Highly Efficient and Effective Removal of Fat from Fried Chicken via Centrifugation

by Lucas B. Carey, Michael Dinitz, and Desiree Tillo

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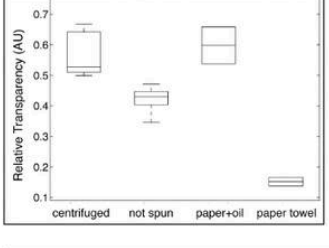
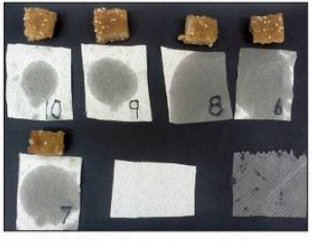
Approximately 20 percent of Israelis and more than 30 percent of Americans are obese [1,2]. Deep-fried foods contribute a significant fraction of their daily fat intake[3]. Fried chicken is a popular high-fat food in both Israel and the U.S. and contributes to a significant fraction of daily fat consumption [3]. Indeed, an increase in fried chicken consumption has been blamed for contributing to the increase in obesity in both China [4] and the Arabian Peninsula[5]. Most current research on reducing the fat in fried chicken has focused on reducing fat uptake during the frying process. [6] However, these methods have not been adopted by restaurants or consumers. Here we present centrifugation of the already cooked fried chicken as an alternative method for fat reduction. We show that centrifugation of fried chicken reduces the fat content. This method, in contrast to all existing methods that target food preparation and cooking, can be applied to already fried chicken, thus providing the first method that can be used directly by consumers with access to a centrifuge.



Results and Discussion

In order to determine if centrifugation is an effective post-purchase method for removing fat from fried chicken we placed equally sized pieces of chicken schnitzel on paper towels and spun them in a centrifuge. We find that spinning at 3000g (4000 rpm) results in an edible, yet visually unappealing piece of fried chicken (Figure 1). In contrast, spinning at 200g (1000 rpm) resulted in a piece of fried chicken that is visually indistinguishable from the un-spun negative control (Figure 2). Quantification of removed oils using the method of Simpson [7] showed a significant (Student's t-Test, $p < 0.001$) increase in the transparency of the paper towels, suggesting that a significant amount of oil was removed from the fried chicken (Figure 3). These results show conclusively that centrifugation is a cost-effective and efficient way to make fried chicken healthier. The results obtained from centrifugation at low speeds suggest that this method may be applicable in the absence of a centrifuge, e.g. by spinning a bucket tied with a string over one's head (Figure 4).



ABOVE LEFT: Figure 1. Centrifugation of schnitzel at 3000g affects schnitzel integrity and results in a visually unappealing piece of fried chicken.

ABOVE RIGHT: Figure 2. Centrifugation of schnitzel at 200g (pieces 6, 7, 8) results in an appetizing piece of fried chicken, similar to un-spun controls (pieces 9, 10).

BOTTOM LEFT: Figure 3. Centrifugation of schnitzel increases the transparency of paper towels.

NEXT PAGE: Figure 4. A schematic of the proposed low-initial-capital method. (A) Equipment set-up. (B) Spinning procedure.

Materials and Methods

Preparation and centrifugation of schnitzel. Two freshly deep-fried schnitzels were purchased from the cafeteria at the Weizmann Institute of Science in Rehovot, Israel. The schnitzels weighed 128.46 and 129.67 grams, suggesting that a highly precise manufacturing process produces these schnitzels. One of the schnitzels was cut into approximately equally breaded and sized (3.9–6.5 grams) pieces and heated in an LG MS3046SQ microwave for 45 seconds on full power. Schnitzel sections were then placed on pre-weighed paper towels and were weighed again prior to centrifugation. Schnitzel pieces were spun in an Eppendorf 5810R centrifuge for one minute at either 3000g or 200g, or left on top of the centrifuge as a negative control.

Measurement of paper towel transparency. Schnitzel pieces were removed from the paper towels and paper towels were placed on a Leica DM4000B microscope and images were captured at 50x magnification. Three images of each paper tower were taken and transparency was measured by the average pixel intensity across each image using ImageJ software.

Quantification of fat released from schnitzel. The oil released from schnitzel pieces was measured as previously described[7]. Briefly, the oil released from food makes any object (of the kind we are considering here) that comes in contact with the food transparent. By measuring the increase in transparency the relative amount of oil released can be estimated.

