Quinoa as an alternative forage crop in organic dairy farming

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Introduction
Experience with quinoa (Chenopodium quinoa) in 2000 on Aver Heino, Centre for organic dairy farming, showed that it was an easy crop to grow and conserve, with high production in a relatively short growing period. When used in a feeding experiment the quinoa whole crop silage (WCS) showed a high dry matter (DM) intake but disappointing fodder qualities. In 2001 an experiment was conducted to establish the effects of cultivar, N application level and harvest date on the fodder quality of WCS.

Materials and Methods
Two varieties of quinoa (Ras1 and Atlas) were compared at three nitrogen (N) application levels: 40 m^3 cattle slurry, with 0 (N1), 50 (N2) and 100 (N3) kg fertilizer N ha^-1; i.e. 67, 117 and 167 kg available N ha^-1, and four harvest moments: after a growing period of 70, 84, 98 and 112 days). Variety and N level were randomised within three replicates. The quinoa was grown on a ploughed grass/clover field on a sandy soil.

Results
Atlas yielded more than Ras1 (p<0.001, Fig.1). N level had no effect on the DM yield.

The DM content increased with increasing growing period, for Atlas more than for Ras1 (interaction p<0.01, Fig. 2).

On average the crude protein (CP) content of Ras1 was about 18 g kg^-1 DM higher than of Atlas (Fig. 3). For N2 and N3 CP content decreased from 70 to 98 days growing period. The OMD of Ras1 was on average about 3% higher than that of Atlas (Fig. 4). A longer growing period led to a higher OMD.

Conclusions
The new cultivar Ras1 had a lower DM yield than Atlas but a better fodder quality. It is possible to increase the CP content by earlier harvesting, but this is accompanied by a lower DM yield, DM content and OMD. Thus quinoa is not a viable alternative to grass or grass/clover for protein production.