

# **Nutritive value and fermentation parameter of Yacón (*Smallanthus sonchifolius*), Orange (*Citrus sinensis*) and pineapple shell (*Ananas comosus*) ensiled in different mixture in Colombia**

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**Introduction** Colombia has an important vegetal diversity and by-products with potential use in animal feeding. One of the options within the plant, the Yacón and is generated from the agro-products, which are a problem to give a final destination, its use as silage for cattle feed, be established as a viable option handling. Yacón is a native plant of the Andes. The leaves of Yacón are not harvested for feeding ruminants. This forage does not compete with human food and has not been extensively studied in the country, in terms of animal nutrition. The orange and pineapple shell are agro-products interesting of use in animal feeding as silage. In this study the nutritional value and fermentation parameters of silage leaves of Yacón (*Smallanthus sonchifolius*), orange (*Citrus sinensis*) and pineapple (*Ananas comosus*) shell were evaluated as option of supplementation in animal feeding.

**Material and Methods** Samples of Yacón were taken from the existing planting on the campus of La Salle University in Bogotá. Eleven treatments were evaluated with different inclusion rates of leaves Yacón with each shells of orange and pineapple respectively. Control treatments were leaves Yacón 100%, orange 100% and pineapple 100% . Then leaves Yacón 90: orange shell 10; leaves Yacón 80: orange shell 20, leaves Yacón 70: orange shell 30 and leaves Yacón 60: orange shell 40 and the same mixtures and levels but using pineapple shell. These mixtures were stored at ambient temperature in small plastic bags of around 1 kg fresh matter for a period of 42 days. At the end of the fermentation period, samples were taken for analysis of nutritional quality (dry matter, crude protein, in vitro digestibility of dry matter) and fermentation parameters (pH, ammonia nitrogen). The experimental design was completely randomized, eleven treatments and three replicates. Variables were analyzed by the GLM procedure of SAS.

## **Results and Discussion**

### *Fermentation parameters.*

pH: there was a difference between the treatments for pH ( $P < 0.001$ ). The best pH value it had orange shells to 100% (3.7), followed by mixtures higher values to 4.0 and the 100% control Yacón and pineapple shells (100%) with the highest values (5.30 vs 5.39) respectively.

Ammonia nitrogen: values also differ significantly. The highest value was for 100% Yacón and mixtures had intermediate values.

*Nutritive value.*

Dry matter: difference was found between the treatments ( $P < 0.001$ ). The most content of DM was pineapple shells (26.3% vs 16%) of Yacón and orange shells. The mixtures with orange had the second-order, and finally mix with pineapple.

Crude protein: shows significant difference between treatments. The highest value for the Yacón 100% (19.1%), the mixtures had intermediate values and the lowest values were for controls with orange and pineapple (10.1 and 7.1%) respectively.

In vitro digestibility of dry matter IVDMD: differences were significant. More digestible silages were orange and pineapple shells (93.1 vs 75.9%) and the least digestible was Yacón with (52.06% IVDMD). The mixtures had intermediate values around 62%.

**Conclusions**

The utilization of Yacón in different mixtures show an interesting use as ensilage, because the use of mixed Yacón leaves these levels fermentation byproducts ensures adequate as long as the inclusion levels Yacón sheet not exceeding 80%, since the use of either orange or pineapple byproducts can be used but the orange is who shows better fermentation parameters and nutritional quality. This shows that the silages of these materials have great potential for use in animal feed.