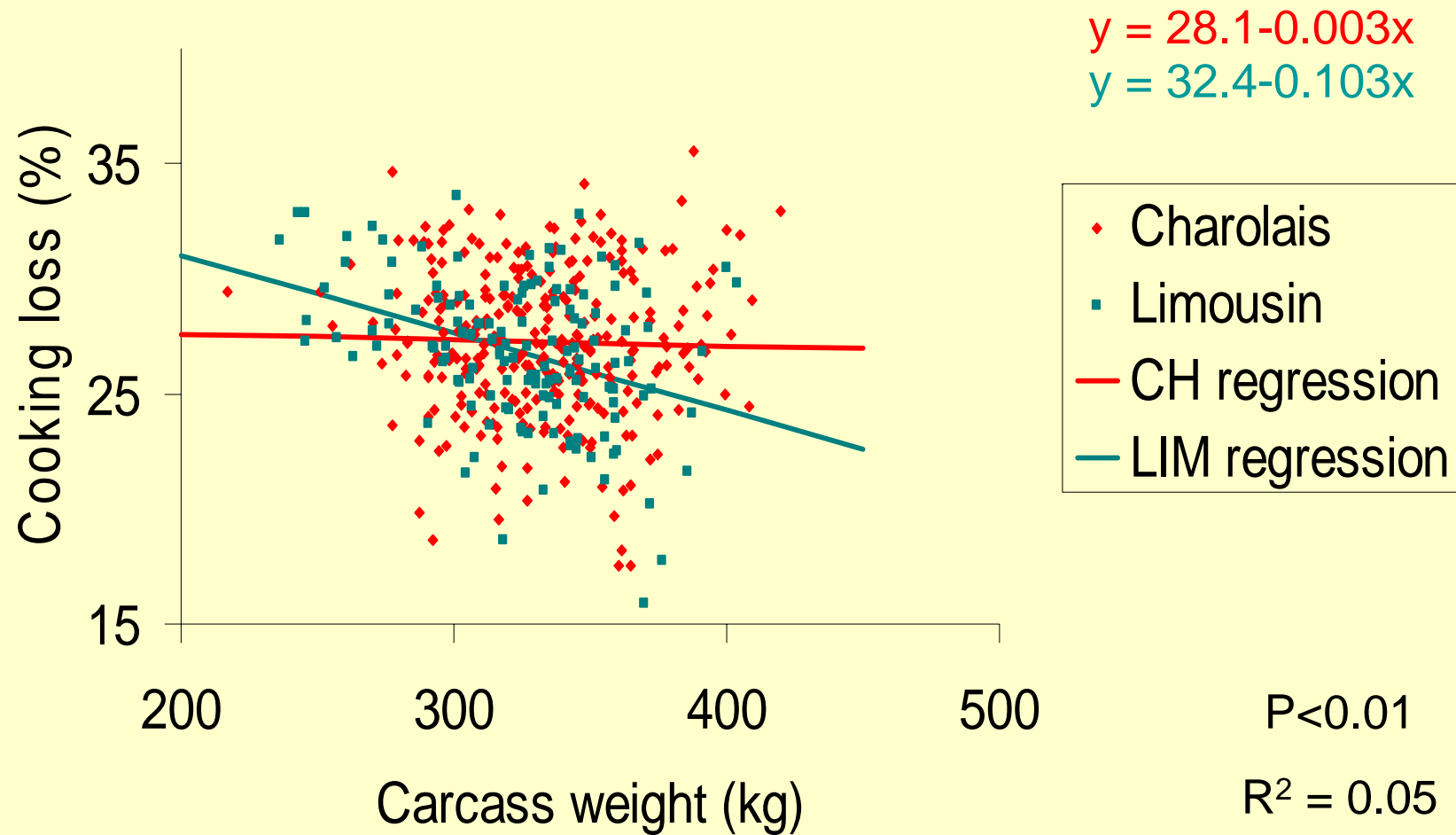
Effect of gender on meat quality

	Heifer	Steer	SED	Gender
Ultimate pH	5.55	5.51	0.016	NS
Sarcomere length (μm)	2.59	2.58	0.051	NS
Cooking loss (g/kg)	272	279	3.6	*
Warner Bratzler shear force (kg/cm ²)	2.69	2.61	0.068	NS

