Waste Green Plant Material As a Potential Source of Leaf Protein

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Introduction

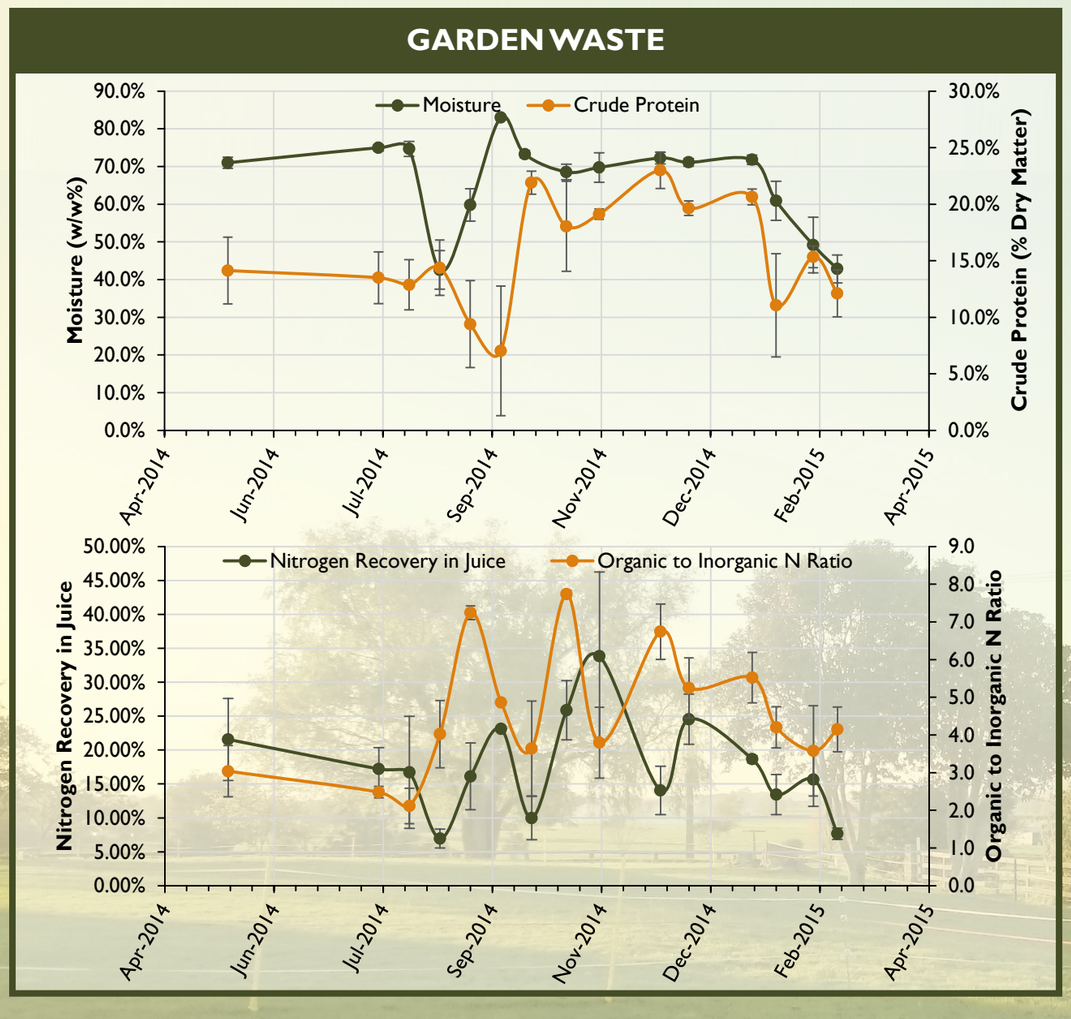
Global population is projected to increase by 3.1 billion people between 2000 and 2050. Global affluence will also increase during this period, causing demand for food and feed protein to more than double. Conventional protein sources will not be able to meet this additional demand without exacerbating already serious environmental problems. Alternative protein sources urgently needed to meet growing demand. One alternative is protein recovered from the leaf cells of leafy plants. Historically, leaf protein was recovered from alfalfa using an inefficient and uneconomic recovery process. It may be economically feasible to use an improved process to recover protein from waste green plant materials, such as garden waste and paunch grass. This research seeks to determine the protein content of these materials, which indicates their potential to be processed into animal feed.

