

# Effect of draining and rinsing on the sodium and water soluble vitamin content of canned vegetables

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## Abstract 609.3

Public health advocates are urging people to reduce their sodium intake. While many manufacturers are reducing the sodium content of their products, consumers can also reduce the sodium content. The effect of draining and rinsing before heating on the sodium content of canned vegetables, and that of other minerals and vitamins was evaluated. Four brands of canned corn, peas, and green beans were purchased in Blacksburg, VA. Total can contents, drained solids, and rinsed vegetables were analyzed. Vegetables were rinsed with 3.5 L of lukewarm tap water and allowed to drain for 2 min. Vitamin C was analyzed at Virginia Tech, while minerals and other B-vitamins were analyzed at commercial laboratories under contract with USDA. Sodium in peas went from 261 mg/100 g (total can contents) to 249 mg/100 g (5%) after draining and to 231 mg/100g (7%) after rinsing. Minimal sodium was lost after draining the green beans; after rinsing, sodium fell from 231 mg/100 g (total can contents) to 214 mg/100 g (7%). Sodium in corn went from 205 mg/100 g (total can contents) to 185 mg/100 g (10%) on draining and to 162 mg/100 g (12%) on rinsing. Vitamin C was also lost with both treatments; 10% in green beans; 21% in corn, and 6% in peas; other nutrients were also evaluated. Based on this study, draining and rinsing can be effective in reducing sodium in canned vegetables; however, varying amounts of some water-soluble nutrients may also be lost. Funding: ARS/USDA and NIH.

## Methods

- Sampling:**
- Two national brands and two, store brands, of canned corn, green beans, and peas were purchased in grocery stores in Blacksburg, VA.
- Sample preparation and analysis:**
- The Food Analysis Laboratory Control Center (FALCC) at Virginia Tech measured and prepared the foods as follows after removal from the cans:
    - Total can contents – vegetables and packing liquid were measured
    - Drained solids – vegetables were drained for 2 minutes using a standard #8 sieve and weighed
    - Rinsed – Drained vegetables were rinsed with 3.5 L of lukewarm tap water and allowed to drain for 2 minutes.
  - All samples were weighed, homogenized, and composited according to NDL instructions.
  - Aliquots were packed under nitrogen and shipped frozen to analytical labs under contract to USDA. Vitamin C was analyzed at Virginia Tech (Nishiyama et al., J. Agric. Food Chem. 52 (2004) p. 5472-5; and Phillips et al., Food Chem. 92 (2005) p. 587-95).
  - Samples were analyzed for proximates (nitrogen, AOAC 991.20; fat, AOAC 933.05; ash, AOAC 945.46; and moisture, AOAC 964.22), minerals (AOAC 985.01), thiamin (AOAC 942.23), riboflavin (AOAC 970.65), and niacin (AOAC 944.13).



**Table 1. Sodium Content of Canned Green Beans (mg/100 g)**

Food	Mean	n	S.D.*	Range
Solids and liquids	235	3	12.8	215 – 259
Drained solids	231	3	18.3	211 – 268
Rinsed	214	3	21.4	178 – 252

**Table 2. Sodium Content of Canned Sweet Corn (mg/100 g)**

Food	Mean	n	S.D.*	Range
Solids and liquids	205	3	8.7	189 – 219
Drained solids	186	3	9.9	172 – 205
Rinsed	163	3	14.0	137 – 185

**Table 3. Sodium Content of Canned Sweet Peas (mg/100 g)**

Food	Mean	n	S.D.*	Range
Solids and liquids	261	4	26.7	210 – 328
Drained solids	249	4	23.3	211 – 308
Rinsed	231	4	15.5	207 – 275

Figure 1. Effect of preparation on the sodium, potassium, phosphorus, magnesium, and calcium in canned green beans

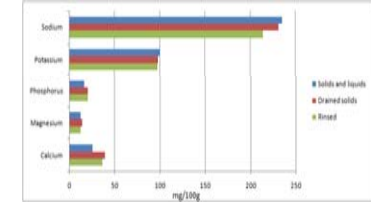


Figure 2. Effect of preparation on the sodium, potassium, phosphorus, magnesium, and calcium in canned corn

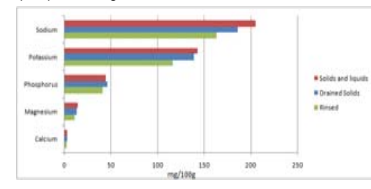
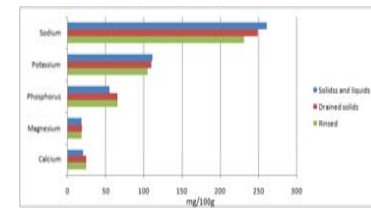


Figure 3. Effect of preparation on the sodium, potassium, phosphorus, magnesium, and calcium in canned peas



