

## Dietary conjugated linoleic acid is incorporated differentially into tissues of the pig

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Conjugated linoleic acids (CLA) have the potential to be incorporated into foods and marketed as functional foods. CLA have anticarcinogenic, antiatherogenic and immune modulating properties as well as the ability to decrease body fat deposition in growing pigs (1). The aim of this study was to determine the total amount of CLA and the rate of assimilation of individual CLA isomers in pig tissue as a result of CLA feeding. Thirty female cross bred (Large White x Landrace) pigs (initial weight 57 kg) were randomly allocated to one of 6 dietary treatments (0, 1.25, 2.5, 5.0, 7.5 and 10.0 g/kg of CLA55 which contains 55% of CLA isomers (Natural Lipids Ltd., Hovdebygda, Norway). The main CLA isomers, *tc/ct* 11,13; 10,12; 9,11 and 8,10, were present at 18, 30, 25 and 14% (w/w) of the total CLA content, respectively. Pigs were fed *ad libitum* for 8 weeks and samples of subcutaneous fat (SF) and muscle were collected at slaughter. Total fat was extracted and free acids were analysed using silver-ion high-performance liquid chromatography (2). Transfer efficiencies of the CLA isomers into porcine tissue were calculated as follows:  $(((\text{final CLA mass} - \text{initial CLA mass}) - (\text{final CLA mass in control pigs} - \text{initial CLA mass in control pigs})) / \text{total CLA consumed}) \times 100$ .

Transfer efficiencies (%) of CLA isomers	Dose of CLA55 (g/kg)						Significance <sup>2</sup>			
	0	1.25	2.5	5.0	7.5	10.0	SED <sup>1</sup>	C	L	Q
SF <i>tc/ct</i> 11,13	0.00	6.43	19.33	24.50	24.04	29.72	2.01	<0.001	<0.001	<0.001
SF <i>tc/ct</i> 10,12	0.00	3.67	11.97	16.87	15.93	18.16	1.57	<0.001	<0.001	<0.001
SF <i>tc/ct</i> 9,11	0.00	0.00	44.72	68.44	66.20	56.56	3.99	<0.001	<0.001	<0.001
SF <i>tc/ct</i> 8,10	0.00	6.46	22.72	31.46	39.23	26.56	2.97	<0.001	<0.001	<0.001
SF total CLA	0.00	6.99	26.58	38.42	37.58	34.30	2.41	<0.001	<0.001	<0.001
Muscle <i>tc/ct</i> 11,13	0.00	0.59	0.20	0.89	1.18	0.84	0.22	<0.001	<0.001	0.010
Muscle <i>tc/ct</i> 10,12	0.00	0.25	0.00	0.55	0.36	0.46	0.16	0.005	0.002	0.20
Muscle <i>tc/ct</i> 9,11	0.00	0.71	0.31	0.89	0.94	0.34	0.44	0.26	0.28	0.042
Muscle <i>tc/ct</i> 8,10	0.00	0.23	0.00	0.98	1.03	0.41	0.39	0.040	0.032	0.065
Muscle total CLA	0.00	0.41	0.08	0.74	0.76	0.52	0.22	0.007	0.003	0.027
Total CLA	0.00	7.40	26.66	39.17	38.34	34.82	2.40	<0.001	<0.001	<0.001

<sup>1</sup> standard error of the difference between different doses of CLA-55 (n = 5 per treatment group).

<sup>2</sup> C = CLA doses; L = linear effect of CLA; Q = quadratic effect of CLA.

Approximately one third of the total dietary CLA given to the pigs was incorporated into the fat (sum of intramuscular and subcutaneous fat), with the highest transfer efficiency value (39.2%) recorded for the group of pigs fed the intermediate level of dietary CLA55 (5.0 g/kg). Dietary supplementation of CLA increased the total CLA content in adipose tissue and muscle fat of pigs with the highest transfer efficiency of about 38% (P < 0.001) and 0.8% (P = 0.007), respectively. The concentration of most isomers of CLA increased in a linear (P < 0.001) fashion with increasing concentration of CLA55 in the diet, while overall CLA transfer efficiency in subcutaneous fat and intramuscular fat was maximised at a dose of 5 or 7.7 g/kg of CLA55, respectively. There was selectivity in the uptake or incorporation of certain isomers. The *tc/ct* 10,12 isomer, which was the most abundant in the diet had the lowest transfer efficiency, while the *tc/ct* 9,11, the second most abundant isomer had the highest transfer efficiency. At the highest level of CLA supplementation, as much as 15.1 mg of total CLA was detected per gram of subcutaneous fat while a five fold lower (2.88 mg/g of fat) level of CLA was detected in the intramuscular fat. In conclusion, CLA is readily incorporated into pig tissue and CLA-fortified pork may prove to be a source of CLA in human diet.

### References

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Key words: conjugated linoleic acid, pig, functional foods