University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Nebraska Swine Reports | Animal Science Department

1-1-1997

Retention of Selected Nutrients in Grilled Boneless Pork Chops

Judy A. Driskell
University of Nebraska - Lincoln, jdriskell1@unl.edu

Fayrene Hamouz
University of Nebraska - Lincoln, fhamouz1@unl.edu

Sharon Davis
University of Nebraska - Lincoln

David Giraud
University of Nebraska - Lincoln, dgiraud1@unl.edu

Jidong Sun
University of Nebraska - Lincoln

Follow this and additional works at: http://digitalcommons.unl.edu/coopext_swine

Part of the Animal Sciences Commons

Driskell, Judy A.; Hamouz, Fayrene; Davis, Sharon; Giraud, David; and Sun, Jidong, "Retention of Selected Nutrients in Grilled Boneless Pork Chops" (1997). *Nebraska Swine Reports.* Paper 208.
http://digitalcommons.unl.edu/coopext_swine/208

This Article is brought to you for free and open access by the Animal Science Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Swine Reports by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Retention of Selected Nutrients in Grilled Boneless Pork Chops

Judy A. Driskell
Fayrene L. Hamouz
Sharon L. Davis
David W. Giraud
Jidong Sun[1]

Summary and Implications

Fresh pork Canadian Backs, cut into boneless pork chops, were cooked to 160°F internal temperature by grilling at one of the following temperatures: 200, 250, 300, 350, or 400°F. Significantly longer cooking times were observed for chops grilled at 200°F than for those grilled at the higher temperatures. The yields, as well as the moisture and crude fat content of the chops in the different treatments, were similar. Retention values for selenium were similar for all treatment groups. Chops grilled at 400°F had significantly lower retention values for vitamin E and thiamin and a tendency for lower retention values for vitamin B-6. To optimize cooking time and nutrient retention, the most desirable temperatures for grilling boneless pork chops are 250, 300, or 350°F.

Introduction

Nebraskans and other Americans select pork as a meat choice about 24% of the time. Pork cuts are sources of many essential nutrients, including vitamin B-6, vitamin E and selenium. These nutrients are a potential public health issue in our country. Many Americans consume less than adequate quantities of vitamin B-6 and vitamin E and selenium have been implicated as possible protective factors with regard to the incidence of cancer and coronary heart disease. Little is known, however, about the content of these two nutrients in most foods, including pork cuts. Thiamin, the most heat labile nutrient found in meat, was measured as an index nutrient.

Cooking methods affect retention values for many nutrients. Previous studies in our laboratory indicated retention values for vitamin B-6 were significantly higher in Chef's Prime$_{TM}$ pork loin roasts cooked in a bag than those roasted, while those roasted were significantly higher in B-6 retention than those braised. Also, retention values for thiamin were significantly higher in roasts cooked in a bag and roasted than in those braised. Significantly more vitamin B-6, thiamin, iron, magnesium and zinc also were retained in pork strips cooked by stir-frying than by broiling or microwaving.

The purpose of the present study was to determine the retention of selenium, vitamin E, vitamin B-6 and thiamin in boneless pork chops prepared on a commercial grill set at five different temperatures, but brought to the same internal temperature of 160°F.

Methods

Fresh pork Canadian Backs were cut into boneless pork chops (1 in thick, .1 in fat trim, mean of 140 g). Chops were vacuum packaged and held at -30°F for less than 30 days before refrigerator defrosting and grilling. For the grilling, a commercial grill was set at the following temperatures: 200, 250, 300, 350 and 400°F. The chops were turned when an internal temperature of 97°F was reached. All chops were cooked to 160°F internal temperature. Each cooking occasion was replicated five times. Cooking times and yields were determined.

Samples of all chops, including a raw chop for each cooking occasion, were taken for chemical analyses. Moisture, crude fat, selenium, vitamin E, vitamin B-6 and thiamin content of all samples were determined and true retention values calculated for the vitamins and selenium. True retention was calculated as the nutrient content of the chop cooked, divided by its content before cooking multiplied by 100.

Results and Discussion

The cooking times for the chops, expressed as minutes per gram, are given in Table 1. Significantly longer ($P<.05$) cooking times were observed for chops grilled at 200°F than for those grilled at the higher temperatures. Yield values for chops in the different treatment groups were similar.