## Results

- Green Beans:**
- The sodium content of 3 brands ranged from 189 – 219 mg/100 g of total can contents, with a mean of 205 ± 8.3 mg/100g (Table 1). This compares with a current value of 259 mg/100 g in SR23 and a current mean label claim of 325 mg/100g. One store brand contained 2 mg sodium/100 g, although the label stated 400 mg/120 g serving. As this could be labeled "No Sodium Added", it was removed from all calculations, including the effect of draining and rinsing.
  - The sodium content was reduced 2% by draining the total can contents, and an additional 7% by rinsing (Figure 2).
  - The calcium content increased on draining (39%), and then decreased slightly (8%) on rinsing. However the calcium content of green beans is relatively low (25 mg/100 g) for total can contents, contributing only 3% of the DV per serving.
  - Other minerals (potassium, phosphorus, magnesium, zinc, copper, and manganese) and B vitamins (thiamin, riboflavin, and niacin) changed only slightly during the various treatments.
  - Vitamin C decreased slightly (3%) during draining, and somewhat more (6%) during rinsing. Again, the vitamin C content of canned green beans is low—3.6 mg/100 g for total can contents.

- Corn**
- The sodium content of 3 brands of canned corn ranged from 189 to 219 mg/100 g with a mean of 205 ± 12.8 mg/100 g (Table 2). This compares to the current value of 213 mg/100 g in SR23 and a current mean label claim of 279 mg/100 g. Of the four brands sampled for sweet corn, one store brand contained 128 mg sodium/100 g, though the label indicated 340 mg/125 g serving. As this could be labeled "Reduced Sodium", it was removed from all calculations, including the effect of draining and rinsing.
  - The sodium content was reduced by 9% by draining the total can contents, and an additional 12% on rinsing (Figure 3).
  - Other minerals (calcium, iron, magnesium, phosphorus, zinc, copper, and manganese) changed only slightly, and with the exception of potassium, were not present at nutritionally significant levels.
  - Vitamin C decreased about 5% on draining and another 18% on rinsing. However, the vitamin C content of canned corn is relatively low: 2.2 mg/100 g for the total can contents.
  - Thiamin and riboflavin values changed little during the treatments, though both were present at levels that are not nutritionally significant. Niacin decreased 6% on draining, and an additional 13% on rinsing, but is not present at nutritionally significant levels (0.94 mg/100 g for total can contents).

- Peas**
- The sodium content of 4 brands of canned sweet peas ranged from 210 to 328 mg/100 g, with a mean of 261 ± 26.7 mg/100 g (Table 3). This is slightly lower than the current value in SR23 of 250 mg/100 g and 8% lower than the mean label value of 283 mg/100 g.
  - Draining the total can contents resulted in a sodium reduction of 5%; an additional 7% of the sodium in the drained solids was removed by rinsing.
  - The potassium content changed only slightly on draining (1%) and an additional 5% lost on rinsing; the values are not nutritionally significant.
  - While the levels of some minerals (calcium, iron, zinc, copper, and manganese) did change during draining, they changed only slightly on rinsing and were not found at nutritionally significant levels. Other minerals (magnesium and phosphorus) only changed slightly during both treatments.
  - About 5% of the vitamin C was lost during both treatments. One serving of peas (total can contents) provide 16% of the DV.
  - While a substantial amount of riboflavin was lost during draining (66%), it was not present at a nutritionally significant level. Other B vitamins, also not present at nutritionally significant levels, showed little change during either treatment.

## Introduction

A recent Institute of Medicine report (IOM, 2010a), linked high sodium intakes to hypertension and advocated steps to reduce sodium intake in order to lower rates of hypertension in the United States. The average sodium intake of Americans is more than 3,400 mg/day (USDA, 2010), while recently released Dietary Guidelines for Americans (USDA, 2010) are now recommending intakes be limited to no more than 2,300 mg/day for healthy individuals and 1,500 mg/day for at-risk individuals, which comprise about half of the population. While companies have marketed a number of reduced-sodium products, overall sodium intake has not changed (IOM, 2010b). Some speculate that this may be due to the perception that such products do not have the same flavor as the original product. While some companies have worked to reduce the sodium content of their products, others have not, fearing that if their competitors did not make similar changes, their products would be at a disadvantage.

Canned vegetables currently average ~ 240 mg sodium/100 g solids. Sinar and Mason (1975) examined the effect of rinsing and cooking in tap water on the sodium content of cooked vegetables, but did not examine the effect of these treatments on other minerals and water-soluble vitamins. Vermeulen et al. (1983) examined the effect of rinsing on the calcium and sodium content of canned green beans, but did not look at water-soluble vitamins. The objective of this study was to

- Determine if the sodium content of canned vegetables had changed since the existing data for these vegetables in the USDA National Nutrient Database for Standard Reference (SR) was first collected in the early 1980s;
- Compare analytical data for sodium content with label claims;
- Examine the effect of draining and rinsing on the sodium content of canned vegetables.

## References

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## Summary

- Draining and rinsing of canned vegetables can reduce the sodium content from 9-23%.
- Analytical values for the three vegetables tested were lower than that declared on the label.
- Of all the nutrients tested, vitamin C decreased from 5-28% with draining and rinsing. However, for green beans and corn, vitamin C is not present in nutritionally significant amounts. Slight decreases for some other nutrients were not generally significant due to the usual low levels found in these vegetables.