

## The effect of feeding genetically modified Bt maize (MON810) for 30 days on weanling pig growth performance organ weights and organ histopathology

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**Introduction** Genetically modified (GM) crops are now being used more frequently as animal and human food, with maize currently the second most cultivated transgenic crop (James, 2008). An ongoing debate exists as to whether transgenic plants have the same nutritional value as their conventional counterparts and as to the safety of GM organisms for human consumption (Aumaitre *et al.*, 2002). The objective of the present study was to investigate the effect of feeding the insect resistant MON810 maize for 30 days on weanling pig growth performance, organ weights and organ histopathology.

**Materials and methods** Thirty two crossbred (Large White × Landrace) weaned pigs (entire males) were used in a 31 day experiment to investigate the effects of feeding GM maize (Bt maize – Pioneer, MON810) on pig growth performance, organ weight and organ histopathology. The pigs were weaned at 28 days of age, blocked by weight and ancestry and randomly assigned to one of two treatments. The treatments were: GM maize (Pioneer PR34N44 event MON810) or the non-GM isogenic parent line (Pioneer PR34N43) at 38.8% of the diet. Following weaning the pigs were given a baseline adjustment period of 6 days, during which they were provided with *ad-libitum* access to a non-medicated non-GM starter diet. The pigs were individually penned in a total of four identical climate controlled rooms with 8 pigs per room (16 pigs/treatment). Each treatment group was equally represented in each room to avoid a room effect. Individual body weight and feed disappearance were recorded on d 0, 7, 14, 21, 28 and 31 of the study where d 0 was the first day on which experimental diets were fed. Feed was available until weighing and any waste or uneaten feed left in the feeders was dried and recorded. The pigs were slaughtered on day 31 and internal organs (heart, kidneys, spleen and liver), devoid of all blood clots and/or fat deposits, were removed from the carcass, weighed and sampled for histopathological analysis. Statistical analysis was performed using the GLM procedure of SAS and organ weights were analysed with final body weight included as a covariate in the statistical model. For all response criteria, the individual pig was the experimental unit.

**Results** Overall, pigs fed the GM maize diet tended to have higher ( $P=0.11$ ) daily gain, significantly higher feed intake ( $P<0.05$ ) and tended to be heavier ( $P=0.11$ ) than pigs fed the non-GM maize diet (**Table 1**). The weight of the heart, liver and spleen did not differ between treatments ( $P>0.05$ ). However, pigs fed GM maize had heavier kidneys than control pigs ( $P=0.05$ ; **Table 1**).

**Table 1** The effect of feeding Bt Maize (MON810) on weanling pig growth performance and organ weights

	Non-GM Isogenic Maize	GM Maize	SE	P-value
Final body weight (kg)	24.7	26.0	0.56	0.11
Daily gain (g/d)	576	620	18.2	0.11
Feed intake (g/d)	697	770	22.9	0.03
Feed conversion efficiency (g/g)	1.22	1.24	0.015	0.28
Kidneys weight(g)	145.2	161.0	4.52	0.05
Spleen weight (g)	47.5	54.3	2.71	0.14
Liver weight (g)	690.0	665.3	17.98	0.38
Heart weight (g)	133.3	142.2	3.96	0.18

**Table 2** Chemical analysis of the experimental diets

Diet	Dry matter (g/kg)	Crude Protein (g/kg)	Oil (g/kg)	Crude Fibre (g/kg)	Ash (g/kg)	DE (MJ/kg) <sup>†</sup>
Non GM maize	894	209	61	21	55	15.50
GM Maize	892	211	59	19	56	15.46

<sup>†</sup> Digestible energy (DE) was calculated using equation 22 of Noblet & Perez (1993)

**Conclusions** The difference in feed intake between treatments could not be explained by differences in chemical analysis of the diets (Table 2) or by mycotoxin or pesticide residue in the maize as these were found to be below minimum detectable levels. The difference in kidney weights found may indicate an adverse effect on kidney function, however, no indicators of kidney damage were found following histopathological examination. The difference in kidney weights found here are contrary to findings of a subsequent longer term feeding experiment conducted at our centre, which have shown no treatment effect on kidney weight.

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### References

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