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**Nutritive value of citrus pulp ensiled with wheat straw  
and urea, using in vitro and in vivo methods**

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**Abstract**

Fresh citrus pulp (FCP) was mixed with wheat straw (WS) 90:10 to provide a mixture with about 20% DM and divided into 3 parts. One part ensiled without urea, and the other two parts added with 0.5 or 1 % urea and ensiled. Each mixture was prepared in 200 kg, and ensiled in 5 nylon bags (40kg each). After three months of ensiling, silos were opened and sampled for chemical analysis, in vitro gas test and digestibility. Additionally, voluntary intake and digestibility of the silages were determined in sheep nutrition along with basal diet (Alfalfa hay+WS+barley ground), using five animals per diet. Results showed that dry matter (DM) ranged 19.316 to 21.15 percent and pH 3.59 to 3.74 in silages. Crude protein was 6.06% in urea free silage that was increased to 11.5 and 18.53% in silages contained 0.5 and 1% urea. NH<sub>3</sub>-N (as % of total N) was 0.4% in urea free silage whereas it was 2.38 and 3.28 in silages contained 0.5 and 1% urea. NDF and ADF contents were 24.1 and 23.7 % in FCP that were increased to 40.8 and 36.3% in silages. There were no significant differences between silages for gas production and estimated digestibility and metabolizable energy. The in vivo digestibility of DM (57.05 to 59.15%), OM (60.80 to 63.86%) and NDF (45.15 to 47.34%) were similar between the basal diet and the experimental diets as well as the experimental silages. However, digestibility of CP was increased in silages contained 0.5 and 1% urea ( $P<0.05$ ). ME content of basal diet was 2.44 Mcal/kgDM in basal diet and 2.32 to 2.37 Mcal/kg DM in experimental diets that were not statistically different between the diets. An increasing trend was observed for DM intake where the animals received ad libitum silages than the basal diet. Daily urine weight and urine pH was increased ( $P<0.05$ ) when the animals fed 1% urea silage, comparison to the other diets but, ruminal pH was not affected by the treatments. Finally, it is concluded that ensiling of FCP plus WS to provide a mixture with optimum DM content may be an appropriate method of preserving and using of this by product in ruminant nutrition. In addition, deficiency of CP could be compensated by addition of proper amount of urea.

**Keywords:** Orange pulp, wheat straw, urea, silage