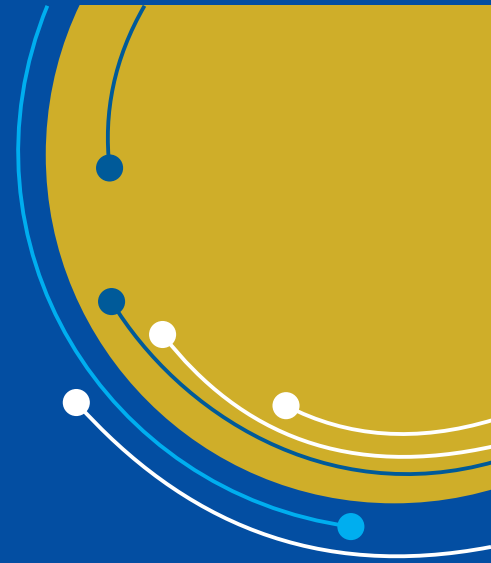
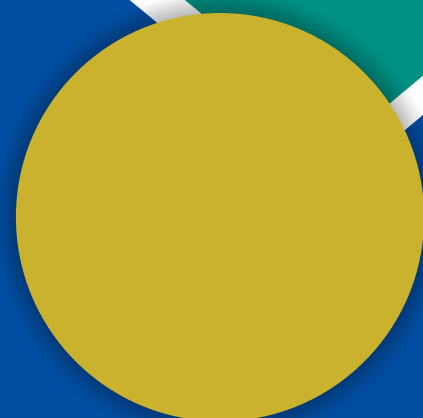


# Use of Citrus Pulp in Animal Feed



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Increasing population of Pakistan has elevated the demand of grains, consequently increasing the competition between humans and animals for grains, which has resulted in higher prices of concentrate. Most of the livestock farmers are unable to feed concentrate to their animals to fulfill their requirement which is adversely affecting performance of their animals. In this situation, there is demand for exploring cheaper non-conventional feed resources that can replace

concentrate sources, especially grains.

Different agro-industrial by-products especially fruit wastes can be used as an energy source for feeding livestock. Citrus pulp is an important by-product obtained after extraction of juice from the citrus fruit. A large quantity of pulp is being produced in Pakistan which is not commonly fed to animals. It causes disposal problems as well as environmental pollution.

Citrus pulp was collected from a juice extraction company and was spread on polythene sheets for sun drying. Chemical composition of dried citrus pulp indicates that it is an excellent source of nutrients that can be fed to animals especially to ruminants. Various trials were conducted using buffalo bulls, buffalo calves, lambs and early lactating buffaloes. Animals were fed forages and concentrate. The concentrate contained 10, 20, 30 and 40% dried citrus pulp. These studies showed that dried citrus pulp could be used successfully up to 40% in the diet of lambs and calves without any ill effect on feed intake, digestibility and growth performance. It can be used to substitute costly energy sources in the diet of ruminants, resulting in cost effective ration formulation.

**Table 1: Chemical composition of dried citrus pulp**

Items (%)	Dried citrus pulp (% DM basis)
Organic matter	94.40
Crude protein	6.56
Metabolizable energy (kcal/kg)	3060
Neutral detergent fiber	21.19
Acid detergent fiber	14.61
Ash	5.37

**Table 2: Feed intake and weight gain in lambs and calves fed 40% dried citrus pulp of the concentrate**

Parameters (kg/day)	Lambs	Calves
Dry matter intake	1.41±0.026	9.03±0.154
Crude protein	0.21±0.010	1.30±0.025
Neutral detergent fiber	0.31±0.010	3.23±0.057
Acid detergent fiber	0.25±0.008	1.62±0.028
Weight gain/day (g)	75.83±1.852	608±3.16

