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Massey University
Agronomy Department
Palmerston North
New Zealand

**Feed value of tagasaste (*Chamaecytisus palmensis*) for goats and preferential
browsing activities by goats and sheep in multi-species shrub /pasture conditions.**

A Thesis submitted in partial fulfilment of
the requirements for the degree of
Master of Agricultural Science
in Agronomy

By

Rameshwar Singh Pande
1990.

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Abstract

The objective of the thesis work was to investigate the feed value and diet selection of tagasaste foliage vs lucerne hay chaff; browsing activities in mixed conditions of tagasaste shrub/pasture; and the preference ranking for forage shrubs species including tagasaste in multi-shrub/pasture conditions by goats as well as sheep.

I. Two experiments were carried out in The Animal Physiology Unit, Massey University and Grassland Division DSIR, Palmerston North.

A) Indoor experiment: to evaluate DM intake, feed selection, digestibility, chemical compositions of tagasate foliage and lucerne hay.

B) Outdoor experiment: to evaluate browsing activities of goats on mixed conditions of tagasaste shrub and pasture and goat behaviour.

1.1 DM intake, *in - vivo* OMD, *in- vitro* OMD and body weight change were similar for both tagasaste foliage and lucerne hay groups.

DM intakes were 33.37 ± 1.64 (g/kg BW/day) for tagasaste foliage and 26.49 ± 2.22 (g/kg BW/day) for lucerne hay.

In - vivo DMD were $70.42 \pm 1.35 \%$ and $66.94 \pm 1.35 \%$ for tagasaste and lucerne hay chaff respectively. Similarly, *in- vitro* DMD were 62.48% vs 66.63% for tagasaste and lucerne hay group. Tagasaste leaves only were higher in *in - vitro* DMD compared to stems only. *In- vitro* DMD of leaves were 69.29% whereas for stems were 47.45% .

Tagasaste foliage and lucerne hay chaff were similar in Nitrogen (3.16 vs 3.21% DM); NDF (45.89 vs 45.39% DM); ADL (7.10 vs 6.76% DM). But ash content in tagasaste foliage was less than half that of lucerne hay (5.18 vs 11.92% DM).

Goats selected most leafy parts of the tagasaste foliage, which were high in Nitrogen content and digestibility but lower in NDF and lignin than the feed offered. In the feed refusal of tagasaste foliage Nitrogen content was 2.52% DM; and NDF and ADL were 55.1% and 9.0% respectively. However, such type of selectivity were not distinct while feeding on lucerne hay chaff, possibly due to its homogeneous nature.

During the indoor measurement periods body weight change were 0.026 ± 0.008 (kg/day/kg BW) and 0.036 ± 0.008 (kg/day/kg BW) for tagasaste foliage and lucerne hay group respectively.

1.2 Goats spent more time on browsing on tagasaste foliage than grazing on pasture. Percentage of activities on browsing observations were $36.0 \pm 2.08 \%$ compared to $22.2 \pm 2.08 \%$ for grazing and $41.7 \pm 2.08 \%$ on idling.

Goats browsed tagasaste foliage up to 1.5 m height. Bipedal stance was frequently observed. Goats ate dead bark of tagasaste branches particularly towards the end of the experiment period when there was no more foliage to browse. The use of artificial shelter was rare, instead of that they selected open and relatively dry places for night camping. Overgrazing might be harmful for better performance of tagasaste plants.

Body weight changes in mixed conditions of tagasaste shrub /pasture conditions were higher than in indoor conditions while feeding either on tagasaste foliage or lucerne hay chaff as a sole diet. In shrub/pasture conditions body weight change was 0.133 ± 0.02 (kg/day/kg BW) and 0.122 ± 0.02 (kg/day/kg BW) for the two groups.

2. In the second trial preference for browsing by goats and sheep in multi-shrub species and pasture conditions including tagasaste, preference ranking for shrub species, and overlap of browsing activities between goats and sheep were evaluated in DSIR, Ballantrae Hill Station. The tested species were six leguminous shrubs including tagasaste, three non leguminous shrubs and two erect grass species.

Leguminous species: tagasaste (*Chamaecytisus palmensis* (Christ) Hutch.), broom (*Cytisus scorparius* (L)Link.), tree medic (*Medicago arborea* L.), black locust (*Robinia pseudocacia* L.), gorse (*Ulex europaeus* L.), short spine gorse (*Ulex europaeus*L.).

Non leguminous species: tauhinu (*Cassinia leptophylla* (Frost.F.)R.Br.), ceanothus (*Ceanothus griseus* (Trel.) Mc Minn.), and manuka (*Leptospermum scorparium* J.R.et,

G.Frost.).

Erect grass species: toetoe (*Cortaderia fulvida* (Buchan) Zotov.), pampas (*Cortaderia selloana* Schult) Asch.& Graeb.).

2.1 The browsing activities of goats were high compared to sheep. Goats and sheep ranked shrub species differently, but the differences were not extreme. Similarly, proportional utilizations of shrubs were higher in goats compared to sheep. Overlap of browsing activities for shrub species was higher in summer and autumn than in winter.

Goats spent 44.67 ± 1.3 % of activities on browsing compared to 11.56 ± 1.3 % of sheep. Grazing activities between goats and sheep were 48.57 vs 80.49 ± 1.3 % of total observation respectively. Similarly idling activities were 6.76 vs 7.95 ± 1.3 % for goats and sheep respectively. Low idling activities during the two hours record period might be due to the overnight fasting of the animals.

2.2 The most intensively browsed species were tree medic, tagasaste and ceanothus by goats as well as sheep. Among the other species goats preferred gorse and short spine gorse compared to other shrub species while sheep preferred black locust and broom. Less preferred species were pampas, tauhinu, toetoe and manuka. Utilization of these species was higher by goats than by sheep. A comparison between these results and those of Lambert *et al.*, (1989) indicated that there were some difference in estimates of preference made under indoor and outdoor conditions.

The results indicate the potential of common grazing with goats and sheep especially

in shrub/pasture conditions, in the absence of shrubs incorporation of tagasaste in goat farming systems could be useful .

Acknowledgements

"Life merge into the all prevalent, the eternal;
body turn to ashes.
Mind ! meditate on the eternal spirit;
Remember past deeds.
Minds ! Remember past deeds;
Remember, Mind ! Remember".

- Eksha-upnishad;

Dr Sally Diana Newton is no more with us. Her deeds, her memory remained only ! I met her at the very beginning of this thesis work as one of the supervisor for this thesis project, her enthusiasm, supportiveness and friendliness impressed me deeply in my heart. I would like to express my sincere gratitude and wish to pray for the everlasting peace of her soul !!!

May Peace and Peace and Peace be Everywhere !!!

When a tree bears fruit it is not only the branches which involves to produce that fruit, but the whole system of the tree, the soil where it stands and extract nutrients, the air where it breaths and spread its arms, the sun from where it receives warmth and

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