Effects of low protein diets on fat deposition in the whole body and within the muscle and subcutaneous adipose tissue of pigs

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BSAS annual conference 2009

Low protein diets and fat deposition

Introduction

- Protein levels are often high in UK pig feeds
- High protein diets lead to high N excretion and emissions from pig farms
- Low protein ‘nutritional strategies’ can result in good performance (BSAS 2008) but do they increase fatness?

Low protein diets and fat deposition

Design of trial

- 2 Breeds (Duroc and Large White crosses)
- 3 Nutritional Strategies
- 4 Replicates
- Total 192 entire male pigs

Low protein diets and fat deposition

Nutritional strategies

Wt range	Baseline (B)			SOTA [d]			Low P [e]		
	DE[a]	CP[b]	L[c]	DE	CP	L	DE	CP	L
40-65	13.5	210	12	14.0	195	12	14.0	195	12
65-90	13.5	210	12	13.5	180	11	13.5	165	10
90-120	13.5	210	12	13.0	170	10	13.0	130	7

[a] MJ DE/kg ; [b] g/kg crude protein; [c] g/kg lysine; [d] 'state of the art'; [e] Low protein

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Measures of fatness

- P2 fat thickness (mm)
- Dissected fat in carcass side (%)
- Dissected fat in empty body (%)
- Fatty acids in *longissimus* muscle (%) (marbling fat)
- Chemical fat in dissected lean (%)

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Overall effects of nutritional strategy

Variable	Nutritional strategy			S.E.D.	P value
	Baseline	SOTA	Low P		
P2 fat thickness (mm)	15.86	16.94	18.73	1.385	†
Dissected fat in carcass side (%)	17.80	18.45	20.75	2.091	†
Dissected fat in empty body (%)	13.80	14.69	16.39	1.578	†
FA in *longissimus* muscle (%)	1.35^{a}	1.45^{ab}	1.63^{b}	0.113	*
Chemical fat in dissected lean (%)	4.37^{a}	4.50^{a}	4.86^{b}	0.172	*

† Significant breed x nutritional strategy interactions, bigger response in LW than Duroc

