

Chapter 5

Summary, Conclusions and Recommendations

The first aim of this study was to compare the qualitative and quantitative properties of the intake of *A. nummularia* (Hatfield Select) over time. This was done over a relatively short grazing period of five days. The second aim was to compare the qualitative and quantitative intake of goats and sheep over time. Qualitative intake properties such as CP, NDF and IVDOM were determined while quantitative intake was determined by OMI, DOMI and DOMI/kg $W^{0.75}$. Rumen parameters such as rumen NH_3-N and VFA were also compared over time as well as between goats and sheep. These will illustrate the decline in the quality and the quantity of forage consumed as the grazing period progresses, as well as the utilization by goats and sheep.

Oesophageal fistulated goats and sheep were used to collect samples of herbage selected by these animals. Qualitative analyses were conducted on these samples to determine the quality and quantity of intake. Rumen cannulated sheep and goats grazing on the pasture were used to collect rumen fluid which was used to determine the utilization of these material consumed by the animals. This was done by analysis for NH_3-N and VFA.

There was a definite decline in the quality and quantity of intake over the grazing period. Some parameters, for example CP, were significant. The CP concentration declined from 18% to 3.9 % for goats and from 19.9% to 6.6% for sheep. The cell wall constituents (NDF) increased with about 10% from the start to the end of the grazing period. The IVDOM decreased with 14% and intakes were almost halved from the start to the end of the grazing period. Other authors have also observed this decrease in quality and quantity of intake. The lower quality and quantity of intake was because of a decline in the availability of high quality edible material. By the end of the grazing period (5 days), there was no edible material left, which caused an extremely low quality and quantity intake.

Rumen $\text{NH}_3\text{-N}$ concentrations also declined as the dietary CP declined, but it was still present in high enough concentrations to sustain the rumen micro flora population. Rumen VFA's decreased over the grazing period. The acetic acid to propionic acid ratio increased towards the end of the grazing period. This caused a possible decline in the efficiency of utilization of ME for maintenance, as acetic acid has an efficiency in utilization of ME of 59% and propionic acid of 86% (McDonald *et al.*, 1995). This means that energy will have to be supplemented to sustain maintenance. By increasing the DMI, better selection in terms of qualitative parameters will take place. This could compensate for the shortage in energy.

This extreme decrease in the quality and quantity of intake emphasizes the importance of grazing management on *A. nummularia*. It is important not to defoliate these plants more than 70%, because it was noticed that after two-thirds of the grazing period the qualitative and quantitative intake declined far below the animals maintenance requirements. This was evident in the loss of (on average) 1.5 kg of live weight by sheep over the five day grazing period.

Sheep selected a diet of higher quality than goats. This was against expectations, that goats would be superior in quality of diet selected. Sheep selected a diet of higher CP and IVDOM and lower NDF than goats throughout the duration of the grazing period. Sheep also showed a higher OMI than goats, but sheep were twice as heavy as goats and had a $\text{DOMI}/\text{kg W}^{0.75}$ lower than goats. From this it is evident that sheep selected a better quality diet, but due to the lower intake per metabolic live weight, goats would be better able to fulfill their maintenance requirements. To illustrate this, goats had a higher concentration of rumen $\text{NH}_3\text{-N}$ than sheep, which illustrates a higher total intake of N, and a better degradation of the CP by rumen microbes. A higher rumen $\text{NH}_3\text{-N}$ will stabilize a bigger rumen microbial population which will increase the digestibility of a feed further. Initially goats had a larger acetic acid to propionic

acid ratio indicating a higher fibre intake and digestion by goats than sheep. Due to the low intake of sheep towards the end of the grazing period, sheep had a higher acetic acid to propionic acid ratio at the end of the grazing period. This contributes to the fact that goats were better able to maintain body weight through the grazing period.

It is concluded that sheep selected a higher quality diet than goats on *A. nummularia* cv. Hatfield Select. Due to lower intakes of sheep per metabolic weight, goats were, however, more capable of supporting their maintenance requirements than sheep.

For both goats and sheep, it would be advisable to supplement the energy requirement of these animals with feed high in energy. This will also improve intakes and would even support a certain level of production.