Variation of nutrient content in a batch of growing pig meal due to segregation in the feeding silo and to transport with different feed conveyors

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Introduction
Pig meal is a heterogeneous mixture of different particles. Each particle has a specific size but also a specific nutritional value. The particle size profile as well as average nutrient content of fattening meal is mostly quite similar between different batches. However, different manipulations of a batch such as emptying the feed silo or distribution of the meal throughout the stable by a feed conveyor can affect the particle profile of the feed. The particle size of pig feed is related to feed digestibility (Al-Rabadi et al, 2009) and voluntary feed intake (Anguita et al, 2007), but it also affects the incidence of gastric ulceration (Dirkzwager et al, 1998) and the occurrence of tail biting (Brumm et al, 2008). This study aimed to investigate possible variations in nutrient content of fattening pig meal between the point a new batch of meal is delivered in the silo and the point when the silo is almost empty. Secondly the effect of transport of meal by different types of conveyors on the nutrient content of feed was investigated.

Materials and Methods
The study was performed in four different farms. In each farm, feed samples were taken one day after the feed silo was filled with a new batch of growing pig meal (BEGIN) and again when the feed silo was almost empty (END). Every time, samples were taken in the feeding troughs in the pens on four different places along the feed conveyor: in the first pen of the first compartment (DISTANCE 1, 2, 3, 4). Two of the sampled farms used screw conveyors (SCREW) to transport the pig meal from the feed silo to the feeding troughs in the pens, the two other farms used round-bottom drag conveyors (DRAG). Secondly, two of the farms offered their pigs standard meal (STANDARD), the other two farms added corn cob mix (CCM) on a daily basis to the standard meal before it was delivered to the different feeding troughs. The nutrient content of all feed samples was analysed for the following parameters by using near infrared spectroscopy: dry matter (DM), crude fibre (CF), crude fat (CFAT), crude protein (CP), crude ash (CA), sugar (SU) and starch (ST). All data were statistically analysed by using SPSS 17.0 statistical software.

Results
The amount of CP and ST was significantly higher when samples were taken shortly after filling the silo than samples taken when the silo was almost empty (P < 0.001). For CFAT, CF and CA the opposite was true, these nutrients were lower in the beginning of the silo than at the end (P < 0.001 for CFAT and P < 0.05 for CA). The SU content of the feed samples was lower at the end of the silo than at the beginning, although this was not significantly (0.1 > P > 0.05). The differences between BEGIN and END for CFAT, CF and CA were significantly larger for stables using DRAG than those using SCREW (P < 0.05). Also the difference in SU content was numerically larger for DRAG (0.1 > P > 0.05). The differences in RE and ST were not affected by the conveyor type. Feed type did not significantly affect the differences in nutrient content between BEGIN and END but numerically, CCM had a more stable nutrient content than STANDARD. Distance, neither at BEGIN nor at END, significantly influenced the nutrient content of the feed. However, some numerical trends could be observed which are similar to those seen between BEGIN and END of the silo.

Discussion
The results indicate that manipulation of feed by emptying of the silo and distribution throughout the stable by automated feed conveyors can affect the nutrient content of the feed. Although differences are small from a first point of view, they can have an effect on the performance and health of the pigs in the different pens of a stable. There for the link of these differences in nutrient content will be further linked with differences in particle size and profile. In a following study the link between the variation in nutrient content throughout the stable will be studied in relation to feed intake and growth performance of pigs.

References.