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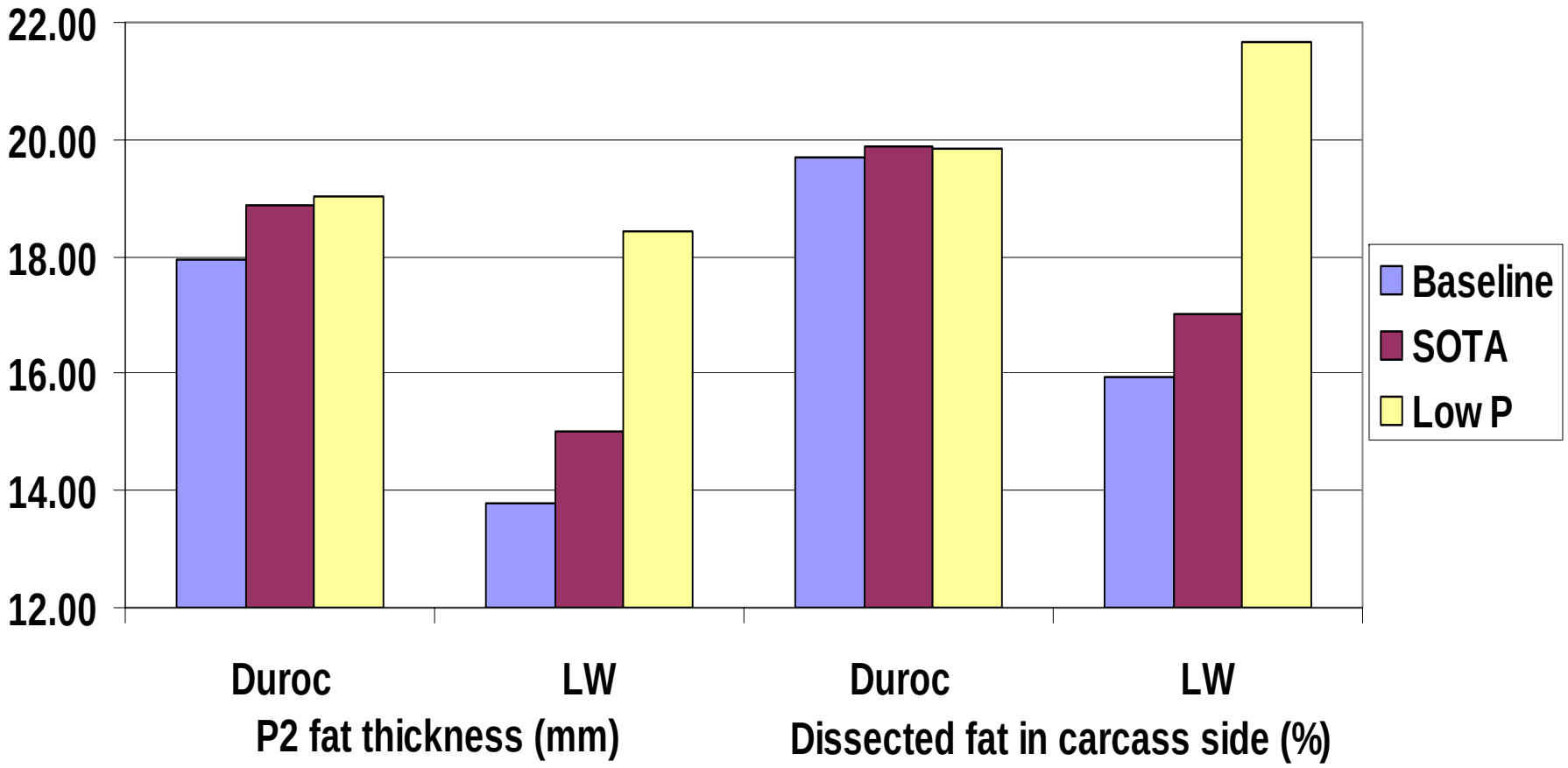
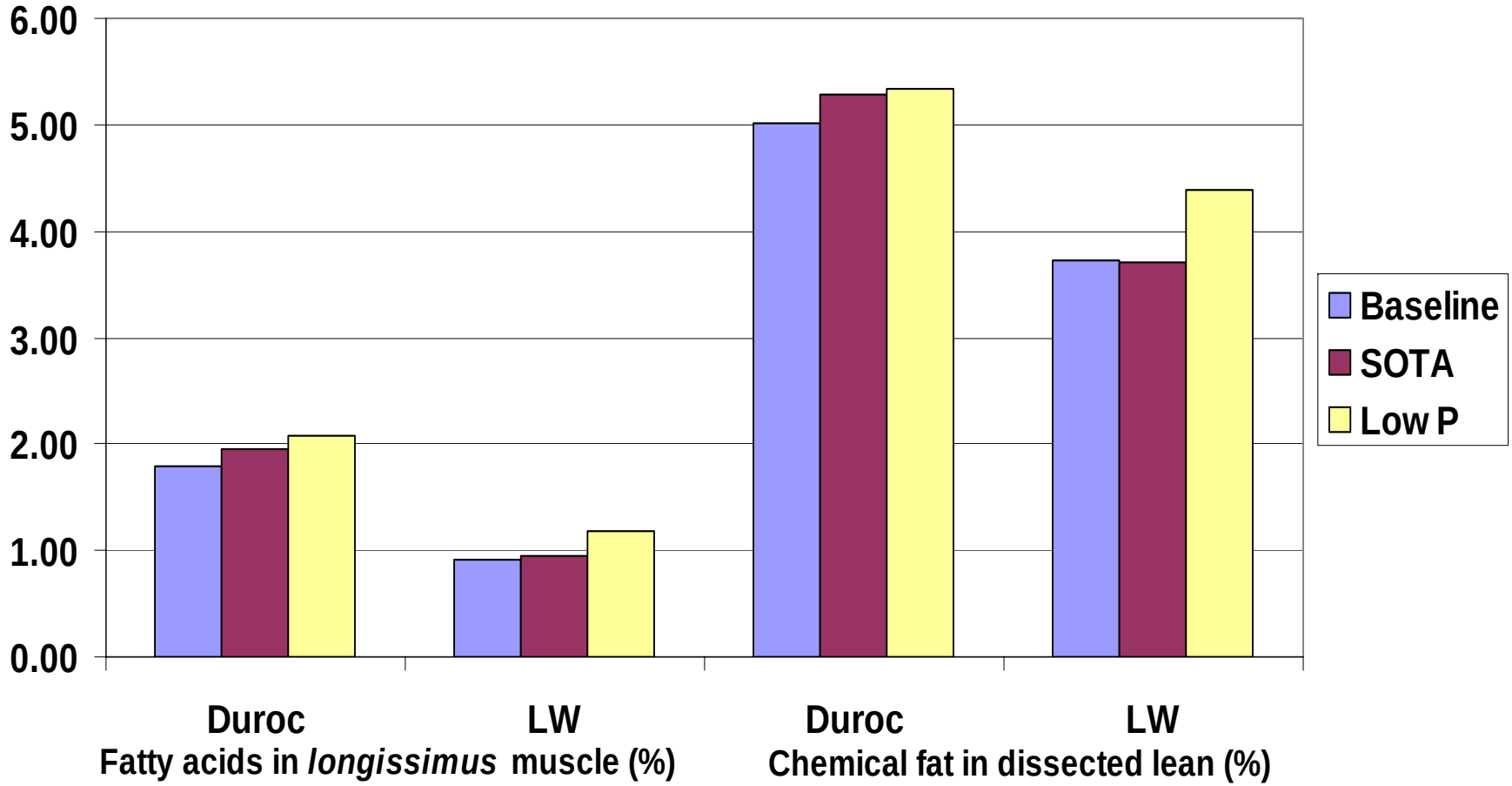
Breed x nutritional strategy interactions



