25-30th august 2013

EAAP meeting

Effect of finishing practices on beef quality from *Rectus Abdominis* and *Longissimus Thoracis* muscles of Maine Anjou culled cows

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Introduction

Finishing practices effects on beef quality well reported

YOUNG BULLS
STEERS
HEIFERS
Culled cows

Experimental Designs (controled conditions)

Main effects

Physical activity

⇒ no effect on tenderness (LT, RA) (or decrease) more oxidative fibres, less IMF

High feeding level

⇒ higher intramuscular fat content, lower % type IIx fibres, sometimes higher soluble collagen content

⇒ few effects on sensory traits and tenderness, no effect on colour

Diet composition

⇒ Maize/Grass silage vs hay: improved tenderness

⇒ Pasture + concentrates: higher intramuscular fat content, no effect on tenderness,

⇒ Pasture vs Maize Silage: darker meat, flavour modified by oxydation of n-3 FA, lower % type IIx fibres and higher % of types I and IIa fibres

Similar effects in culled cows? Relation with farm finishing practices?

INTRODUCTION

Oury et al. (2008) : Effects of farm finishing practices on tenderness of RA and LT muscles in heifers

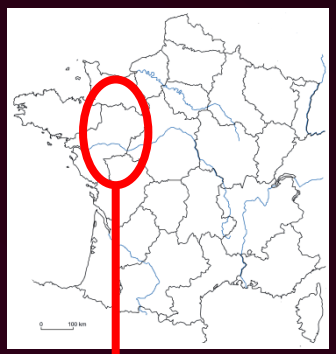
Our objective

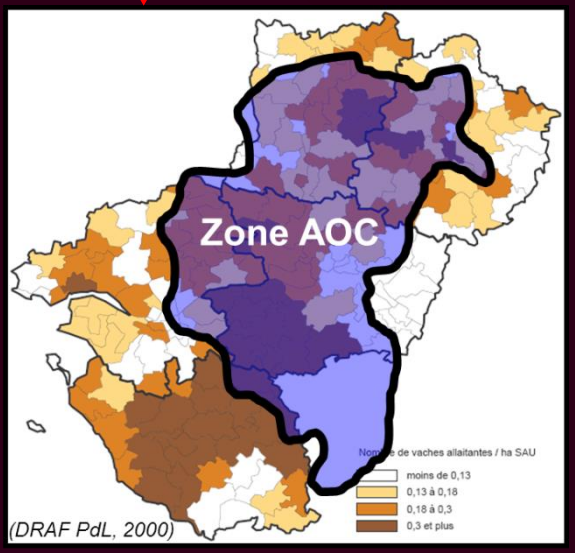
TO STUDY THE EFFECTS OF FARM FINISHING PRACTICES ON THE BEEF QUALITY IN MAINE ANJOU CULLED COWS

TWO MUSCLES : *Rectus abdominis* and *Longissimus thoracis*

A case study :
Maine-Anjou protected denomination (PDO)
(Rouge des Prés breed)

Maine Anjou PDO





Many advantages

1/ Local production (1 slaughterhouse)

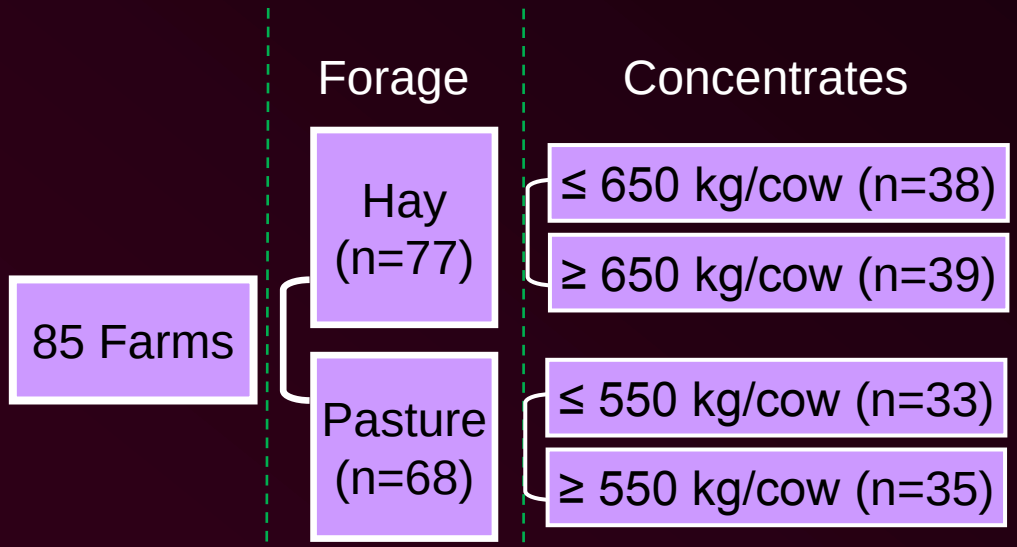
⇒ Same slaughtering and sampling conditions

