C18:3n-3 content in beef meat as influenced by breed, diet and muscle location

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Introduction

Beef meat production

- Some years ago
  - Only animal performance
- Actually
  - Sensory qualities: consumers point of view
    - Tenderness
    - Flavour
  - Nutritional qualities → health
    - Decrease in n-6 FA content
    - Increase in n-3 FA content

Introduction

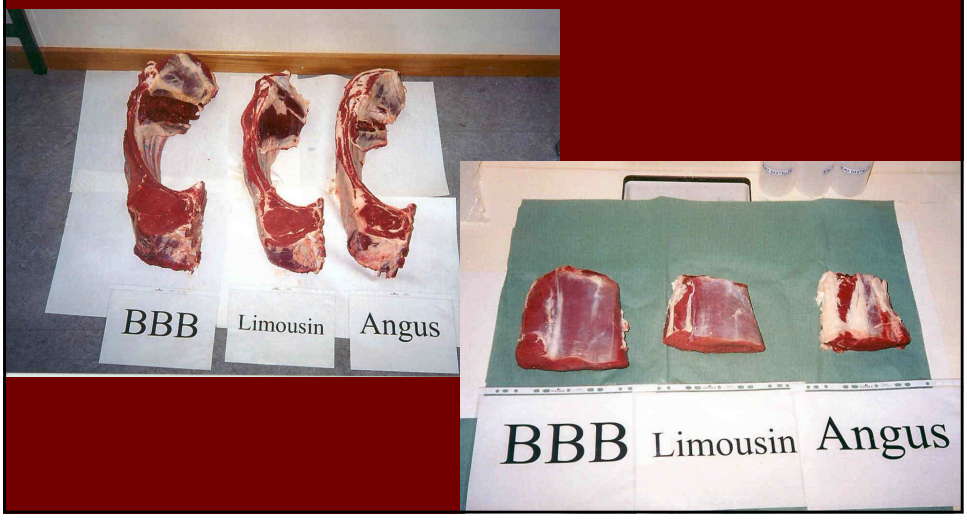
Aims:

Influence of breed, diet and muscle location

on C18:3n-3 content in beef meat

Material and methods

- 36 Young bulls
  - 3 Breeds: BB – LIM – AA



Material and methods

- 36 Young bulls
  - 3 Breeds: BB – LIM – AA
- 2 Diets:
  - Diet 1: cereals-based diet

    More barley and maize

    * ↑ starch → rumen fermentation → propionic acid → glucose precursor
    * ↑ starch → less rumen fermentation → intestinal glucose

