

# Breed-Specific Mechanisms of Fat Partitioning in Pigs

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## Introduction

- Intramuscular fat (IMF), also called marbling fat, is desirable in pork as IMF content is positively associated with juiciness, tenderness and flavour.
- Many years of selective breeding has dramatically reduced not only undesirable subcutaneous fat (back fat) but also desirable IMF.
- Pig breeds with similar subcutaneous fat (SF) content largely differ in IMF content.
- This suggests that the mechanisms regulating fat partitioning are breed-specific.
- Our previous work has shown that the lipogenic enzyme stearoyl-CoA desaturase (SCD) plays a key role in IMF formation in commercial breeds.

## Objective

- To investigate the role of SCD in intramuscular and subcutaneous fat formation in genetically diverse breeds.

## Methods

- Animals



**Large White x Landrace**

Commercial European breed

n = 12



**Alentejano**

Traditional Spanish/Portuguese breed

n = 12



**Bízaro**

Traditional Portuguese breed

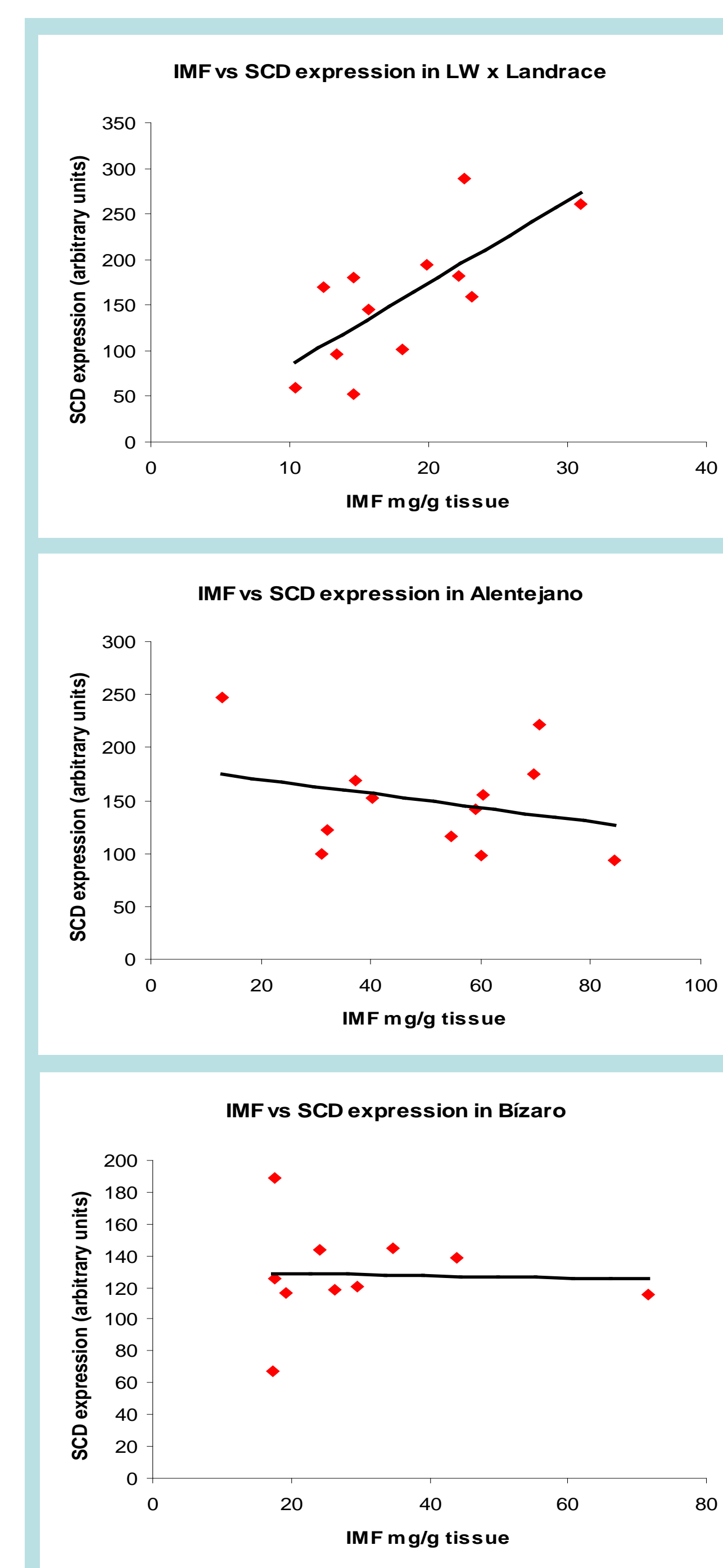
n = 10

- The animals were of 90Kg live weight.
- Samples of subcutaneous fat and *longissimus thoracis et lumborum* muscle were taken 5 min after slaughter and frozen in liquid N<sub>2</sub>.
- SCD protein expression was analysed in isolated microsomes from both tissues by Western blotting.
- Fatty acid composition and fat content were determined by gas chromatography.

