Effect of supplementation with linseed and CLA on adipose tissue cellularity of Holstein young bulls

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INTRODUCTION

Beef meat → ↑ SFA, ↑ n-6:n-3 → Cardiovascular diseases

Healthy beef meat → ↑ n-3FA + ↑ CLA → Feeding strategies → Linseed / Protected CLA

Fig. 1. Beef meat

Fig. 2. Linseed

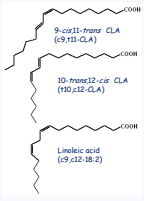

Fig. 3. CLA isomers structure

OBJECTIVE

To study the effect on adipose tissue cellularity of Holstein young bulls

MATERIAL AND METHODS

Animals and feeding

Fig. 4. Holstein bulls

- ✓48 Holstein bulls
  - Initial weight: 239.8±6.61 kg
  - Slaughter weight: 458.6±9.79 kg
  - Slaughter age: 322±5.96 d
- ✓4 Feeding groups
  - Control (C): 0% linseed, 0% CLA; n=12
  - Linseed (L): 10% linseed, 0% CLA; n=12
  - CLA (CLA): 0% linseed, 2% CLA; n=12
  - Linseed+CLA (L+CLA): 10% linseed, 2% CLA; n=12
- ✓Diets isoenergetic (3.34 McalEMkg^{-1}) and isoproteic (16.9% CP)

Adipocyte size

- ✓2 g SC adipose tissue at the 10th right rib
- ✓2 g IM adipose tissue at the 10th right rib

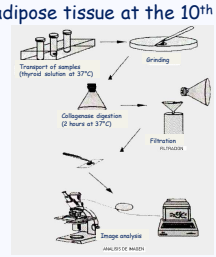

Fig. 5. Collagenase digestion

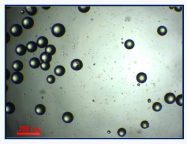

Fig. 6. Subcutaneous adipocytes

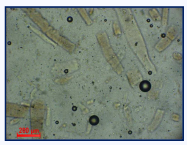

Fig. 7. Intramuscular adipocytes

RESULTS AND DISCUSSION

Table 1. Effect of linseed and CLA supplementation on growth performance, carcass quality and tissue composition of the 10th rib

	Treatments					
	C	L	CLA	L+CLA	SEM	sig
Slaughter weight (kg)	450.5	460.4	454.5	468.8	9.79	ns
Average daily gain (kg/d)	1.72	1.78	1.76	1.84	0.05	ns
Cold carcass weight (kg)	233.9	237.8	237.2	249.5	5.82	ns
Dressing percentage	51.9	51.7	52.2	53.2	0.38	ns
10th rib tissue composition, %						
Subcutaneous fat	4.0	3.3	3.6	3.3	0.36	ns
Intermuscular fat	14.4	14.0	15.2	13.9	0.62	ns
Muscle	58.4	59.5	57.5	59.7	0.96	ns
Bone	22.3	22.4	22.9	22.4	0.76	ns

ns, not significant (p>0.05)

Growth, carcass and fattening parameters were similar in the 4 groups

Table 2. Effect of linseed and CLA supplementation on adipocyte diameter

	Treatments					
	C	L	CLA	L+CLA	SEM	sig
Subcutaneous adipocyte diameter (μm)	160.0	160.0	159.7	169.4	6.85	ns
Intramuscular adipocyte diameter (μm)	45.6	48.1	43.6	48.8	2.94	ns

ns, not significant (p>0.05)

- ✓SC adipocyte diameter was similar in the 4 gropus
- ✓IM adipocyte diameter was similar in the 4 gropus

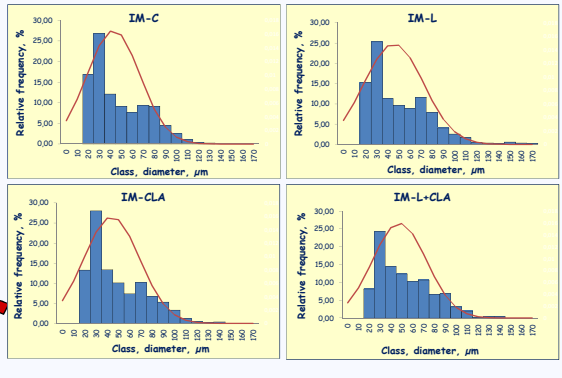

Fig. 8. Frequency distribution of intramuscular adipocyte diameter

✓Not normal distribution ➔ possible adipocyte proliferation in IM adipose tissue

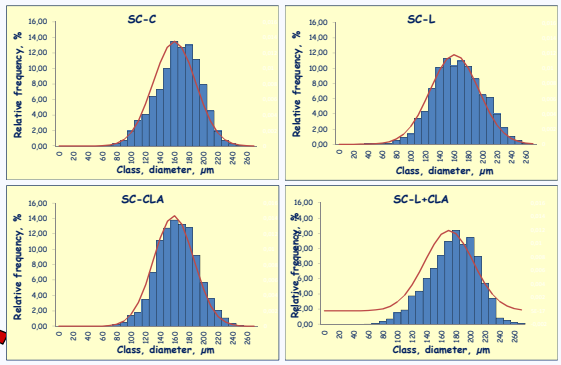

Fig. 9. Frequency distribution of subcutaneous adipocyte diameter

✓Normal distribution

✓SC depot would be in a more advanced stage of development than the IM depot

CONCLUSION

The supplementation with linseed and CLA had no effect on the cellularity of subcutaneous and intramuscular adipose tissues, which showed a different pattern of development.

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