    50-75% acetyl units for fatty acids
  - Diet 2: pulp-based diet

    More sugar beet pulp

    * ↑ pectine → rumen fermentation → acetic acid

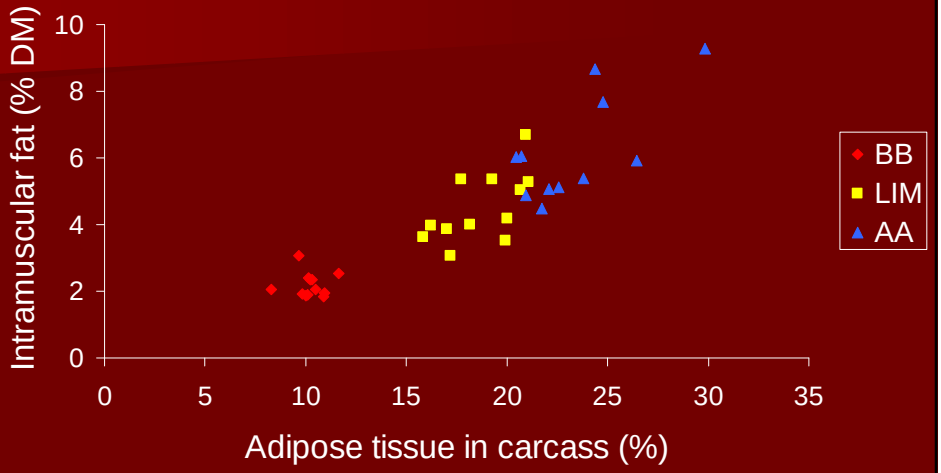
    10-15%

Material and methods

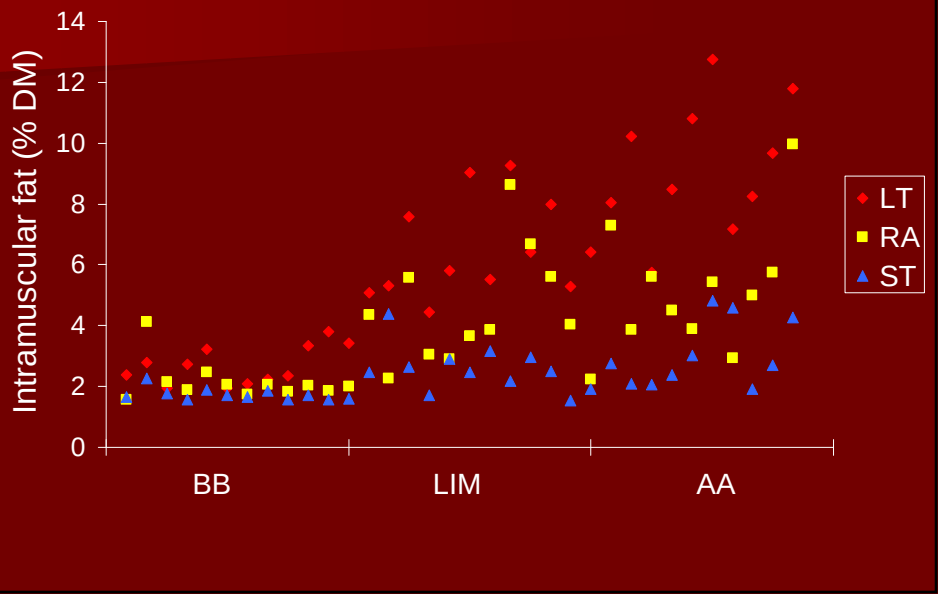
- 36 Young bulls
  - 3 Breeds: BB – LIM – AA
- 2 Diets:
  - Diet 1: cereals-based diet
  - Diet 2: pulp-based diet

  => 6 animals in each group
- Bulls slaughtered at 18-20 months of age
- 3 Muscles
  - Rectus abdominis (RA)
  - Longissimus thoracis (LT)
  - Semitendinosus (ST)

Results and discussion



Results and discussion



Results and discussion

- No diet effects on fatty acids content except for:

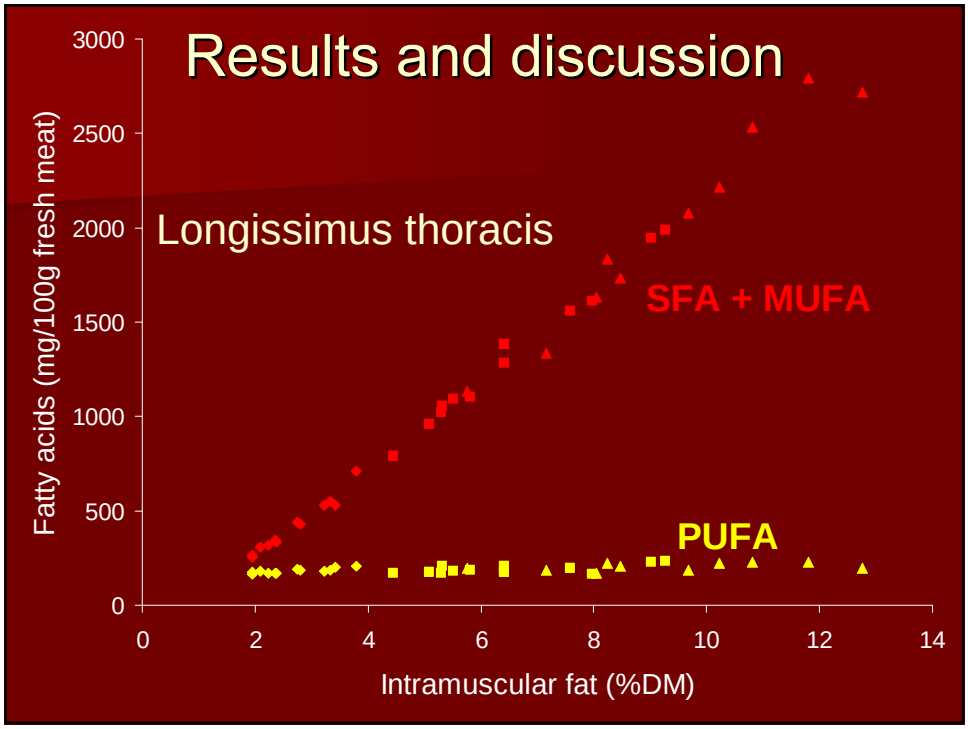
	C18:2n-6	n-6	n-6/n-3
Diet pulp	102.5	141.6	4.6
Diet cereals	109.0	149.9	5.1