2/ Main animal type = culled cows

⇒ Sampling population = 1800 animals

3/ Diversity of finishing practices (Schmitt et al., 2008)

=> Length of finishing period = 85d (± 16)



Experimental design

45 farms split in similar groups (based on finishing practices)

112 culled cows

Farm Survey

- Animal characteristics
- Finishing practices (length, forages, supplementation, …)

Muscles Sampling

LT — Left RA

- Fibre proportions
- Fibre size
- ICDH (oxidative) and LDH (glycolytic) activities
- IMF content
- Collagen (total and insoluble)
- Colour
- Shear force

Right RA

Sensory analysis

Statistical analysis

Finishing practices (duration, forages, supplementation,…)

n=112

Clustering Ascendant Analysis

5 GROUPS

n=97

Anova (General Linear Model)

Effects on meat quality traits

Results & Discussion

Finishing practices

	LongF	HayF	ConcF	HaylageF	PastF
Nb	17	26	18	15	21
Finishing duration, d	142 ^{c}	80 ^{a}	107 ^{b}	80 ^{a}	86 ^{a}
Pasture, % w/w	8 ^{a}	6 ^{a}	4 ^{a}	4 ^{a}	83 ^{b}
Haylage, % w/w	46 ^{b}	11 ^{a}	16 ^{a}	88 ^{c}	3 ^{a}
Hay, % w/w	46 ^{b}	83 ^{c}	80 ^{c}	7 ^{a}	14 ^{a}
Suppl., kg/d	5.8 ^{a}	7.3 ^{b}	9.7 ^{c}	9.1 ^{c}	7.6 ^{b}
Suppl, kg	819 ^{c}	580 ^{a}	1029 ^{d}	721 ^{b,c}	665 ^{a,b}

LongF: Long finishing period, mix hay/haylage, small amount Cc
HayF: Short finishing period, hay, medium amount Cc
ConcF : Average finishing period, hay, large amount Cc
HaylageF : Short finishing period, haylage, large amount Cc
PastF: Short finishing period, pasture, medium Cc

Results & Discussion

LT characteristics

No differences between finishing groups :

ICDH & LDH activities, Fibre size, collagen (total & soluble), shear force, Intramuscular fat, and pH

	LongF	HayF	ConcF	HaylageF	PastF
Nb	17	26	18	15	21
Fat/muscle, % W/W	30.9 ^{a}	29.3 ^{a}	38.0 ^{b}	29.1 ^{a}	30.8 ^{a}
IIx, %	14.5	14.0	14.6	10.9	7.0
IIa, %	53.1 ^{a}	55.7 ^{a,b}	51.7 ^{a}	56.3 ^{a,b}	62.1 ^{b}
I, %	32.4	30.3	33.6	32.7	30.9
L*	40.0	39.7	39.6	40.2	39.6
a*	9.2 ^{b}	8.4 ^{a}	9.3 ^{b}	8.4 ^{a}	9.2 ^{b}
b*	7.0 ^{a}	7.2 ^{a}	7.4 ^{a}	7.7 ^{a,b}	8.2 ^{b}

Results & Discussion

RA characteristics

No differences between finishing groups :

ICDH & LDH activities, Fiber size, shear force, Intramuscular fat, and pH

	LongF	HayF	ConcF	HaylageF	PastF
Nb	17	26	18	15	21
IIx	25.2	22.7	24.8	30.4	23.2
IIa	40.8 ^{c}	38.9 ^{b,c}	35.4 ^{a,b}	33.6 ^{a}	37.6 ^{a,b}
I	33.9 ^{a}	38.4 ^{b}	39.8 ^{b}	36.0 ^{a,b}	39.2 ^{b}
Total collagen	3.51 ^{a,b}	3.83 ^{b}	3.33 ^{a}	3.35 ^{a}	3.57 ^{a,b}
Insoluble collagen	2.73 ^{a,b}	2.99 ^{b}	2.55 ^{a}	2.63 ^{a}	2.81 ^{a,b}
L*	39.8 ^{b}	38.4 ^{a}	38.8 ^{a,b}	40.1 ^{b}	38.3 ^{a}
a*	6.1	5.6	5.8	5.3	5.9
b*	4.5	4.4	4.5	4.6	4.6