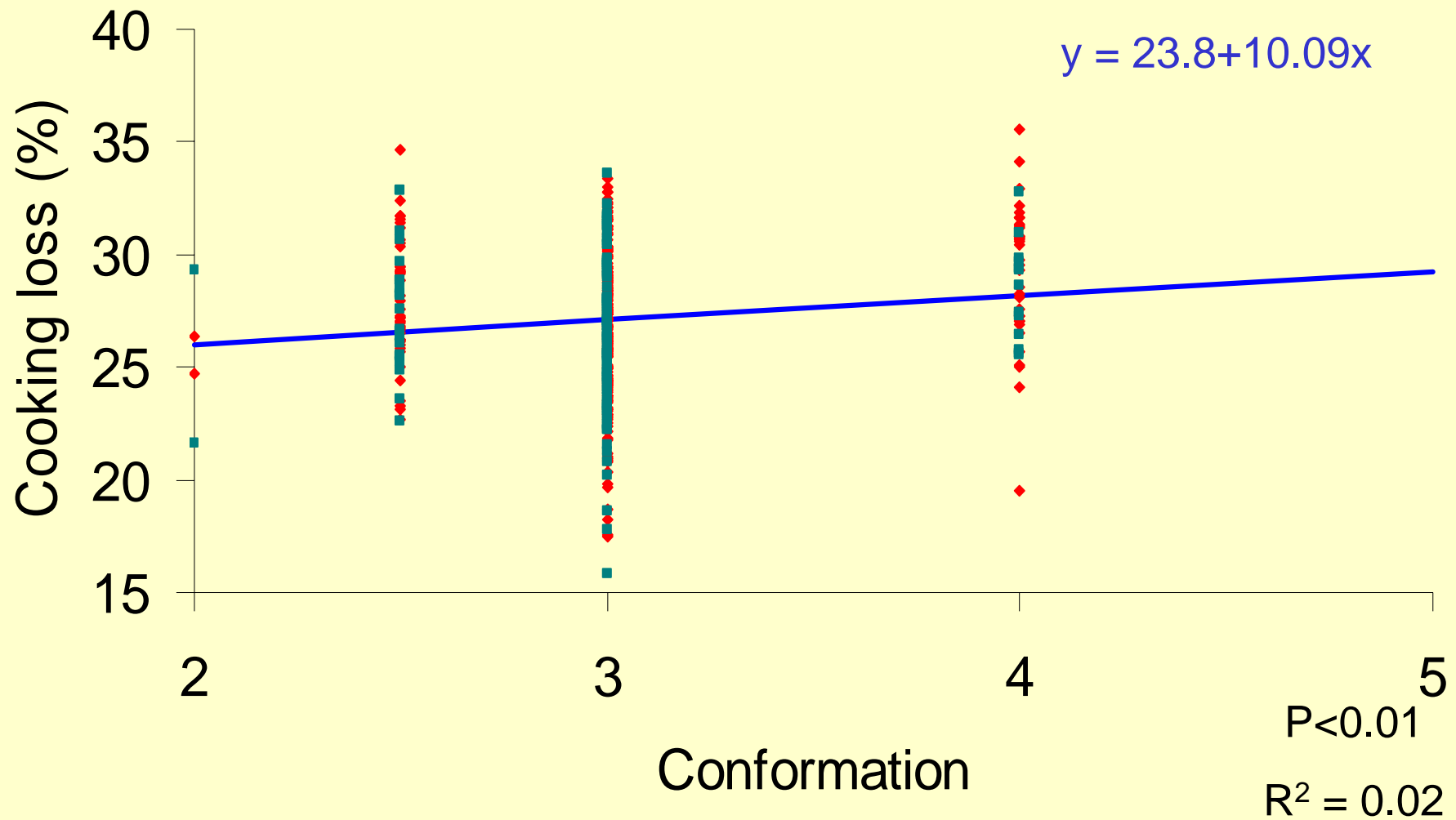
Effect of gender on meat colour

	Heifer	Steer	SED	Gender
L*	39.0	40.5	0.76	NS
a*	26.6	24.3	0.64	***
b*	17.3	16.2	0.42	***
Chroma	31.8	29.2	0.73	***
Hue	33.5	33.9	0.50	NS

