Dietary Iron Improves Iron Status in Finisher Pigs Fed Wheat-Based Diets

S.D. Jayasooriya[1,2], J.R. Pluske[2], F.R. Dunshea[2,3], H. Gill[1] and E.N. Ponnampalam[1]

[1]Department of Primary Industries, Werribee, VIC 3030. [2]Murdoch University, Murdoch, WA 6150. [3]University of Melbourne, Parkville, VIC 3052.

Inulin-type fructans (IFT) have been shown to increase the absorption of copper, zinc and iron. Bacterial fermentation of IFT in the large intestine has been implicated in the increased intestinal absorption of iron naturally present in plant-based diets (Yashuda *et al.*, 2006). Hence, inulin may promote the absorption of iron from the pig's diet and increase muscle iron content in pork. Attempts to increase muscle iron levels using iron supplements alone have largely been unsuccessful. Therefore, this study investigated effects of supplemental inulin (In) and organic iron (Fe) on growth, iron status and pork quality of boars and gilts.

Thirty-two individually-housed Large White x Landrace pigs (16 boars and 16 gilts) (51.1± 0.41 kg) were allocated to a 2x2x2 factorial with the respective factors being supplemental organic iron (0 and 500 mg/kg Bioplex™, Alltech Inc., Kentucky, USA), inulin (0 and 50 g/kg Fibruline®, Warcoing, SA Belgium) and sex. The wheat-based diets were offered at 95 % of estimated *ad libitum* intake to ensure consistent inulin and Fe intakes within a treatment. After 5 weeks blood was obtained by venipuncture and analysed for blood cells and haematocrit and serum analysed for iron and haemoglobin. Color (L* value) and drip loss of the *Longissimus dorsi* muscle was measured at 24 h post-slaughter. Data were analyzed using analysis of variance. For brevity P-values below 0.005 are presented as 0.00 and some established sex effects are not discussed.

Table 1: *Effects of dietary treatments on carcase traits, serum iron and haemoglobin content in finisher pigs fed wheat-based diets.*

Sex (S)...	Boar				Gilt							
Iron (Fe), g/kg ...	0		500		0		500			Significance		
Inulin (In), g/kg...	0	50	0	50	0	50	0	50	SED	S	Fe	In
Daily gain (g/d)	816	866	843	932	774	806	748	872	58.8	0.04	0.26	0.02
Carcase weight (kg)	64.6	65.9	62.7	68.7	63.5	61.5	60.8	64.7	1.86	0.01	0.65	0.02
Serum iron (µmol/l)	26.6	30.5	32.0	29.4	27.0	29.3	32.5	29.5	2.57	0.96	0.05	0.93
Haemoglobin (g/l)	115	118	114	117	129	123	124	124	4.30	0.00	0.96	0.81
Haematocrit (%)	36.5	37.6	35.9	36.8	41.7	38.7	39.3	39.3	1.40	0.00	0.68	0.51
Erythrocytes[1,2]	7.1	6.4	6.4	6.5	7.5	7.0	6.9	7.1	0.29	0.00	0.08	0.21
Drip loss (%)	6.9	6.9	6.8	7.1	6.6	6.6	6.5	6.8	0.21	0.01	0.83	0.16
Colour-L* value[3]	55.7	52.5	57.9	56.3	52.6	54.1	52.5	53.0	1.62	0.00	0.16	0.41

[1]significant Fe x In interaction (P<0.05), [2]x 106/ml, [3]significant S x Fe and S x In interactions (P<0.05); SED, standard error of difference.

Dietary In increased daily gain (795 vs 869 g/d, P=0.02) and this translated to an increase in carcase weight (62.9 vs 65.2 kg, P=0.02; Table 1). However, there was an interaction (P=0.01) between Fe and In such that the response was most marked in pigs receiving supplemental Fe. Serum iron was increased by supplemental Fe although there was an interaction (P=0.03) such that it was increased when pigs were fed diets without In (26.8 v. 32.3 µmol/l) but not with In (29.9 vs 29.4 µmol/l). Boars had lower (P=0.00) haemoglobin (116 vs 125), haematocrit (36.7 vs 39.7%) and erythrocytes (6.6 v. 7.1 x 10^6/ml) than gilts. Inulin tended to decrease erythrocytes (P=0.08) especially when no supplemental Fe was fed as indicated by the Fe x In interaction (P=0.01). Pork from boars had higher (P<0.01) drip loss (6.9 vs 6.6%) and was lighter (55.6 vs 53.1) than gilts. In conclusion, these data suggest that serum iron can be increased by feeding organic iron. Also, boars have lower erythrocytes, haemoglobin and haematocrit values than gilts suggesting some differences in iron status.

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