Low protein diets and fat deposition

Breed x nutritional strategy interactions



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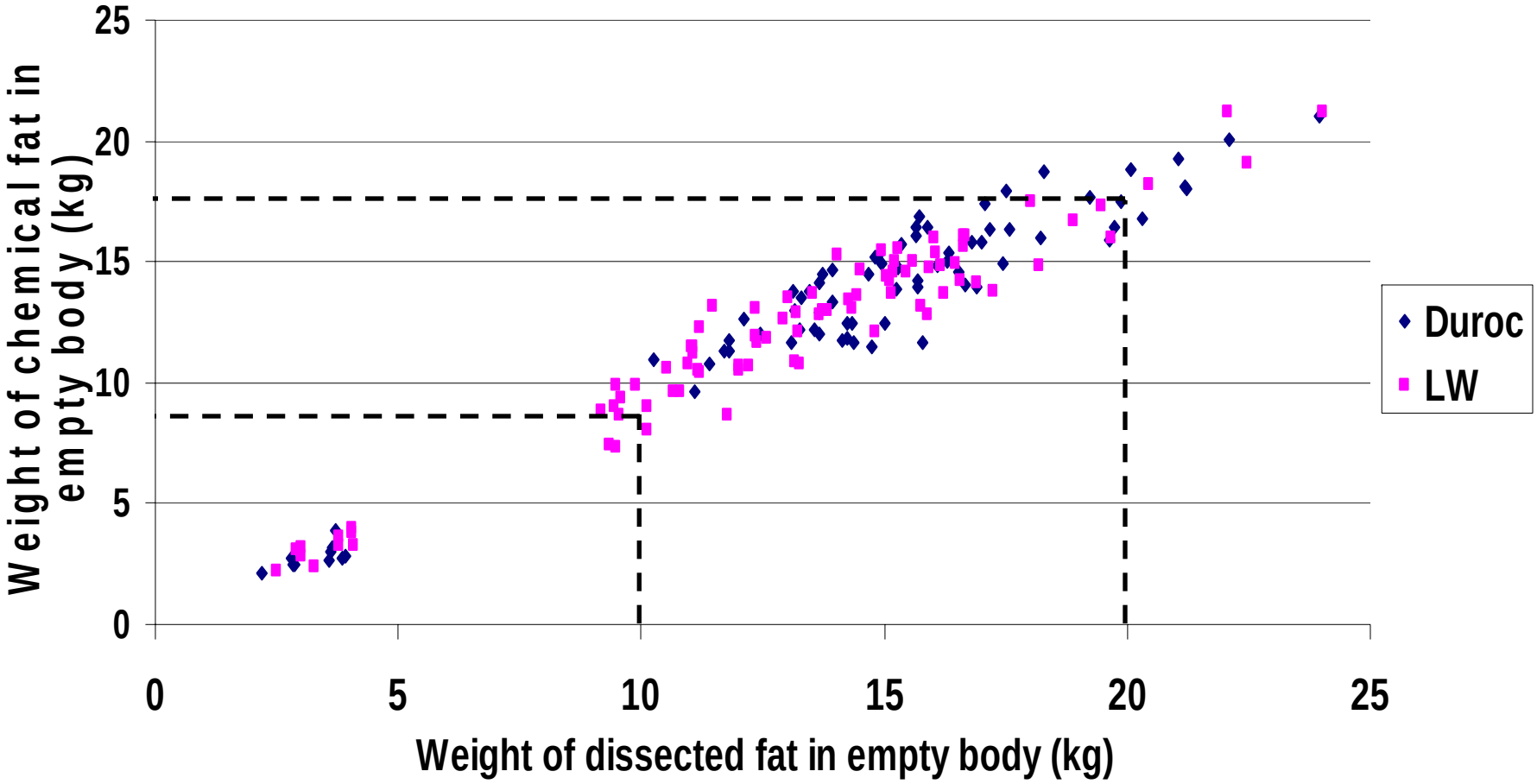
Association between dissected and chemical fat in empty body



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Conclusions

- Low Protein strategies used here (SOTA and Low P) tended to increase fatness
- Effect much greater in the ‘lean’ Large White pigs than the ‘fatter’ Durocs
- Not all increases in fatness are ‘bad’ - more marbling fat may increase juiciness
- Similar trends occurred for all measures of fat deposition although some depots responded more than others.

We thank DEFRA for funding this research