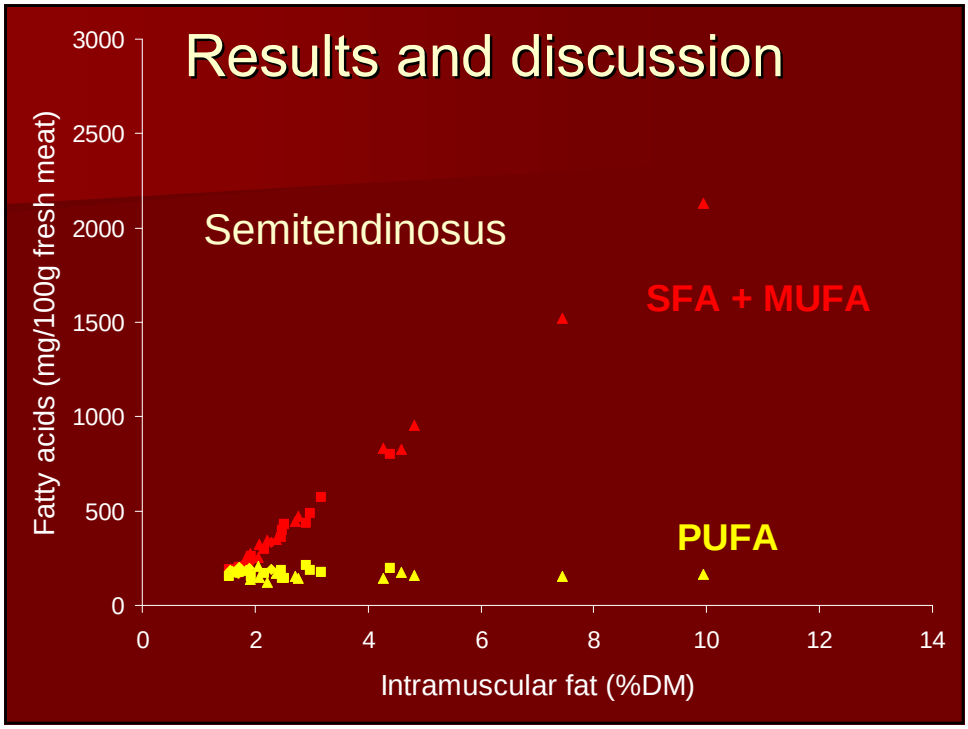
(mg/100 g fresh meat)

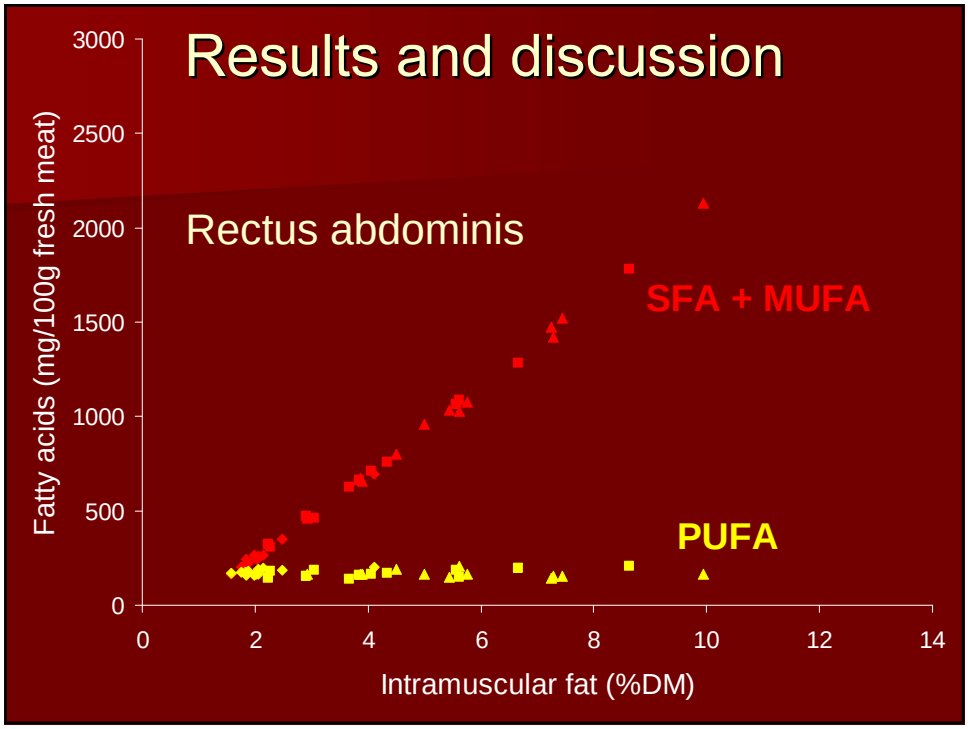
∋ maize grain
- -Rather high fat content (~5%)
- -High in linolenic acid (~50%)