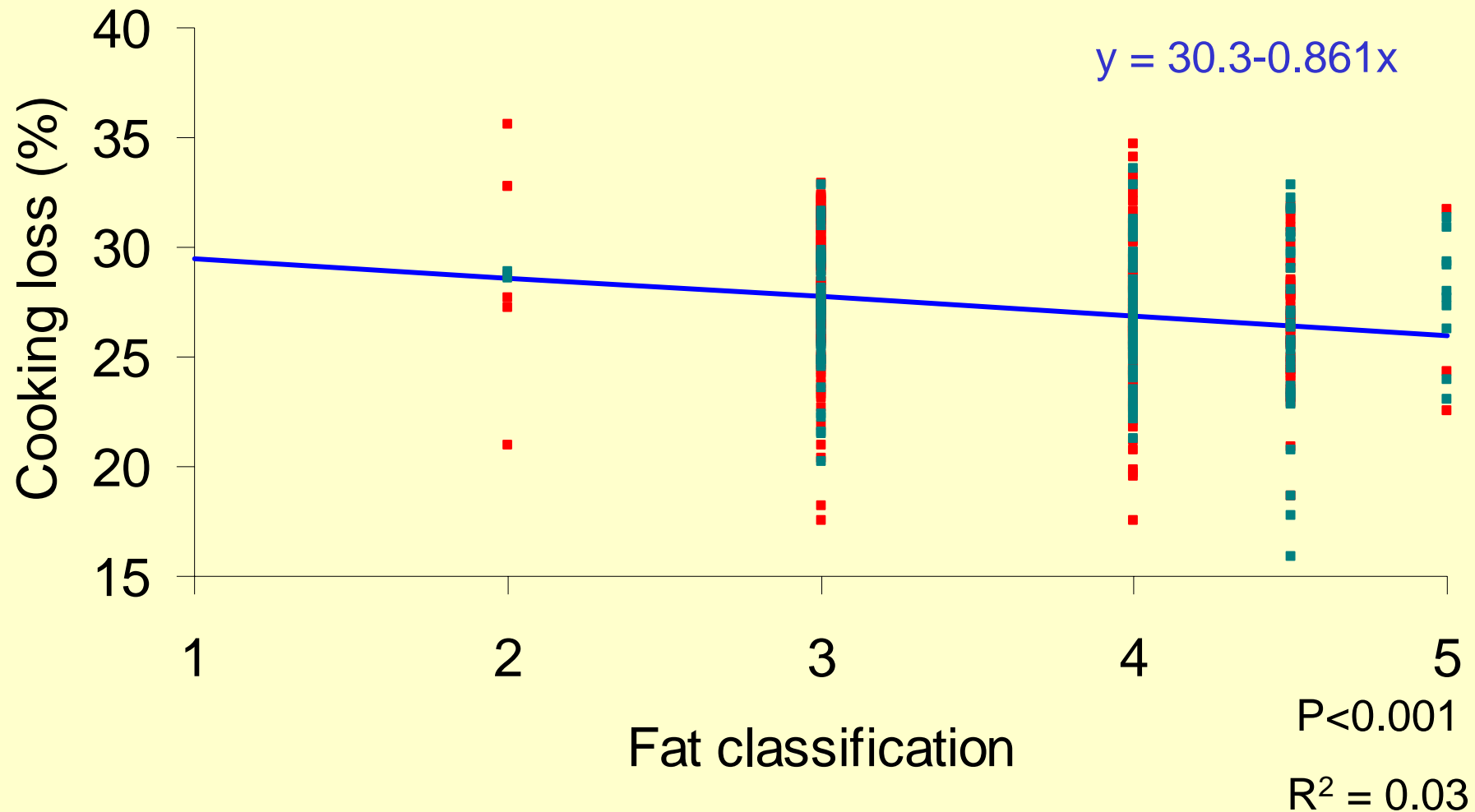
Relationship between carcass weight and cooking loss: influence of breed