References

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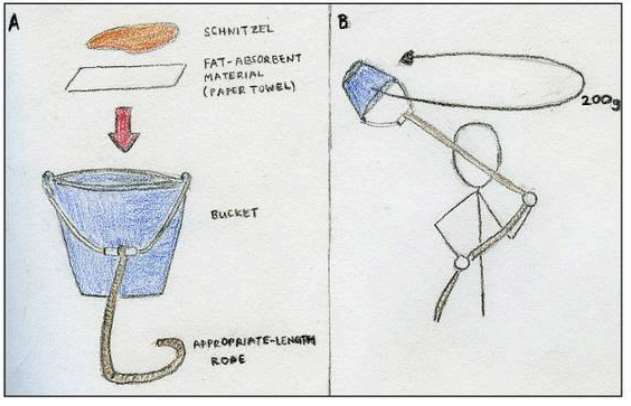
7. "King-Size Homer," *The Simpsons*, Fox, aired November 5, 1995.



Highly efficient and effective removal of fat from fried chicken via centrifugation

Lucas B Carey[1], Michael Dinitz[1] & Desiree Tillo[1]
[1]Department of Computer Science and Applied Mathematics. Weizmann Institute of Science. Rehovot, Israel.

ABSTRACT
Approximately 20% of Israelis and >30% of Americans are obese [1,2] and deep-fried foods contribute a significant fraction of the daily fat intake[3]. Fried chicken is a popular high-fat food and contributes to a significant fraction of daily fat consumption [3]. Indeed, an increase in fried chicken consumption has been blamed for contributing to the increase in obesity in both China [4] and the Arabian Peninsula[5]. Most current research on reducing the fat in fried chicken has focused on reducing fat uptake during the frying process [6], however, these methods have not been adopted by restaurants or consumers. Here we present centrifugation of the already cooked fried chicken as an alternative method for fat reduction. We show that centrifugation of fried chicken reduces the fat content. This method, in contrast to all existing methods that target food preparation and cooking, can be applied to already fried chicken, thus providing the first method that can be used directly by consumers with access to a centrifuge.

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Figure 1. Centrifugation of schnitzel at 4000g affects schnitzel integrity and results in a visually unappealing piece of fried chicken.

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Figure 4. A schematic of the proposed low-initial capital method. (A) Equipment set-up. (B) Spinning procedure.

