

Feeding value of red clover-grass, common vetch and Persian clover for pigs

Kirsi Partanen^{1,2}, Jarmo Valaja³, Hilikka Siljander-Rasi¹

¹MTT Agrifood Research Finland (hilikka.siljander-rasi@mtt.fi), ²Current address: Snellmans Köttförädling Ab (kirsi.partanen@snellman.fi), ³University of Helsinki, Department of Agricultural Sciences (jarmo.valaja@helsinki.fi)

Implications

Red clover-grass, Persian clover, and common vetch grown for green manuring in organic cropping cycles, are valuable forages for the feeding of pigs. They could substitute up to 30% of basal diet (on dry matter basis) in the feeding of growing pigs without negative impact on N retention. This indicates that protein and amino acids of these legumes are well digested and utilized by the pigs. Inclusion of roughage to pig diets shifts N utilization so that N excretion to feces is increased while N excretion to urine is decreased.

Persian clover, in particular, is an intriguing roughage for pigs as its protein contains more amino acids than that of red clover-grass or common vetch. In addition, the digestibility of fiber is good in Persian clover, due to lower cellulose and lignin content in the fiber fraction.

Background and objectives

Grass and legume forages are considered excellent rooting and enrichment material for pigs, but they can also contribute to the energy and amino acid supply of pigs (Carlson et al. 1999, Reverter et al. 1999).

In organic cropping rotation, annual legumes such as Persian clover and vetches are grown for green manuring and fodder and pasture for ruminants (Stoddard et al. 2009). They could be suitable feedstuffs for organic pig production too, but there is a lack of information about their feeding value for pigs.

Our aim was to study the nutrient composition and digestibility of red clover/grass, Persian clover or common vetch, and protein utilization by N balance in growing pigs fed diets with increasing inclusion of these roughages.

How work was carried out?

Roughages were grown in Jokioinen and harvested with silage chopper: common vetch (*V. sativa* var. Ebena) on Aug 14th, red clover-grass (46% red clover, 46 % grass and 8% weeds) on Aug 16th, and Persian clover (*T. resupinatum* var. Accadia) on Aug 28th. Clovers were in early bloom and vetch in late bloom.

The basal diet consisting of barley, peas, rapeseed cake and mineral-vitamin premix was fed as such or replaced with 15% or 30% of roughages on dry matter (DM) basis. Roughages were mixed with the basal diet in a cutter before feeding.

In a study of 7 x 5 cyclic change over design, seven pigs were fed the seven experimental diets in five 16-day periods (2 d transition, 10 d adaptation, 4 d for total collection of feces and urine) between 32 and 95 kg body weight. Daily feed allowance was 85 g DM/kg^{0.75}. Digestibility coefficients were calculated by the regression method.



Key results

Protein and essential amino acid composition of red clover-grass, Persian clover and common vetch:

g/kg DM	Basal	Red clover-grass	Persian clover	Common vetch
CP	178	187	196	196
LYS	8,9	9,0	10,0	9,0
THR	6,6	7,3	7,8	7,3
MET+KYS	5,7	4,3	4,7	4,1
ILE	6,6	7,3	8,2	7,1
LEU	11,7	13,3	14,3	12,7
VAL	9,6	8,6	9,0	8,2
PHE+TYR	12,5	14,0	15,1	13,1
HIS	4,6	3,7	3,9	3,7
ARG	10,7	8,2	9,2	8,4

Fecal digestibility of energy was the highest in Persian clover, 63.7%, followed by red clover/grass (49.1%) and common vetch (42.6%). In particular, the digestibility of crude protein and fiber were higher in Persian clover than in red clover/grass and common vetch. The fiber of Persian clover contained less cellulose and lignin compared to red clover-grass and common vetch.

Inclusion of roughage to pig diets shifted N balance so that fecal N excretion was increased while opposite was seen in urinary N excretion. However, the proportion of ingested N that was retained by pigs growing on average 790 g/d did not differ between the treatments.