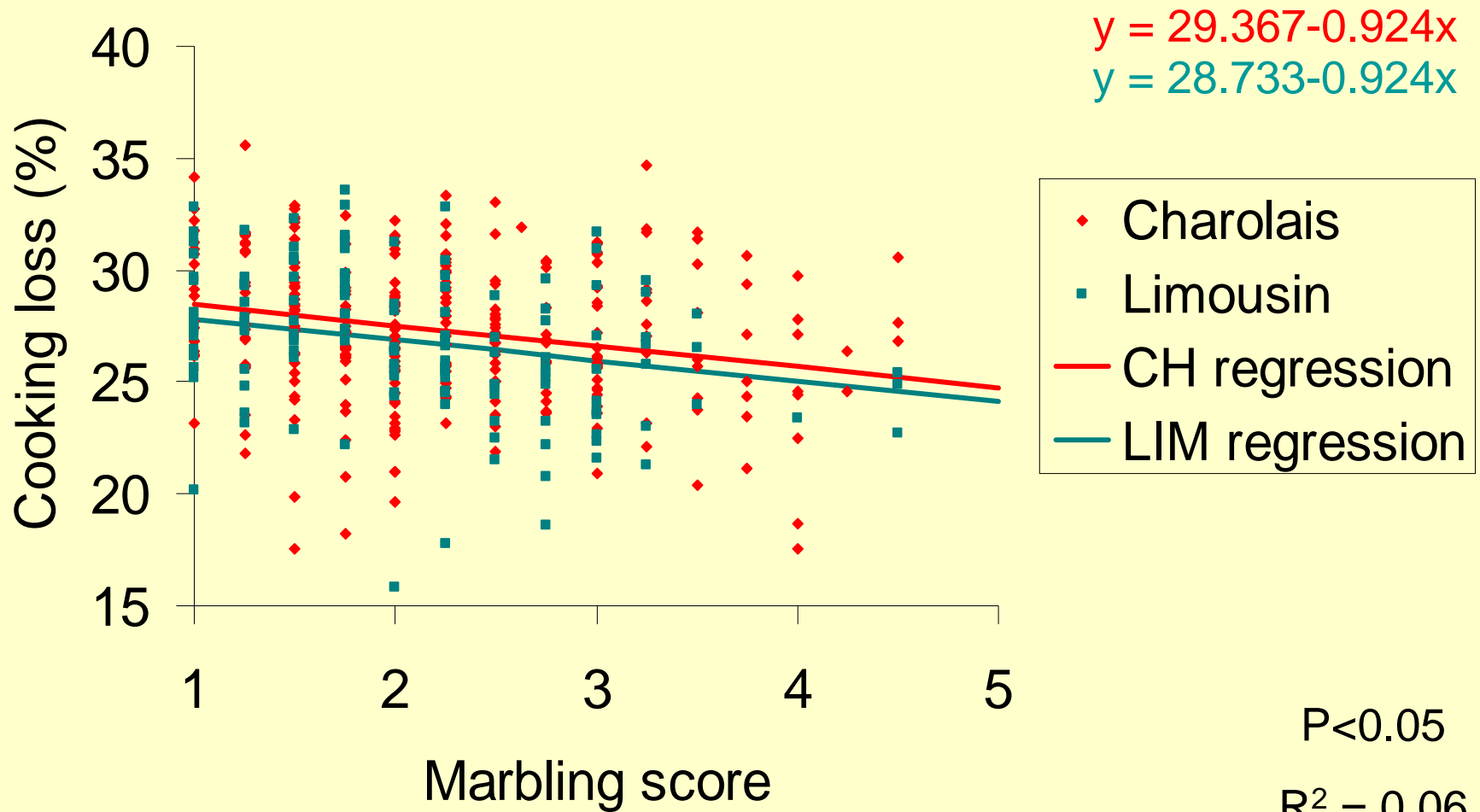
Relationship between conformation and cooking loss: influence of breed



