

Effect of crude fibre, feeding level and body weight on apparent digestibility of compound feeds by swine

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Abstract. The effect of crude fibre content of the feed, feeding level, body weight and method of measuring on apparent digestibility of dry matter (T), organic matter (O) and crude protein (XP) was investigated in growing pigs and adult sows. Most factors influenced digestibility significantly.

Key words: swine, digestibility, feeding level, body weight, crude fibre.

Introduction. The digestibility of feeds can be influenced by several factors such as chemical composition of the diet, the measuring technique, the feeding level and the body weight or age of the animals. However in some cases it is rather difficult to estimate the effect of a single factor. The effect of crude fibre content, for example, can be confounded with an increased dry matter intake if equal energy intake is aimed at. Furthermore the effect of body weight or age is often measured at different levels of feed intake, especially when growing pigs are compared with adult sows. In this experiment several factors were studied.

Material and methods. Twenty two adult sows (liveweight 185-220 kg) and 18 growing male pigs (liveweight 35-105 kg) were used for measuring apparent digestibility (d) of T, O and XP using the classical method of total faeces collection (during 10 days) or the Cr_2O_3 indicator method (during limited periods for 5 successive days). Three compound feeds with 43, 76 or 113 g XF per kg T contained almost equal concentrations of net energy for fattening (NE_f) and digestible protein. This was obtained by substituting maize starch for wheat middlings, lucerne meal (16-18 % XP), citrus pulp (dried), renderer fat and potato protein (dried). Feeding levels of 1.2, 2.4 and 3.6 times maintenance ($M = 293 \text{ kJ NE}_f \text{ per kg}^{0.75}$) were used. The $3.6 \times M$ level was only fed to lactating sows; the other levels were fed to empty or early pregnant sows and to growing pigs. All animals were fed twice a day. Sows received feed in a dry form and growing pigs as slurry. This feeding method was thought not to effect digestibility.

The sows were tethered or kept in metabolism cages and the growing pigs were kept in pens or in metabolism cages. Not all possible combinations of feed, feeding level, housing and methods of measuring digestibility were investigated.

Results. In sows and growing pigs the three feeds differed significantly in d_T , d_O and d_{XP} . An increase of XF in dry matter with 1 percentage unit decreased d_O by 1.8

units in sows and 2.3 units in growing pigs. For d_{XP} the decrease in sows was 1.1 units and in growing pigs 1.4 units. These figures are about the same as shown by Norfeldt et al. (1954). An increase in feeding level from $1.2 \times M$ to $2.4 \times M$ decreased – irrespective the feed – digestibility significantly in growing pigs (d_T –1.7; d_O –1.8; d_{XP} –3.4).

In sows an increase in feeding level from $1.2 \times M$ to $2.4 \times M$ resulted in a significant decrease of d_T , d_O and d_{XP} of –2.8, –2.8 and –5.4 respectively. An increase from $1.2 \times M$ to $3.6 \times M$ resulted in a significant decrease of d_T , d_O and d_{XP} of –3.1, –3.4 and –6.5 respectively. This indicated a non-linear effect of feeding level on digestibility. An effect of feeding level was also shown by Parker & Clawson (1967) and Cunningham et al. (1962), but not by Nehring et al. (1960) and Dammers (1964).

In growing pigs digestibility increased with body weight: for d_T , d_O and d_{XP} with 0.56, 0.46 and 1.04 units respectively per 10 kg increase in body weight. Comparison between growing pigs (70 kg) and adult sows at a feeding level of $1.2 \times M$ showed in general no higher digestibility of the three feeds in sows. Norfeldt et al. (1954) and Fernandez et al. (1979) showed higher digestibilities in pigs with a body weight of 180 kg or more. Differences in feeding level cannot be excluded as a confounding factor in their experiments.

The Cr_2O_3 indicator method showed a lower digestibility of about 1 unit and a smaller standard deviation for d_T and d_O than the classical collection method. Parker & Clawson (1974) and Petry & Enders (1974) observed the same tendency.

Conclusions. The crude fibre content of the feed and the feeding level reduced d_T , d_O and d_{XP} significantly in growing pigs and adult sows. The effect of feeding level in sows was not linear. Feeding level and probably the XF content of the feed can affect the rate of passage of digesta through the gastrointestinal tract. A higher rate of passage can decrease digestibility by a lesser degree of fermentation in the hind gut (van Es, 1982). In growing pigs d_T , d_O and d_{XP} was influenced by body weight, but a comparison between growing pigs (70 kg) and adult sows fed at the same feeding level showed no significant differences. Total faeces collection tended to give a higher digestibility than the Cr_2O_3 indicator method.

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SYNOPSIS

Influence of potassium fertilizer on yield of upland kangkong (*Ipomoea aquatica* Forsk.)

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Abstract. In a greenhouse experiment, effects of potassium fertilization on yield and potassium content of kangkong (*Ipomoea aquatica* Forsk.) were investigated. Kangkong was either ratooned (ratoon method) or resown after harvesting whole plants (seed method).

Key words: kangkong, *Ipomoea aquatica*, leaf vegetable, potassium fertilization, yield, ratoon method.

Introduction. Kangkong, a popular leaf vegetable in Southeast Asia, has received little research attention. Information on effects of cultural practices, among which manuring, on quality and yield of kangkong is limited (Cornelis et al., 1985). In a