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## Food waste to animal feed: Does it confer milk quality and safety?

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### Abstract

In view of increasing need to address rising food demand and combat food insecurity, it is alarming that approximately one-third of the global food supply is lost or wasted each year. In India, burgeoning urbanisation, population growth and modernisation of lifestyles in cities are driving a notable increase of food waste (FW) generation. While municipalities must deal with the complexities of FW management, urban and peri-urban dairy farmers face difficulties in sourcing feed for their cows. Consequently, some farmers have resorted to incorporating FW into their cattle rations. However, the effect of feeding these FWs on milk yield, composition, fatty acid (FA) profile and contamination with environmental toxins remains unclear. Therefore, a study was carried out with dairy farmers in the southern Indian megacity of Bengaluru. The study comprised 39 farmers who in total reared 75 cows on diets incorporating on average 23 % of FW, and 164 cows fed without FW inclusion. During three visits in winter 2021 (n=74 records), monsoon 2021 (n=61), and summer 2022 (n=104), feed intake, milk yield and quality were determined on a per-cow basis. Milk yield was significantly influenced by season and inclusion of FW into the ration, with cows fed FW and during the winter season having the highest milk yield. Conversely, cows fed FW had lower milk fat yield during the monsoon season, but a 10 % higher content of unsaturated FAs compared to milk of cows receiving no FW. Moreover, milk collected during summer contained a higher proportion of unsaturated FAs than milk collected during winter and monsoon (5 % difference). No detectable levels of arsenic and cadmium were found in any of the milk samples. Chromium and lead were found in 60 % and 28 % of the milk samples; with an average concentration  $0.011 \pm 0.014$  and  $0.019 \pm 0.053$  mg kg<sup>-1</sup>, respectively, which were within WHO's permissible limits. In conclusion, elevated levels of unsaturated FAs in milk from FW-fed cows indicate a promising avenue for providing high-quality food from FW. The negligible heavy metal concentrations in the milk suggest that it remains safe for consumers, even when FW is included in the cows' diet.

**Keywords:** Alternative feed sources, dairy farming, food waste, India, urban agriculture, waste management