SUMMARY

The objective of the first part of the thesis is to review the factors affecting the protein metabolism and nitrogen (N)-excretion of the dairy cow, and discuss the use of whole crop silage as a feedstuff to dairy cows. The second part consists of a presentation of a study performed in order to evaluate the use of whole crop wheat silage as a feedstuff to high yielding dairy cows, fed for decreased ammonia emission.

The composition of the protein reaching the small intestines of the cow depends on several factors, such as, the N and energy contents and the quality of the feed ration, and the type and quantity of the rumen microorganisms and their capacity to synthesise protein. The level of crude protein (CP), AAT and PBV, respectively, in the feed ration affects the milk yield and composition. The N-efficiency increases with increasing milk yield and decreases with increasing levels of CP in the feed ration. The composition of the feed ration affects the form in which N is excreted. The N excretion in the faeces and milk has a modest linear positive relationship to the N intake, but the urinary N increases exponentially with increasing N-intake. Optimising the energy and N contents in the feed ration and securing a good balance between energy and protein can decrease the N-excretion.

Combining whole crop silage with grass silage may result in a more efficient utilization of the dietary CP. Existing methods for estimating the digestibility and the energy value of whole crop silage are insecure, and have to be adjusted.

In the study of the including whole crop silage in the feed ration to dairy cows, a Latin square model was used with 12 Swedish Friesian dairy cows, in the beginning or in the middle of lactation. Four different diets were composed, two with 18 % CP (HP) and two with 16 % CP (LP) of the total dry matter (DM). The protein levels were combined with whole crop wheat silage (WS) or super-pressed beet pulp silage (BP). The cows were on each diet for four weeks, and the ammonia emission was estimated during the last week of the study period. The planned differences in protein levels were not fully obtained, which probably was the reason for the differences observed between the diets being small. However, significant differences between the diets were found for the milk urea concentrations, total N and NH₄-N in the manure, and ammonia emission from the manure. The cows given the HP diets had a higher content of milk urea and manure NH₄-N content than did those given the LP diets. The total N in the manure was significantly higher for cows fed the BPHP than the WSLP. Ammonia emission was significantly higher for the cows fed the WSHP than the WSLP. No significant difference in ammonia emission was observed between the BP-diets, but a tendency to a lower emission was seen for the BPLP diet as a whole. A lower level of CP in the diet seems to result in a decreased ammonia emission, and significant difference was seen between the WS diets. It is therefore conceivable that WS could be used in the feed ration to dairy cows together with other roughage to decrease the emission of ammonia without decreasing the milk yield.