References

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Figure 1

Figure 2

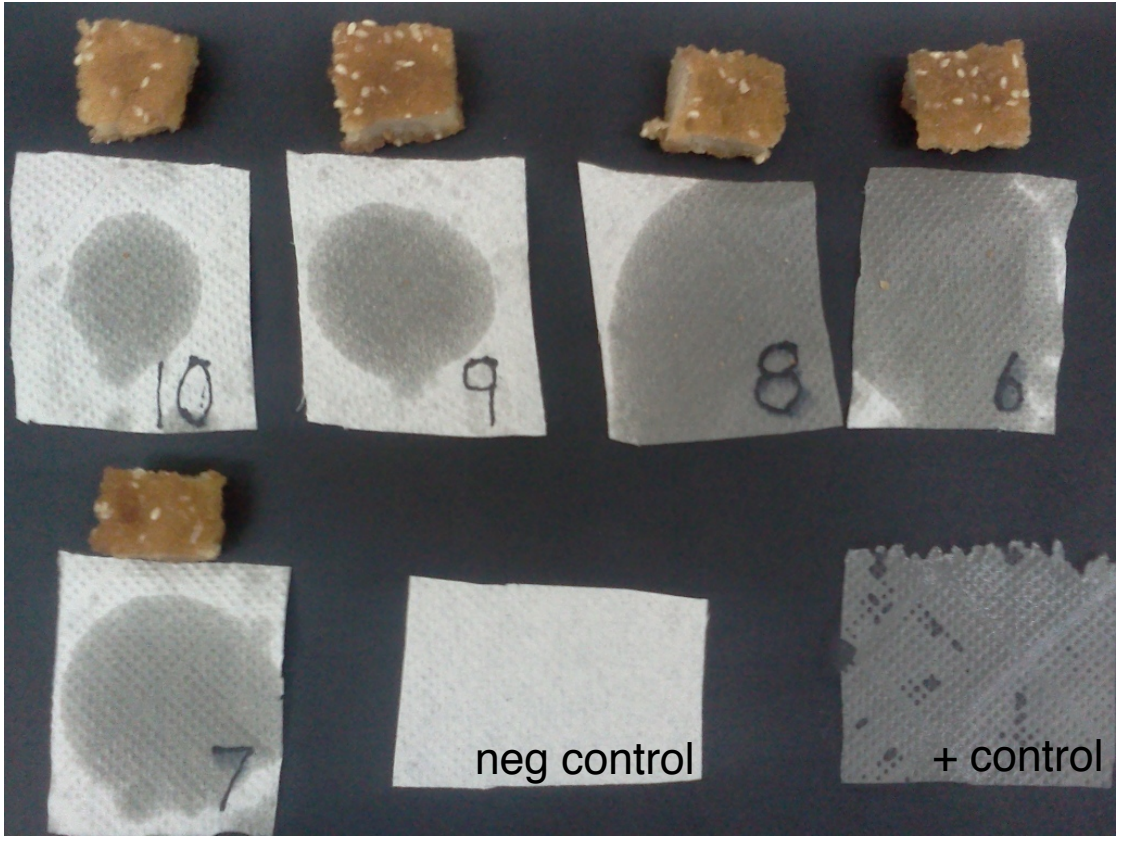


Figure 3

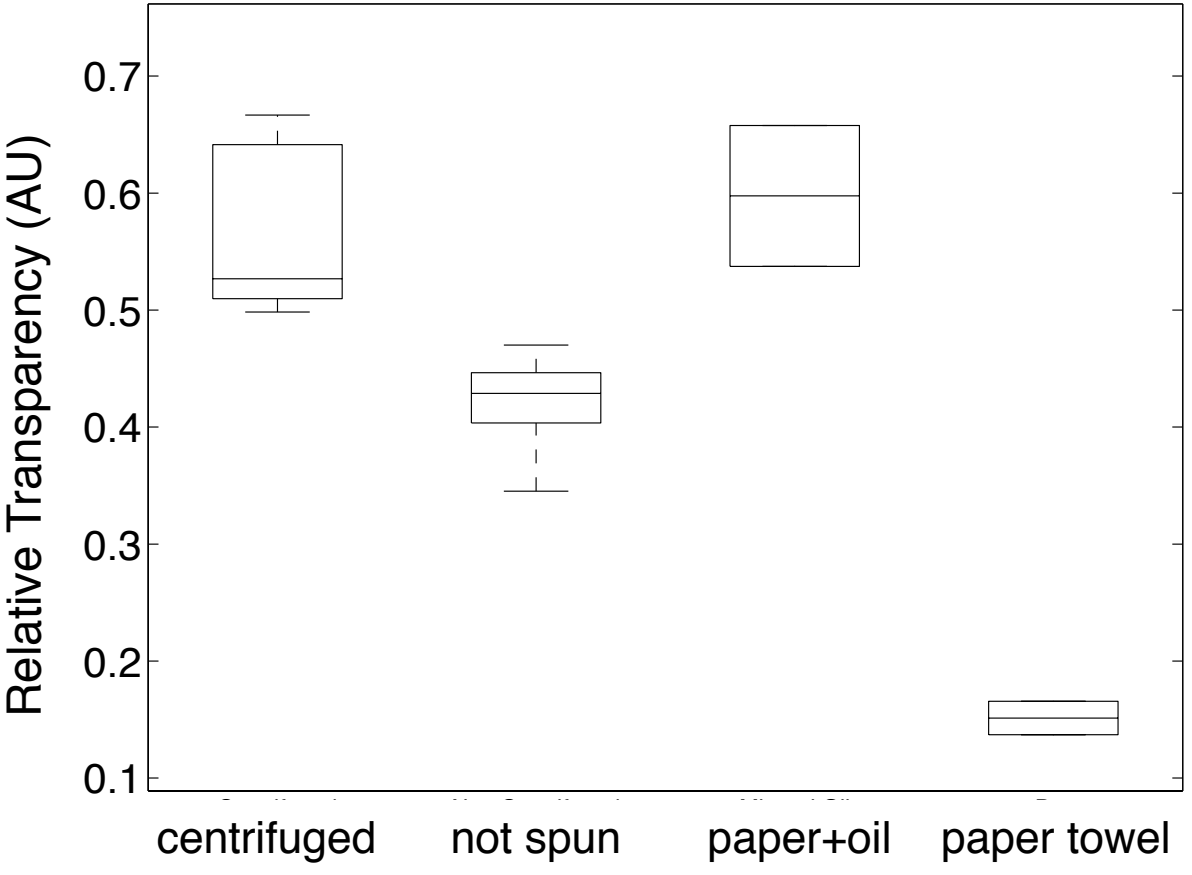
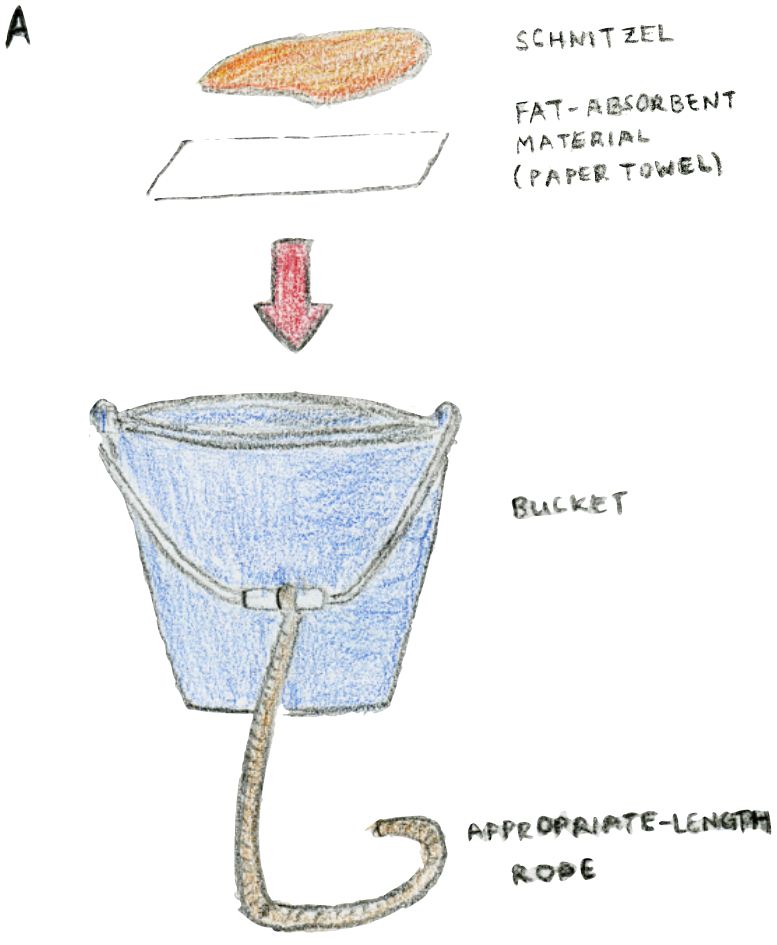
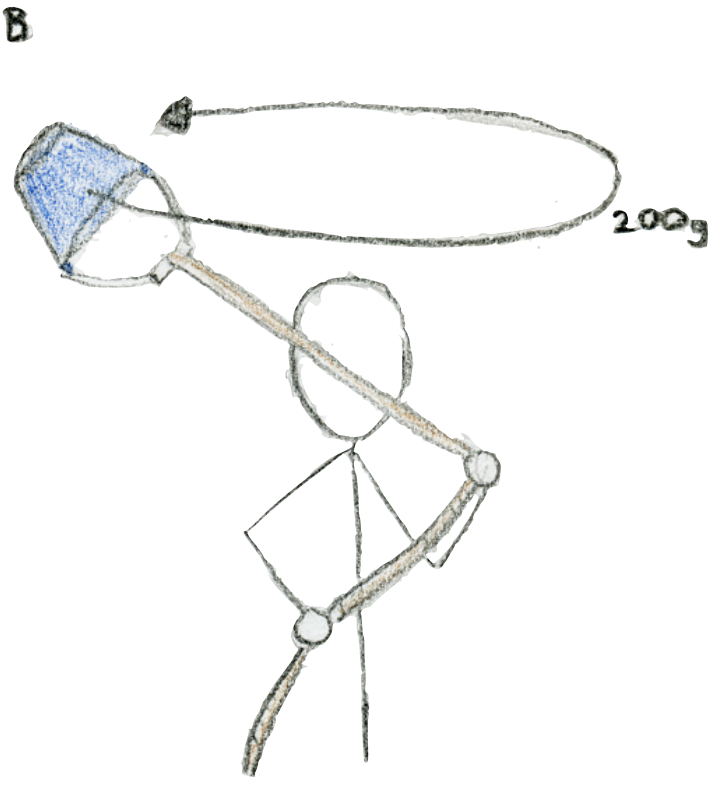

Relative Transparency (AU)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
centrifuged
not spun
paper+oil
paper towel

Figure 4


A
SCHNITZEL
FAT-ABSORBENT MATERIAL (PAPER TOWEL)
BUCKET
APPROPRIATE-LENGTH ROPE


B
200g