Relationship between fat classification and cooking loss: influence of breed



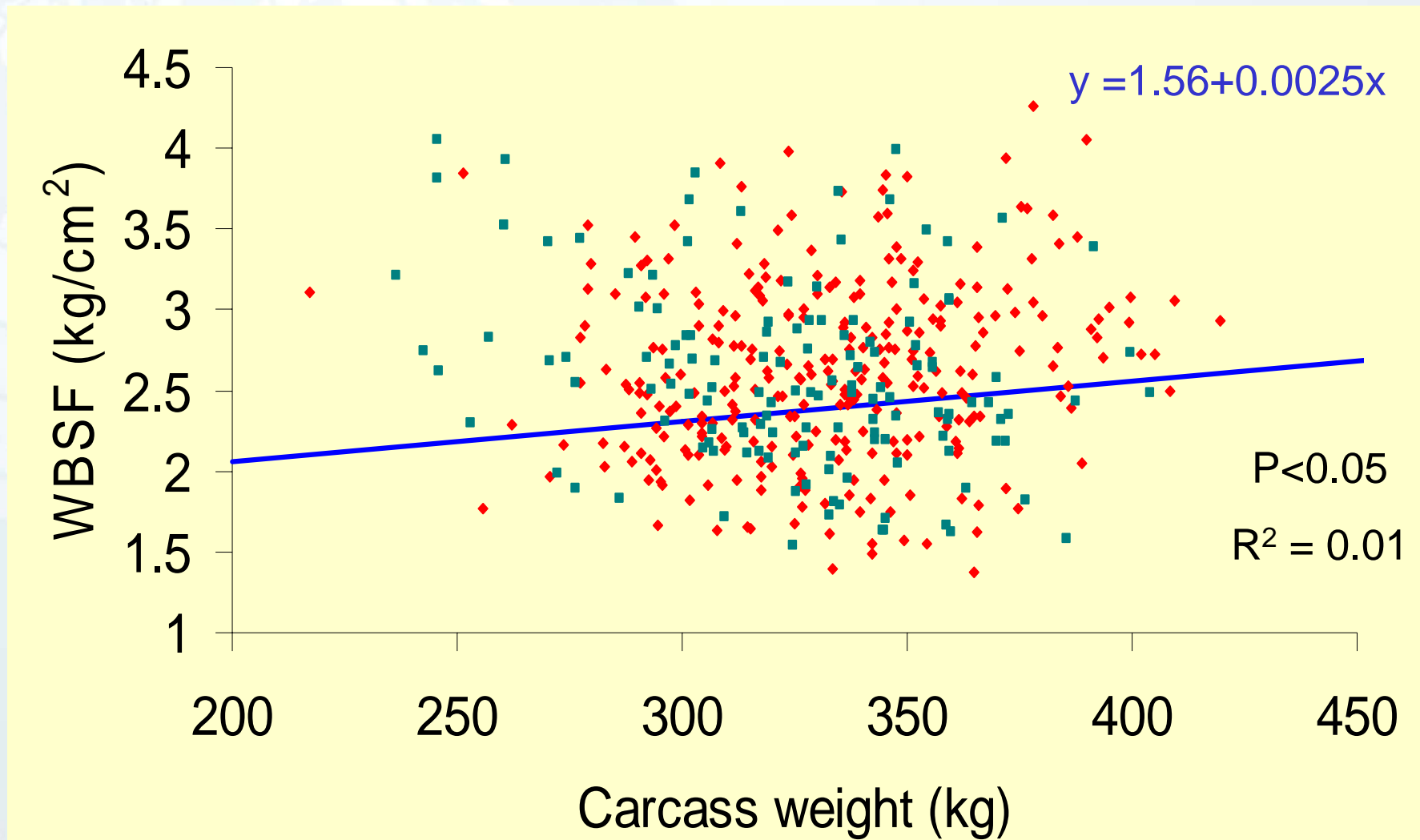
Relationship between marbling score and cooking loss: influence of breed