Higher equipment temperatures have greater impact on internal color than on external color. The internal color of the cooked chops was significantly more ($P<.05$) red when chops were grilled at 200°F than when grilled at temperatures of 300, 350 or 400°F. External color of the cooked chops was not influenced by grill temperature.

The moisture content of cooked chops in the different treatment groups was also similar (mean $\pm$ standard deviation = 59.8 $\pm$ 3.1 g/100 g); the same was true with regard to crude fat content (10.0 $\pm$ 3.6 g/100 g). Values for moisture were similar to USDA Handbook values, but those for crude fat were lower. This may be due to swine production practices which have produced leaner pigs in recent years.

True retention values for selenium were similar for all treatment groups and were close to 100%. True retention values for the selected vitamins in the cooked pork chops are given in Figure 1. Chops grilled at 400°F had significantly lower ($P<.05$) retention values for vitamin E and thiamin than those grilled at lower temperatures. Chops grilled at 400°F tended to have lower retention values for vitamin B-6 than those grilled at lower temperatures; however, these differences were

Table 1. Effect of grill temperature on yield and cooking times for boneless pork chops[1]

Grill temperature, °F	Yield (%)	Cooking time (min/g)
200°F	76.88 ± 3.90	0.21 ± 0.05[2]
250°F	78.29 ± 4.61	0.14 ± 0.03
300°F	77.57 ± 4.84	0.13 ± 0.02
350°F	77.63 ± 3.98	0.11 ± 0.02
400°F	76.01 ± 6.25	0.10 ± 0.01

[1]Values given as mean ± standard deviation.
[2]Significantly higher (P<.05) than cooking times of other groups.

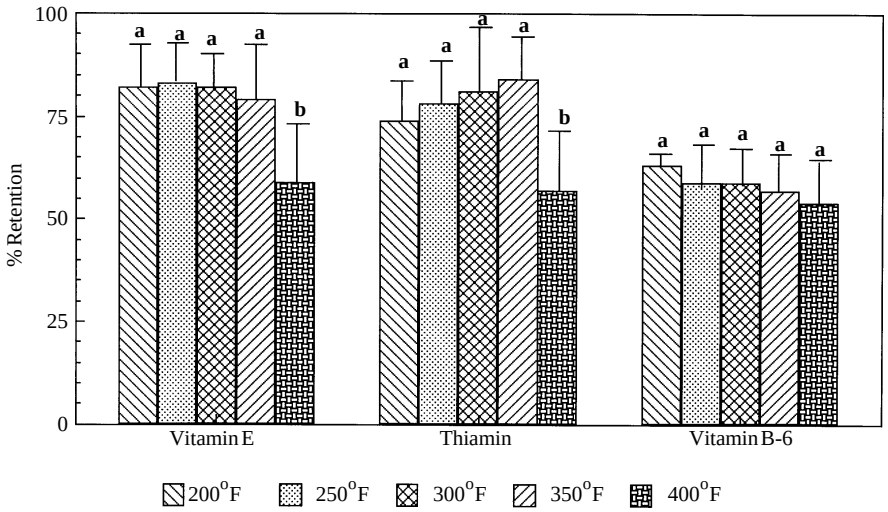

Figure 1. True retention of selected vitamins in boneless pork chops grilled at various temperatures. Values represent means ± standard deviations. Values for each nutrient not sharing a common superscript are significantly different at P<.05.

not significant.

Cooked pork chops (3.5 ounces) were found to contain approximately 96 to 144% of the selenium, 3 to 5% of the vitamin E, 14 to 20% of the vitamin B-6 and 18 to 42% of the thiamin needed to meet the daily Recommended Dietary Allowances of adults.

Conclusions and Implications

To optimize cooking time and nutrient retention, the most desirable temperatures for grilling boneless pork chops were 250, 300 and 350°F. Retention values for nutrients were higher when chops were cooked on grills set at lower temperatures. The cooking time was longer at the lowest grill temperature. Boneless pork chops are rich sources of selenium and good to rich sources of thiamin and vitamin B-6, nutrients which Americans frequently consume in low amounts. The chops also provide some vitamin E.

[1]Judy A. Driskell is a Professor, Fayrene L. Hamouz, an Assistant Professor, Sharon L. Davis and Jidong Sun, graduate students and David W. Giraud, a Research Technologist in the Department of Nutritional Science and Dietetics, University of Nebraska-Lincoln.