Results & Discussion

RA characteristics

No differences between finishing groups :

Flavor persistancy

	LongF	HayF	ConcF	HaylageF	PastF
Nb	17	26	18	15	21
Tenderness	4.4 ^{a,b}	4.3 ^{a}	4.8 ^{c}	4.3 ^{a}	4.6 ^{b,c}
Juiciness	4.5 ^{b}	4.1 ^{a}	4.2 ^{a}	4.3 ^{a}	4.2 ^{a}
Beef flavor	4.7 ^{b}	4.3 ^{a}	4.4 ^{a}	4.5 ^{a,b}	4.4 ^{a}
Flavor	4.9	4.6	4.7	4.8	4.7

Conclusion

Characterisation of Rouge des Prés culled cows

Muscular characteristics (LT) => linked to a better tenderness (Chikri et al., 2012)?

	Effectif	% I	% IIa	% IIx	Surface (μm^2)	LDH	ICDH	Collagène total	Collagène insoluble
AOP-MA	**111**	**31,2**	**56,7**	**12,2**	**2910**	**703**	**1,1**	**2,7**	**2,1**
Charolaise	14	26	15,3	57,4	3275	964	1,3	2,7	2,5
Limousine	14	35,1	13	49,5	3050	867	1,3	2,5	2,1
Salers	14	27,6	16,2	56,3	3166	876	1,6	3	2,5
Aubrac	14	32,6	13,6	53,9	3249	905	1,6	2,4	2,1
Holstein	7	19.8	20.1	60.1	3415	825	1,4	3,3	2,5

Piccard et al. (2012)

Diversity of culled cows (age, milk production ability, weight, conformation…) => effects?

Data and samples collected used to develop proteic and genetic markers of meat quality

Conclusion

Differences between muscles

Effects of finishing practices are not the same between RA and LT

=> for one finishing practice, different levels of meat quality according to muscle

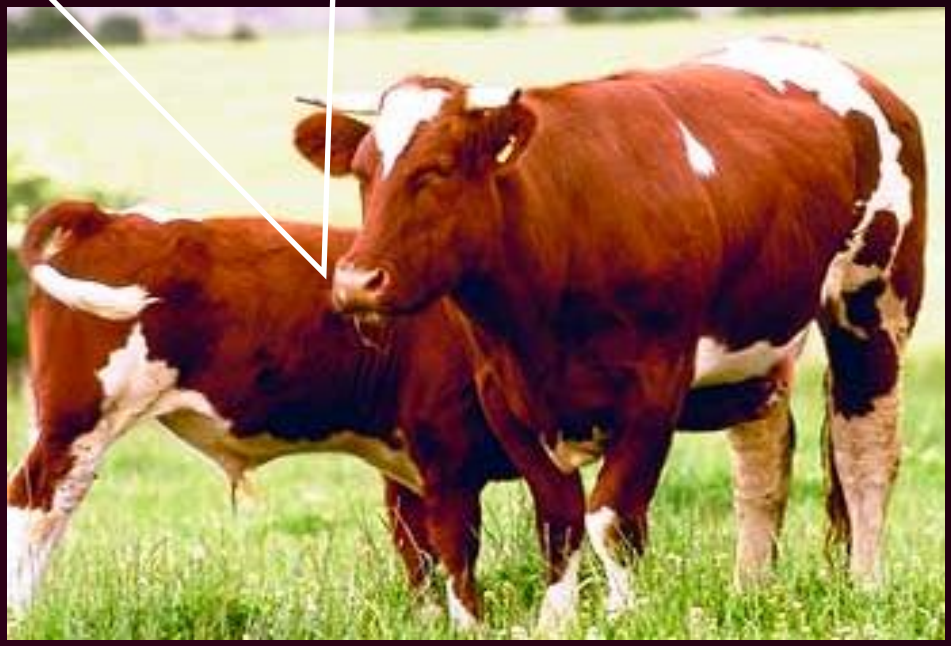
=> management of these differences to sell meat of constant quality?

Adipose tissues

Finishing practices affect intra and inter muscular fat contents

=> advice development to manage adipose tissue formation during finishing period

THANKS FOR YOUR ATTENTION…



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