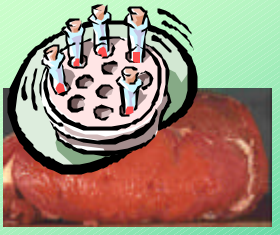
55th Annual Meeting
European Association for Animal Production
5-9 September 2004 - Bled, Slovenia

Commission on Cattle Production
Session on Indicator of milk and meat quality
Poster C6.16

Blood serum metabolites levels and meat water holding capacity in double muscled young bulls



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Introduction

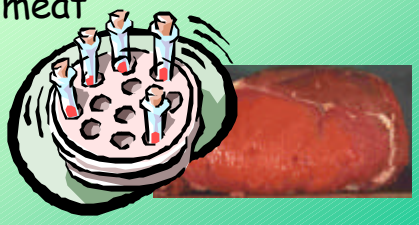
water content, and WHC, are ones of the most important characteristic of meat, influenced by several factors

in muscle, and in meat, the water is mainly linked to proteins, for their chemical and physical binding properties, and its content is influenced by the final pH besides that to the ionic balance

haematochimic parameters are studied to explain animal physiology, and are particularly linked to homeostasis and cell membrane activity, and consequently to meat water content

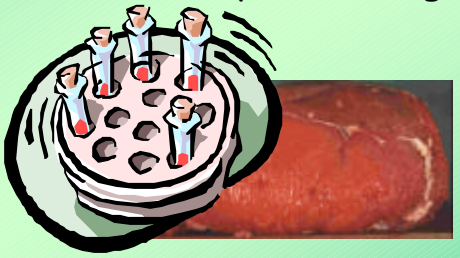
Aim

to understand the role
of serum metabolites
on water holding capacity of meat,
by studying the correlation
between blood metabolites
and water content,
drip losses
and cooking losses of meat



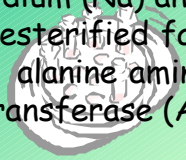
Materials

48 double muscled animals
(24 Piemontese and 24 Belgian Blue)
reared under the same environmental conditions,
slaughtered at the same age (14-16 months),
weight (550-600 kg)
and commercial fattening degree;
blood withdrawn few days before slaughter,
meat analysis on Longissimus th. et l. m.



Methods

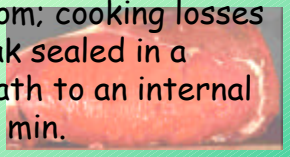
blood serum analysis



sodium (Na) and potassium (K); glucose, cholesterol, and not-esterified fatty-acids (NEFA); urea; protein; creatinine; alanine amino-transferase (ALT) and aspartate amino-transferase (AST); lactate de-hydrogenase (LDH); creatine kinase (CK)

meat analysis

water content (H_2O); drip losses (DL), on a steak kept for 48 h in a plastic container with a double bottom; cooking losses (CL), as water boiling losses on a steak sealed in a polyethylene bag and heated in a water bath to an internal temperature of 70 °C for 30 min.



data analysis

Pearson bivariate correlation coefficient and linear regression (complete and stepwise model)

Results of meat and blood serum analysis

Meat

Blood serum

		mean	std. dev.
pH_i		6.55	.24
pH_u		5.56	.18
H_2O	%	75.28	.60
Drip losses (DL)	%	2.64	.88
Cooking losses (CL)	%	28.78	.98
Sodium (Na)	mmol/l	143.93	34.41
Potassium (K)	mmol/l	5.48	1.46
Glucose (Glu)	mg/dl	129.04	78.68
Cholesterol (Cho)	mg/dl	140.65	43.26
NEFA	mg/dl	153.98	77.67
Urea (N)	mg/dl	32.78	9.91
Total protein (Pro)	g/l	78.22	21.33
Creatinine (Cre)	mg/dl	2.46	.65
ALT	mU/ml	26.61	10.28
AST	mU/ml	130.48	55.96
LDH	mU/ml	3649.89	1814.45
CK	mU/ml	1259.98	1220.23

Correlation between meat and serum analysis

	pH_u	H_2O	DL	CL	Na	K	Glu	Cho	Nefa	N	Pro	Cre	Alt	Ast	Ldh	Ck
pH_i	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH_u	---	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H_2O		---	**	**	-	-	-	-	-	-	-	-	-	-	-	-
DL			---	**	-	-	-	-	-	-	-	-	-	-	-	-
CL				---	**	*	*	*	-	**	**	**	**	-	-	-
Na					---	**	**	**	-	**	**	**	**	**	**	-
K						---	**	**	-	**	**	**	*	**	**	-
Glu							---	**	-	**	**	**	**	**	**	-
Cho								---	-	**	**	**	**	**	**	-
Nefa									---	-	-	-	-	-	-	-
N										---	**	**	**	**	**	-
Pro											---	**	**	**	**	-
Cre												---	**	**	**	-
Alt													---	**	**	**
Ast														---	**	**
Ldh															---	**
Ck																---

-: NS; *: P ≤.05; **: P ≤.01

Linear regression to explain CL by other meat and serum analysis

	P
complete model (16 variables = all)	.006
stepwise model 1 (1 variable = Urea)	.002
stepwise model 2 (2 variables = Urea + H_2O)	.000

stepwise models: probability to enter F≤.05
to remove F≥.10

Discussion

positive correlation inside the meat water content, so as inside the mineral blood level, some parameters of the energetic metabolism, the protein metabolism, and the blood enzymes

significant correlation between all blood serum parameters (excepted NEFA), while CK is correlated only to others enzymes levels

pH values no correlated to any of the studied characteristics of meat quality and blood metabolism

Conclusions

CL are the only parameters on meat correlated with a wide number of blood serum parameters (due to the protein denaturation and cell damages occurred during cooking?)

it could be interesting to improve the knowledge of such relationships, not only in double muscled animals but also in normal ones, with the aim to be able to foresee the WHC of meat