SME Solutions Centre Case Study

Orange Glow – Value-adding underutilised/waste pumpkin produce

The challenge

Pumpkin is one of the major horticulture crops in Australia and more particularly in Queensland. Australia produces about 120,000 tonnes of pumpkins worth around $80m per annum, of which Queensland contributes 40-50% of the total production. Some of the major varieties of pumpkin that are produced in Australia are Butter Nut, Kabocha, Jarrahdale, Ken's Special Hybrid and OOAK. Daintree Fresh is one of the major producers of pumpkins and with a production capacity of up to 30,000 tonnes per year worth roughly $20m. Daintree Fresh developed a superior quality pumpkin variety "Orange Glow" (OG) after several years of painstaking natural breeding. Orange Glow pumpkin is considered a superfood with unique fruit quality and nutritional attributes for example, Orange Glow pumpkins are of deep orange colour with thin skin, very small seed cavity and contain four times more beta-carotene (Pro Retinol Vitamin A) than any other type of pumpkin. Despite these unique advantages its potential is not fully explored in terms of its applications other than sold as fresh produce In addition, a considerable quantity of produce (20-30%) of the total produce is lost or wasted due to various reasons. Hence, Daintree Fresh Pty Ltd., was keen to explore value-adding options for fresh as well as underutilised/waste pumpkin produce as the raw material to process into a range of high value products that can find applications in food, health, cosmeceutical industries. Daintree Fresh partnered with Queensland Department of Agriculture and Fisheries (QDAF) through the FFWCRC-SME Solutions Centre to undertake research on some of these aspects.

As a part of this QDAF processed and produced a range of value-added products from Orange Glow pumpkin produce Suitable processing methodologies were developed and trialled to produce these products which included beta-carotene rich freeze- and air-dried powders and extracts, pumpkin seed oil, protein rich seed meal and probiotic pumpkin juice. If successfully commercialised, this research will help to value-add up to 70% of currently wasted and underutilised pumpkins, more particularly Orange Glow pumpkins, making the industry more sustainable.

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Project impacts

The potential impacts from the project will include:

a. Potential opportunities created to value add more than $20m of pumpkins lost or wasted every year in Australia and more particularly for the industry client Daintree Fresh in Queensland;
b. New value adding pathways developed and trialled targeting utilisation of more than 70% of approximately 36,000 tonnes of surplus/waste pumpkin generated every year in Australia to make the industry more sustainable
c. High value, health benefiting functional foods including beta carotene rich freeze- and air-dried powders and extracts, pumpkin seed oil, protein rich seed meal and probiotic pumpkin juice produced;
d. New pumpkin processing industries can be established boosting regional employment and economy;
e. Environmental benefits such as reduction in wastage of resources thus reducing greenhouse gas emissions; and
f. Contributions to food security.

Conclusions & recommendations

Conclusions:

The concept methodologies developed to produce Orange Glow pumpkin freeze- and air-dried powders, beta-carotene rich extracts, seed oil and protein rich meal and probiotic pumpkin beverage were successfully tested. The conversion yields of fresh pumpkin to powders were quite high (up to 11.5%) which is promising for potential commercialisation. The Orange Glow pumpkin powders produced in the current study were of bright orange colour with high beta carotene levels (84mg/100g) when compared to other normal pumpkin varieties (0.5-6.8mg/100g). When compared to previously produced commercial Orange Glow powder (Daintree supplied) the current samples had 5-10 times more beta carotene. Beta carotene rich edible oil extract (15.2mg/100ml) was successfully produced in a cost-effective way. Pumpkin seed was found to be a good source of healthy unsaturated oil (~75% of total oil), plant protein (~40%) and fibre (42%) in addition to mineral content (7%). This project also successfully developed a probiotic pumpkin beverage with very high survival rate of Lactobacillus probiotic strains during more than 8 weeks chilled storage.

Recommendations:

- The freeze- and air-dried powders, seed oil and protein rich meal were produced at pilot scale in a cost-effective manner which can be considered for scale-up and commercialisation following a detailed cost-benefit analysis;
- Edible oil (sunflower) based extracts of beta carotene were produced on a laboratory scale in the current study. A further study including a minor scale-up and market assessment is recommended before any major scale-up;
- Further development of probiotic beverage is required including exploration of various flavours and other additives for better consumer acceptance and marketability.

Author and acknowledgements

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Participants

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