

Oxalate content of green juices produced by two different methods

Leo Vanhanen
& Geoffrey Savage

Food Science



Faculty of
Agriculture &
Life Sciences

Background

Green juicing is being promoted as a healthy way of obtaining refreshment, quenching thirst and it provides a rich source of nutrients and vitamins.

Unfortunately, green juices are commonly made from seasonally available green leafy vegetable that are also high in oxalates.

Recently, there have been several documented cases of acute oxalate nephropathy attributed to the consumption of green juices.

This experiment compared the composition of two commonly used domestic juicers that produce juices in different ways.



Figure 1. Masticating Juicer



Method

Two green juices were prepared, one using 20% spinach as a base and another identically proportioned juice with twice as much spinach (Low & High).

Both the Low and High spinach containing green juices were prepared using two commonly used domestic juicers.

A masticating juicer (Figure 1), produced a clearer thinner juice and a high speed blender (Figure 2), produced a thicker juice.

Oxalate (total, soluble and insoluble) contents were determined by standard HPLC methods.

Calcium content was determined using an Inductively Coupled Plasma Optical Emission Spectrophotometer (ICP-OES).



Figure 2. High Speed Blender

Results

Table 1. Oxalate content of green juice fractions

Spinach amount	Fraction	Oxalic acid (mg/100 g fresh weight)		
		Total	Soluble	Insoluble
Low (300 g)	High speed blender Juice	171.2 ± 8.3	77.6 ± 5.2 (45.4)	93.5 ± 4.9 (54.6)
	Masticating juicer Juice	209.6 ± 24.2	97.7 ± 2.6 (46.6)	111.8 ± 20.0 (53.4)
	Discarded Pulp	238.1 ± 15.6	86.1 ± 5.6 (36.2)	152.0 ± 13.3 (63.8)
High (600 g)	High speed blender Juice	369.4 ± 11.4	275.2 ± 16.1 (74.5)	94.2 ± 6.1 (25.5)
	Masticating juicer Juice	547.7 ± 15.9	364.0 ± 22.4 (66.5)	181.2 ± 39.2 (33.1)
	Discarded Pulp	541.7 ± 24.4	347.3 ± 9.8 (64.1)	195.2 ± 25.7 (36.0)

(%) = fraction of total oxalate

Overall comparison of the two types of juices showed there were no significant differences between the soluble oxalate content in the Low spinach recipe (77.6 and 97.7 mg/100 g FW) prepared using the high speed blender and masticating juicer respectively (Table 1). However the High spinach juice made by the masticating juicer had a significantly higher amount of soluble oxalate (364.0 mg/100 gFW) compared to the high speed blender (275.2 mg/100 gFW).

The ratio of soluble oxalate in the different types of juices was similar.

Drinking 200 g of either juice would result in the consumption of between 155 to 728 mg of soluble oxalate.

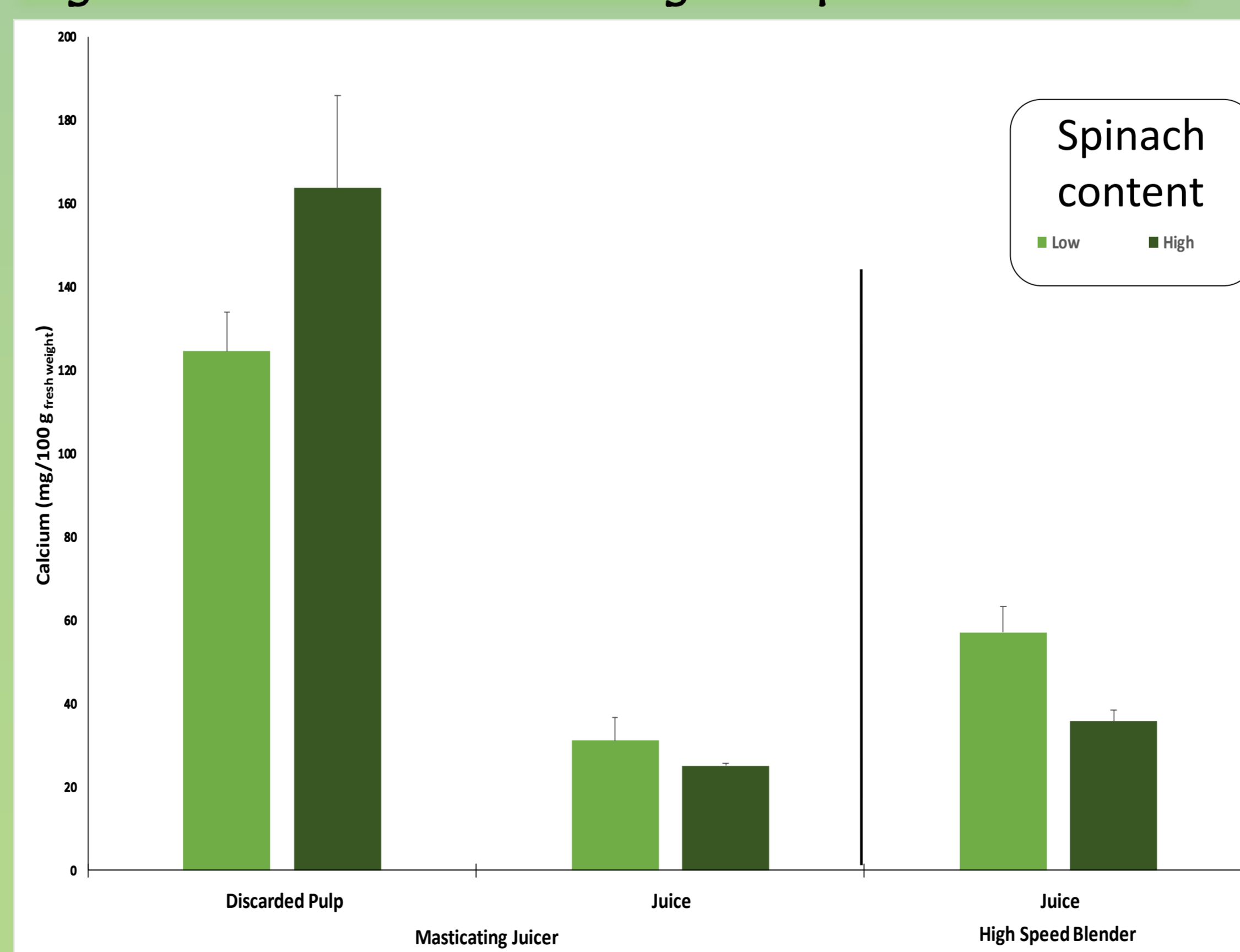
The daily average oxalate intake is reported to range from 44 to 351 mg/day.

Large amounts of calcium are discarded when using the masticating juicer (Figure 3).

When a higher proportion of spinach is used in a recipe, this can lower the amount of total calcium in a juice.

If 200 g of juice were to be consumed the juice from the high speed blender would provide the greater amount of calcium. The juices could provide between 50 to 114 mg of calcium to a diet, however, allowance needs to be made for calcium bound to the different forms of oxalate in the different fractions of juice.

Figure 3. Total calcium of green juice fractions



Conclusions

- Different recipes and different types of juicers give very different soluble oxalate contents.
- A 200 g glass of juice provides between 155 to 728 mg of soluble oxalate and 50 to 114 mg calcium.
- Calcium bound to oxalate needs to be taken into account.
- The discarded pulp contains appreciable amounts of calcium.