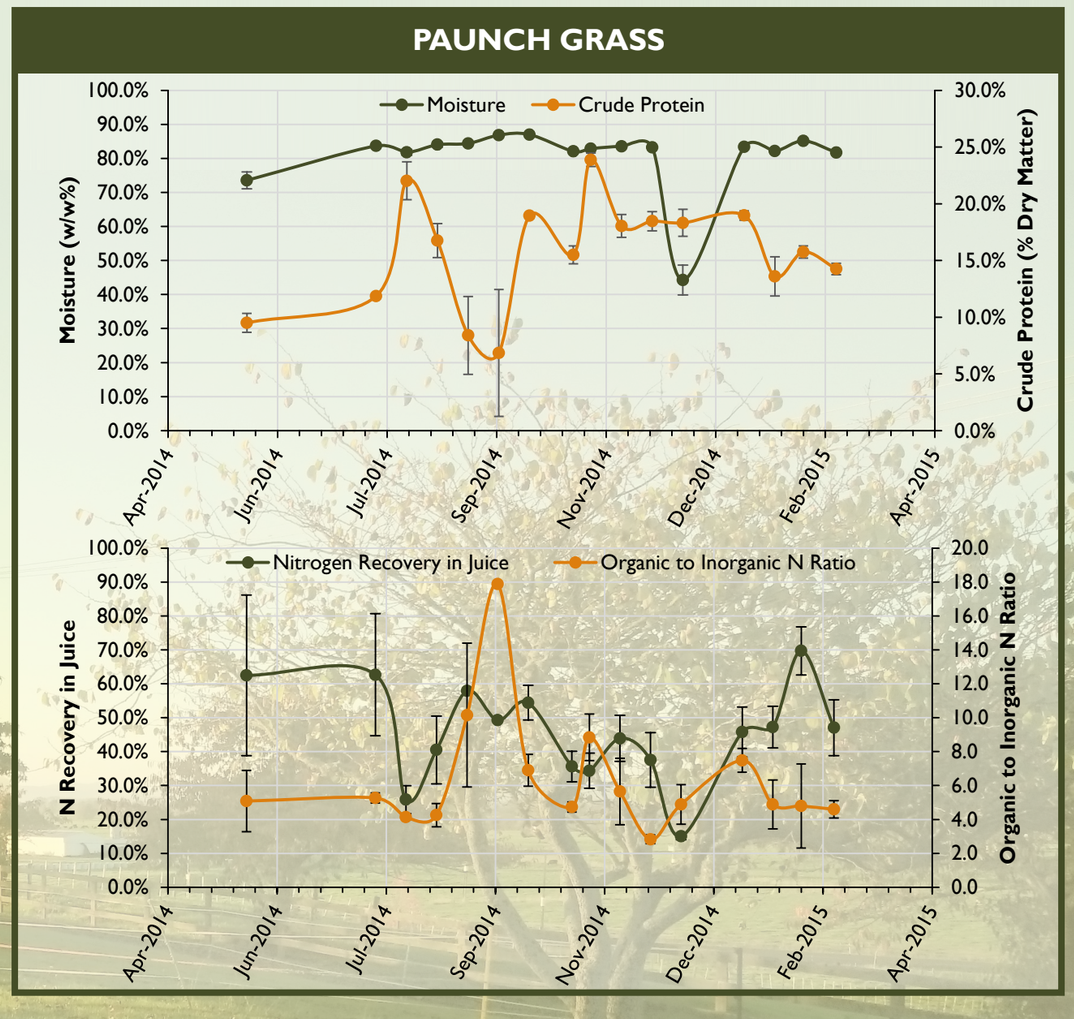
Methods

Samples of garden waste and paunch grass were collected over a 9 month period. Moisture content was determined by oven drying and crude protein content was determined by Isotope Ratio Mass Spectroscopy (IRMS). The leaf cells were broken open using a food processor and the resulting slurry was separated into juice and fibre using a screw press. The total nitrogen and organic to inorganic nitrogen ratio of the juice fraction was determined by Flow Injection Analysis (FIA). Total nitrogen data were used to calculate the nitrogen recovered in the juice, which indicates the efficacy of the laboratory protein recovery process.

Results and Discussion

Both garden waste and paunch grass have a crude protein content comparable to traditional leaf crops (15-25% of dry matter) for much of the year. Neither material would be processed year-round, as both have high-protein and low-protein seasons. The moisture content of green waste exhibits some seasonal variation, whilst paunch grass contains 80-90% moisture for most of the year. Neither material has noticeable seasonal variation in juice nitrogen recovery or the organic to inorganic nitrogen ratio. This suggests that storage, handling, and laboratory protein recovery methods have greater influence upon the latter two variables.





Conclusion and Further Investigation

Garden waste and paunch grass contain comparable levels of protein to leaf crops for much of the year. This makes them a potentially suitable raw material for a leaf protein manufacturing process. Future efforts should focus on stabilising and maximising the nitrogen recovery in the juice as well as the organic to inorganic nitrogen ratio.

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