

Particle size and form of the diet influence production and gastric health in growing-finishing pigs

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Under Danish conditions, pelleted diets increase performance in growing-finishing pigs but compromise gastric health compared with coarsely-ground meal-feed (Hansen, 2004). However, in these studies the particle size of the meal-feed was coarser than commercial practice, and consequently it is not known if pelleted feed increases performance compared with meal-feed or if differences were attributable to particle size effects. The aim of this study was to investigate the effect of feed grinding and pelleting on performance and gastric health in growing-finishing pigs.

The experiment comprised a 2x2 factorial design with the factors being grinding (feed ground through a 3.5 mm screen versus feed ground through a 2 mm screen) and form of the diet (pelleted versus meal-feed). All diets were based on wheat, barley and soybean meal and differed only in processing and milling. A total of 456 pigs in 11 randomized complete blocks (10 or 11 pigs per pen) were used from 29±3.1 kg until slaughter at 103±6.1 kg. Lean meat percentage was measured at the slaughter line using a KC21 classification centre. Lesions in the pars oesophaeica were scored on a scale from 0-10, 0 being normal and 10 having severe gastric ulceration (Christensen, 1998). The influence of dietary treatment was analyzed univariately in a normal linear model using the GLM procedure in SAS (SAS Inc v.9.13). In addition, stomach scores were analyzed using the GENMOD procedure.

Pelleting significantly improved average daily gain (ADG) as well as feed conversion ratio (FCR) but lowered lean meat percentage and resulted in more lesions in the pars oesophaeica (Table 1). Meal-feed ground to pass a 2 mm screen resulted in reduced average daily feed intake (ADFI) and hence a lower ADG. In general, finer grinding increased gastric lesions ($P<0.001$).

Table 1. Performance results and gastric health for growing-finishing pigs fed different processed diets

Grinding	3.5mm screen		2.0mm screen		SEM	P-value		
	Particle size, mm (<1/1-2/2-3/>3)	(47/45/8/0)	Pelleted	Meal		Grinding	Form	Grinding x Form
ADFI ¹ , kg/day	2.47 ^a	2.40 ^a	2.42 ^a	2.19 ^b	0.024	-	-	0.004
ADG ² , g/day	897 ^a	823 ^b	902 ^a	771 ^c	11.1	-	-	0.03
FCR ³ , kg/kg	2.75	2.92	2.67	2.85	0.020	N.S.	< 0.001	N.S.
LMP ⁴ , %	59.2	59.9	59.3	60.3	0.15	N.S.	0.004	N.S.
Ulcer score	1.7	0.2	3.7	2.4	0.11	< 0.001	< 0.001	N.S.
Ulcer score > 5, %	2.1	1.0	21.9	6.7		< 0.001	< 0.001	N.S.

¹ADFI: average daily feed intake; ²ADG: average daily gain; ³FCR: feed conversion ratio; ⁴LMP: lean meat percentage. ^{abc}: values with different letter subscript are significantly different ($P<0.05$).

Feeding meal-feed ground to pass a 3.5 mm screen resulted in a poorer ADG and FCR than pelleted feed probably due to reduced digestibility. Finer grinding of meal-feed is no solution as this compromises average daily feed intake (ADFI) and ADG. The best performance is therefore achieved with feed that is pelleted, but the number of pigs with gastric lesions will increase. Further research is needed to identify the optimal particle size distribution in meal-feed to optimize both production indices and gastric ulcerations.

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References

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