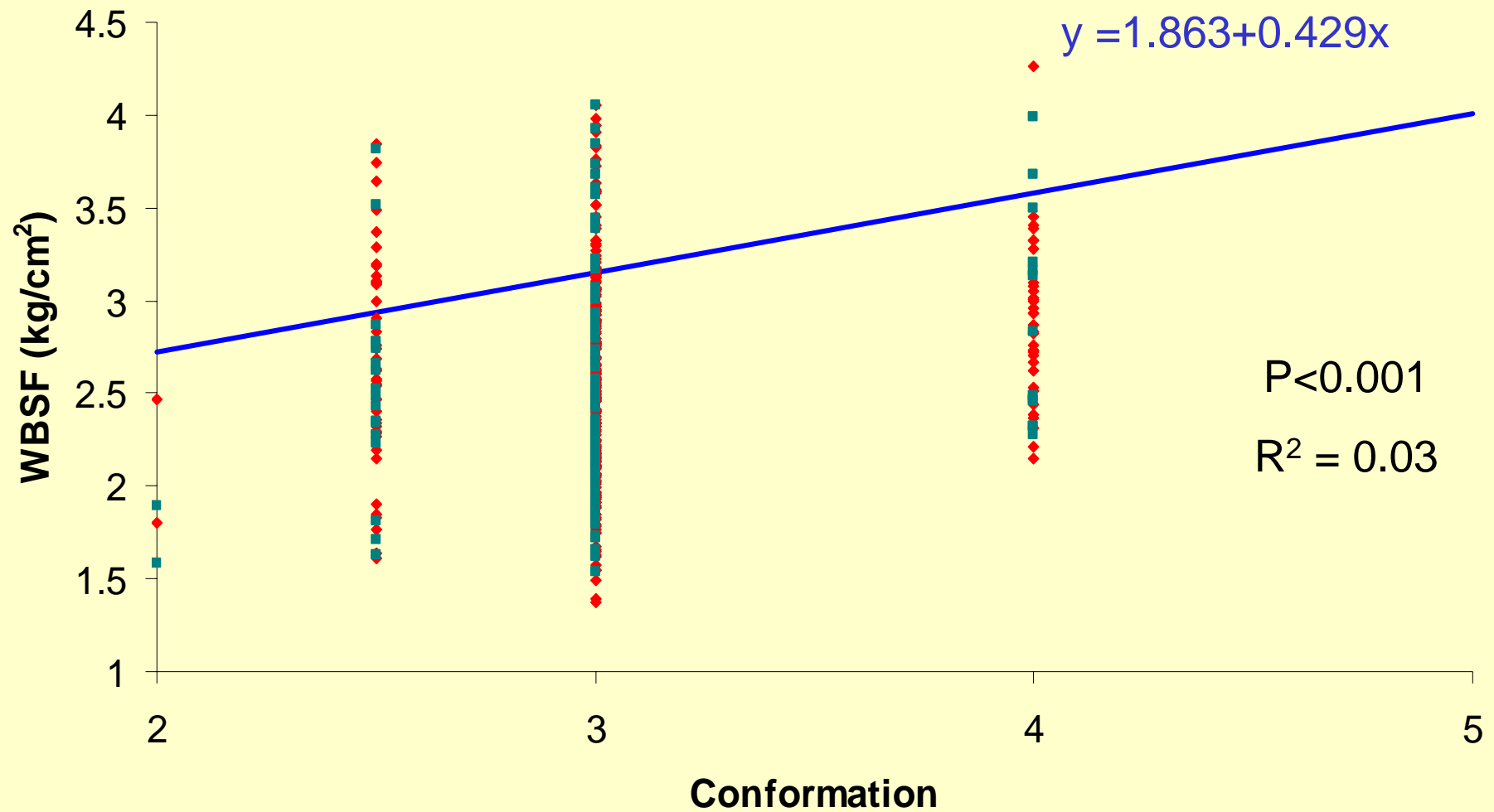
$P < 0.05$

$R^2 = 0.06$

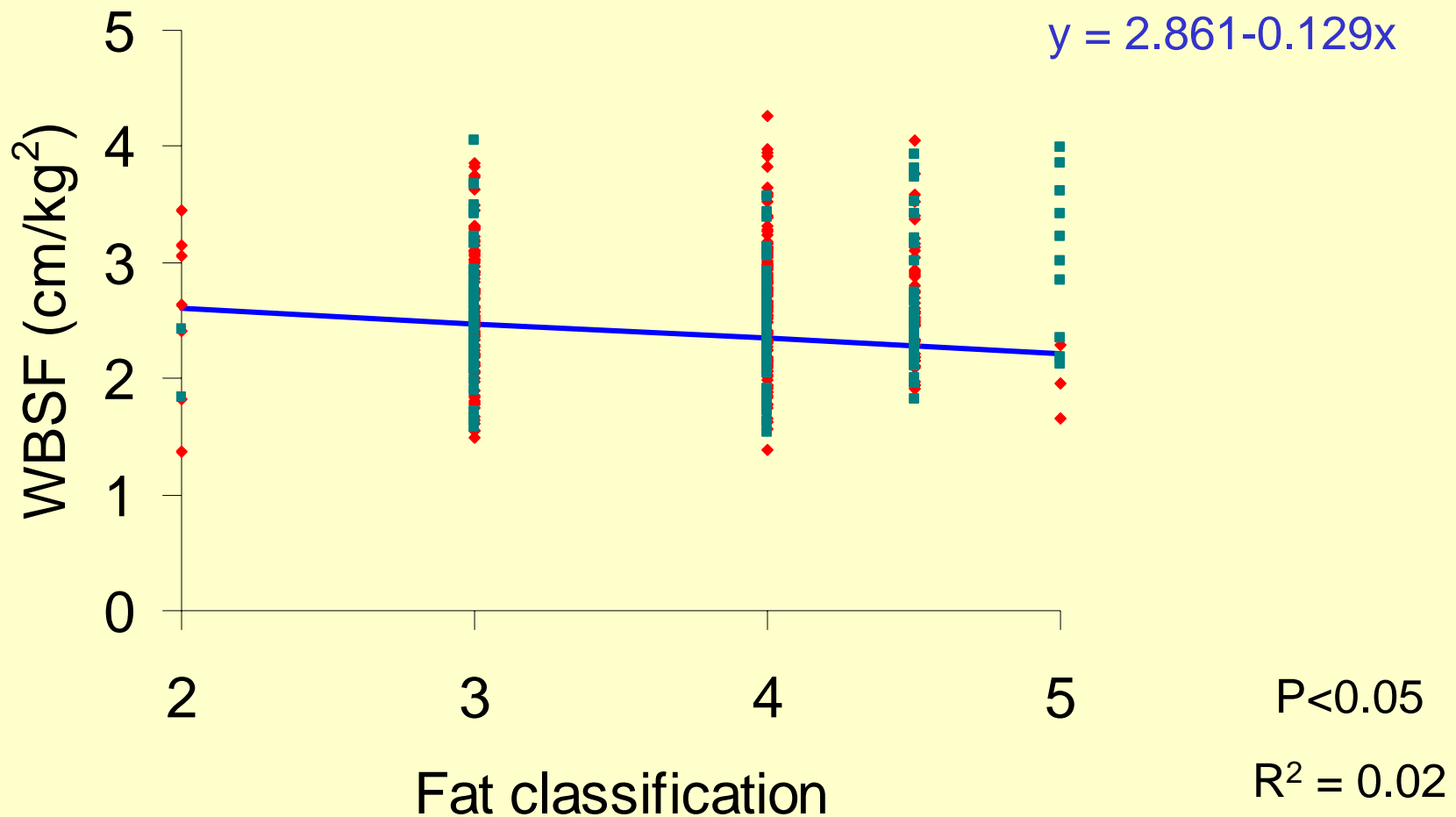
Relationship between carcass weight and shear force: influence of breed



