

**Qualitative characteristics of selected
Atriplex nummularia (Hatfield Select)**

by

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Abbreviations

ADF	Acid Detergent Fibre
ADL	Acid Detergent Liquid
Al	Aluminum
Ca	Calcium
Cl	Chloride
cm	centimeters
CNS	Central Nervous Centre
CO ₂	Carbon Dioxide
CP	Crude Protein
Cu	Copper
DM	Dry Matter
DMI	Dry Matter Intake
DOM	Digestible Organic Matter
DOMI	Digestible Organic Matter Intake
DOMI/kgW ^{0.75}	Digestible Organic Matter Intake per Metabolic Liveweight
Fe	Iron
g	gram
HCl	Hydrochloric acid
IVDMD	<i>In Vitro</i> Digestible Dry Matter
IVDOM	<i>In Vitro</i> digestible Organic Matter
K	Potassium
kg	Kilogram
(LW) ^{0.75}	Metabolic Live Weight
M	Molar
m ²	Square meters
Mg	Magnesium
mg	milligram
MJ	Mega Joule
ml	milliliter

mm	millimeter
mmole	millimole
Mn	Manganese
N	Nitrogen
NaCl	Sodium Chloride
NAN	Non-Ammonia Nitrogen
NDF	Neutral Detergent Fibre
NH ₃ -N	Ammonia Nitrogen
°C	Degrees Celsius
OM	Organic Matter
OMI	Organic Matter Intake
P	Phosphorus
P-CDOMD	Pepsin-Cellulase Digestion of Organic Matter in Dry Matter
P-COMD	Pepsin-Cellulase Digestion of the Organic Matter
pH	H-ion concentration
ppm	parts per million
S	Sulphur
Si	Silica
VFA	Volatile Fatty Acids
Zn	Zinc
µm	micrometer

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Abstract

Qualitative characteristics of selected *Atriplex nummularia* (Hatfield Select)

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This study was conducted in two trials. The aim was firstly to identify the qualitative characteristics of *Atriplex nummularia* (Hatfield Select). Goats and sheep were used to identify three palatability groups of plants in the *A. nummularia* (Hatfield Select) paddock. These palatability groups were compared in terms of quality to one another. Secondly, qualitative and quantitative intakes of *A. nummularia* (Hatfield Select) by goats and sheep were determined. This was done in a grazing trial lasting five days. A comparison was conducted between goats and sheep as well as between the different days of the grazing period.

During the first trial, goats and sheep were used to identify the most-, medium- and least-palatable *A. nummularia* (Hatfield Select) plants. The regrowth on these plants were harvested and used for laboratory analysis to identify the qualitative differences between these three groups. These samples were also

used to determine and compare degradability between the three groups as well as between goats and sheep.

Goats and sheep preferred *A. nummularia* (Hatfield Select) plants with a significantly ($p = 0.05$) higher crude protein (CP), phosphorus (P) and magnesium (Mg) content. The most preferred plants also had higher neutral detergent fibre (NDF), Ca, K, Na, Cl^- and Cu content than the least preferred plants, but these were not significant ($p > 0.05$). *A. nummularia* (Hatfield Select) provides enough CP for maintenance and production in both goats and sheep. All mineral requirements for maintenance in goats and sheep can be satisfied on *A. nummularia* (Hatfield Select), except that of Cu. For production (growth and lactation) only P is deficient and needs to be supplemented. *A. nummularia* (Hatfield Select) makes an ideal drought fodder crop to support the natural veld during the dry season.

An overall higher DM, N and NDF rumen degradability of *Atriplex* was recorded with goats than with sheep. Goats exhibited a significantly ($p = 0.05$) higher DM and N degradation and although a higher NDF degradation was also recorded, this was not significant. The rate of DM, N and NDF rumen degradation was also higher in goats than in sheep. This means that goats have a more favorable rumen environment for the digestion of *A. nummularia* (Hatfield Select). DM and N degradation were also significantly ($p = 0.05$) higher in the most palatable group than the least palatable group. NDF degradability decreased with palatability. This means that the most palatable plants have a higher digestibility and quality than the least palatable plants.

In the second experiment, rumen and oesophageal fistulated sheep and goats were allowed to graze *A. nummularia* (Hatfield Select) for five days. Qualitative and quantitative intakes were determined. The quality and quantity of ingested material were compared between goats and sheep as well as between the different grazing days.

There was a significant decline in the quality and quantity of intake over the grazing period. Some parameters were significant, for example CP. The CP concentration declined from 18% to 3.91 % for goats and from 19.88% to 6.61% for sheep. The cell wall constituents (NDF) increased by about 10% from the start to the end of the grazing period. IVDOM decreased by 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 over time. The lower quality and quantity in intake was because of a decline in the availability of high quality edible material. At the end of the grazing period, there was very little edible material left which caused an extremely low quality and quantity of 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 decreased over the grazing period. The acetic acid to propionic acid ratio increased towards the end of the grazing period. This caused a 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.