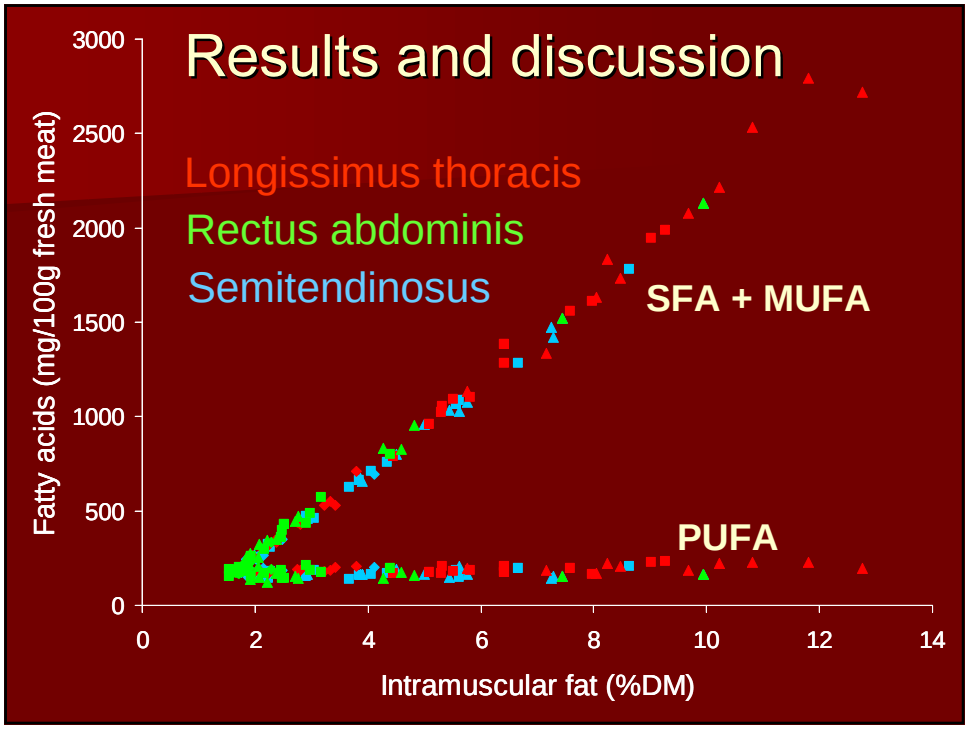
Results and discussion

	PUFA		SFA + MUFA	
	g/100g FA	**mg/100g meat**	**g/100g FA**	**mg/100g meat**
BB	39.9a	180.1	60.1a	301.0a
LIM	21.3b	176.9	78.7b	874.2b
AA	16.7c	175.0	83.3c	1222.1c
LT	17.9a	191.4a	82.1a	1250.2a
RA	25.2b	170.4b	74.8b	726.7b
ST	34.7c	170.3b	65.3c	420.4c


Results and discussion
Longissimus thoracis
SFA + MUFA
PUFA
Fatty acids (mg/100g fresh meat)
Intramuscular fat (%DM)
0
500
1000
1500
2000
2500
3000
0
2
4
6
8
10
12
14


Results and discussion
Semitendinosus
SFA + MUFA
PUFA
Fatty acids (mg/100g fresh meat)
Intramuscular fat (%DM)
0
500
1000
1500
2000
2500
3000
0
2
4
6
8
10
12
14


Results and discussion
Rectus abdominis
SFA + MUFA
PUFA
Fatty acids (mg/100g fresh meat)
Intramuscular fat (%DM)
3000
2500
2000
1500
1000
500
0
0
2
4
6
8
10
12
14


Results and discussion
Longissimus thoracis
Rectus abdominis
Semitendinosus
SFA + MUFA
PUFA
Fatty acids (mg/100g fresh meat)
Intramuscular fat (%DM)
3000
2500
2000
1500
1000
500
0
0
2
4
6
8
10
12
14

Results and discussion

Fatty acids n-3 (mg/100 g fresh meat)

	C18:3n-3	C20:5n-3	C22:5n-3	C22:6n-3	n-3
BB	9.1a	5.2a	11.6a	1.0a	26.9a
LIM	12.1b	5.6a	11.8a	1.1a	30.6b
AA	16.0c	7.3b	12.9b	1.4b	37.3c
LT	16.4a	5.4a	10.1a	1.2a	32.6a
RA	10.5b	4.1b	11.4b	0.8b	27.0b
ST	10.4b	8.5c	14.8c	1.5c	35.3c

Results and discussion

Fatty acids n-3 and n-6 (mg/100 g fresh meat)

	n-3	n-6
BB	26.9a	153.2a
LIM	30.6b	146.3a
AA	37.3c	137.7b
LT	32.6a	158.8a
RA	27.0b	143.4b
ST	35.3c	135.0c

Conclusions

- No diet effect (except for C18:2 n-6)
- Large influence of:
  - Breed
  - Muscle
- In fresh meat:
  - PUFA content unchanged within the 3 breeds
  - SFA + MUFA ↑ with the fattest breed
  - n-3 ↑ with the fattest breed

Thank you for your attention