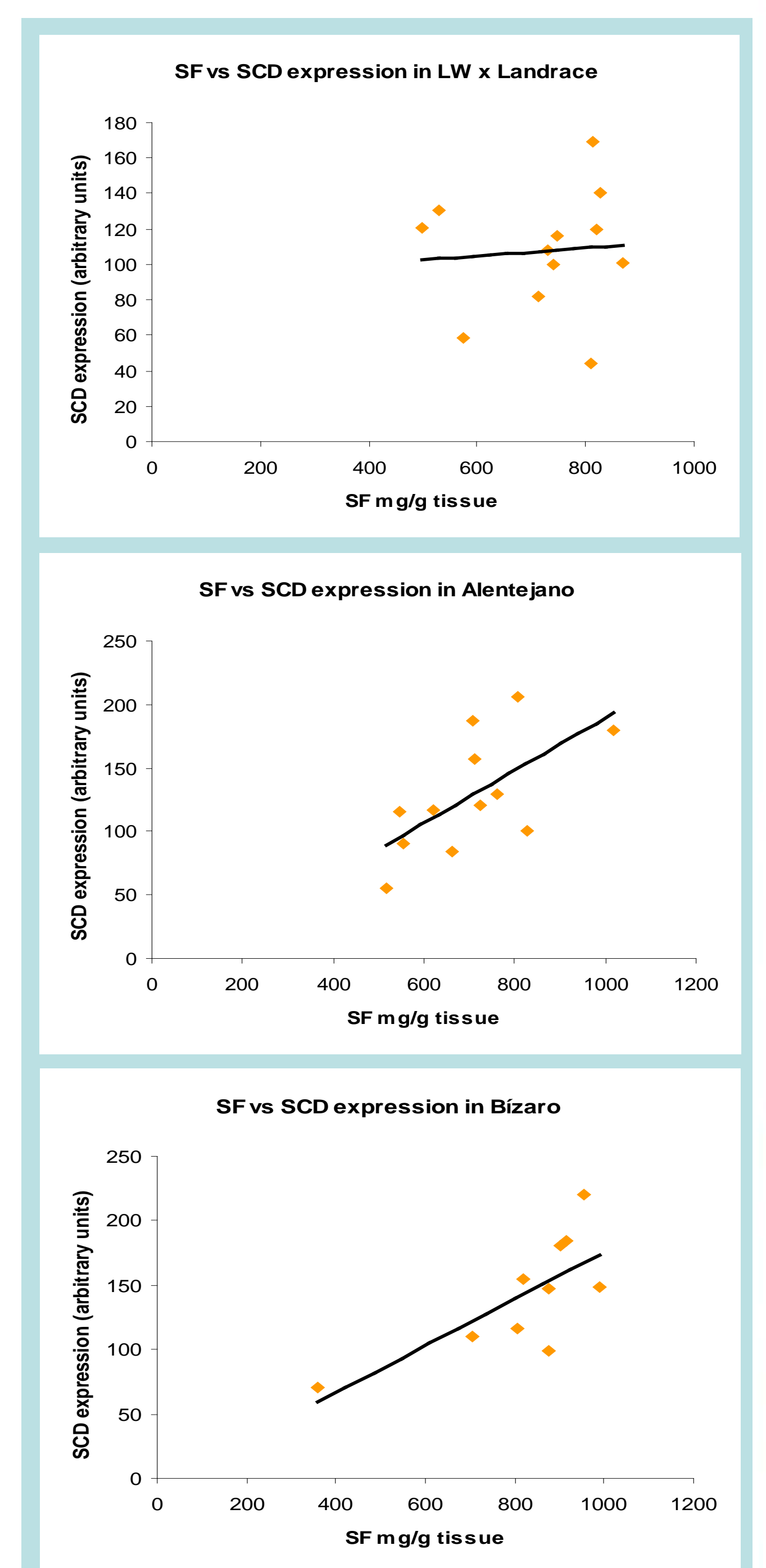
## Results

1. SCD protein expression positively correlates with IMF content in the commercial European breed but not in the two traditional Portuguese breeds (Fig 1).
2. On the other hand, the Portuguese breeds (but not the commercial European breed) had positive correlations between SCD expression and subcutaneous fat (Fig 2).
3. SCD is the enzyme which catalyses the conversion of saturated fatty acids (SFA) to monounsaturated fatty acids (MUFA). Therefore the higher IMF was also accompanied by a larger proportion of MUFA (data are not shown).

**Fig. 1** Relationship between SCD protein expression and IMF content in LW x Landrace, Alentejano and Bízaro breeds.



**Fig. 2** Relationship between SCD protein expression and SF content in LW x Landrace, Alentejano and Bízaro breeds.



## Conclusions

- SCD is involved in the control of intramuscular fat (IMF) content in breeds which have originally low IMF (European Commercial) but not in breeds which have originally high IMF (traditional Portuguese).
- Deposition of IMF and subcutaneous fat is controlled by different mechanisms and these mechanisms are breed-specific.
- Increase in IMF fat content is accompanied by an increase in mono-unsaturated fatty acids which has direct benefits for human health.

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