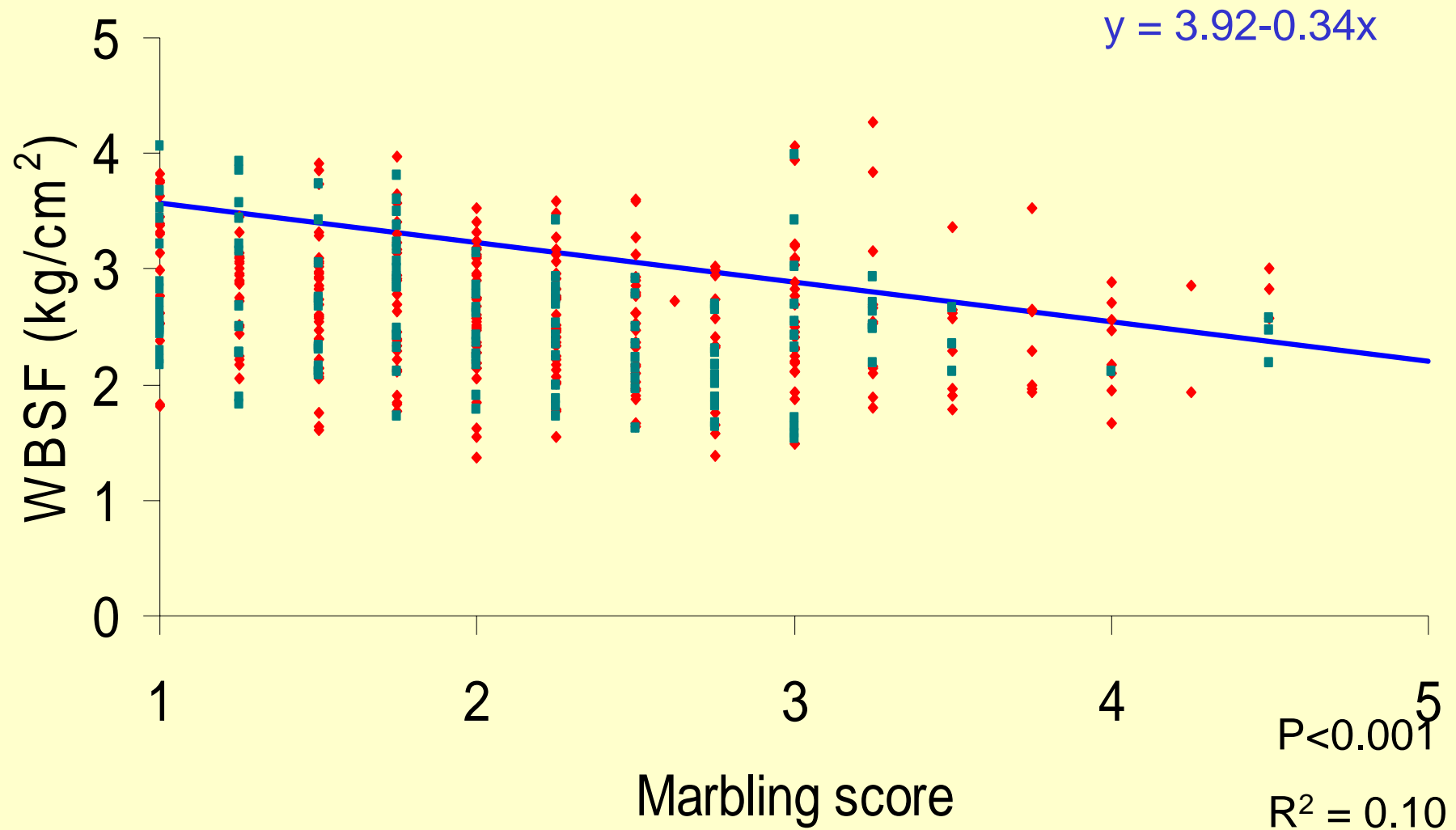
Relationship between conformation and shear force: influence of breed



Relationship between fat classification and shear force: influence of breed



Relationship between marbling score and shear force: influence of breed



Conclusions (I)

- **Relative to Charolais progeny Limousin progeny had:**
 - **higher dressing proportion**
 - **higher fat classification**
 - **larger eye muscle area**
 - **more lean and less bone within the carcass**
 - **lower cooking loss**
- **Relative to steers, heifers had:**
 - **lower dressing proportion**
 - **higher fat classification**
 - **more fat and less bone within the carcass**
 - **lower cooking loss and better colour**

Conclusions (II)

- **Generally CH and LIM progeny had similar relationships between carcass parameters and meat quality parameters**
- **Improving conformation had negative effect on meat quality**
- **Increasing carcass fat classification and marbling score had positive effect on meat quality**



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