

QUESTION

Consumers want to know what brand of paper towel will be most effective to clean up liquids that are frequently found in the kitchen.

There is known research and consumer testing regarding the absorbency of water and the strength of paper towels saturated with water.

A review of the literature did not reveal any research testing paper towel absorbency with other common household liquids.

Because cooking oil spills are common and typically cleaned with paper towels, this research can help educate consumers on what brand of paper towel may help them efficiently clean olive oil and subsequently help consumers find a cost effective option for their household.

HYPOTHESIS

If Brawny paper towels have the best water absorption, then Brawny should be able to absorb more olive oil than other paper towel brands.

RESEARCH

- * The tight stitching technology utilized in Bounty paper towels creates more surface area. Additionally, Bounty has diamond stitching that keeps the 2-ply paper towel together, making it more durable. This results in a more absorbent and stronger paper towel than other brands (Admin).
- * Brawny is a thick paper towel with a cloth-like texture and does not become thin when saturated. This makes Brawny durable and strong. A Brawny user can vigorously scrub any area that needs cleaning (Vu).
- * Viva's trademark "V-weave technology" makes Viva paper towels strong and durable. The texture allows "dirt, grime, and grease to be removed" quickly (Vu). This high priced paper towel has a softer texture than other paper towels but it's premium pricing can be 3-4 times the cost of other paper towels.
- * Kirkland paper towels are a cheaper bulk alternative. These paper towels are absorbent. Kirkland paper towels are strong and do not tear easily when saturated. However, Kirkland paper towels do not maintain strength when saturated with water (Kral/Oliver).
- * Scott paper towels have strong ridges which "clean any mess fast." (Journal Review Team). Scott paper towels are created with a mix of water and soft and hardwood pulp fibers, making them eco-friendly but thin and less absorbent.
- * Seventh Generation is eco-friendly and is 100% recyclable. This is a thin, 1-ply paper towel. "It is not good at cleaning up basic messes" (Kral/Oliver). Seventh Generation's brown paper towels do not use chlorine bleach. Because of this, their paper towels may be undesirable to consumers (Jackson).

VARIABLES

IV: The brand of paper towels.

DV: The olive oil absorbency(mL/50mL)

Constants: The dimensions of the paper towels being used to conduct the experiment, the time given for each paper towel to absorb the olive oil, the duration of the countdown, the brand of olive oil, the surface being used to conduct the experiment, the way to measure how much olive oil the paper towel absorbed, the graduated cylinder being used to hold the olive oil which the paper towels will absorb, and the amount of olive oil being used for each level/replicate to absorb.

MATERIALS

- 100mL graduated cylinder
- Filippo Berio Extra Virgin olive oil
- Scissors
- Timer
- Dish towels x3
- Bounty paper towels
- Brawny paper towels
- Viva paper towels
- Scott paper towels
- Kirkland paper towels
- Seventh Generation paper towels

PROCEDURE

1. Prepare your materials: a cloth dish towel x3, a Brawny paper towels x9 sheets, a Bounty paper towels x9 sheets, a Viva paper towels x9 sheets, a Scott paper towels x9 sheets, a Kirkland paper towels x9 sheets, and a Seventh Generation paper towels x9 sheets
2. Cut each sheet with scissors to the size of the smallest paper towel sheet (Brawny)
3. Fold all of the sheets lengthwise twice
4. Organize your materials on a flat surface. Ensure that each brand is together and labeled. Keep a waste container nearby for quick disposal of soiled paper towels. Have your graduated cylinder and Filippo Berio Extra Virgin Olive Oil bottle within reach.
5. Fill the graduated cylinder with 50mL of olive oil
6. Set a timer for 14 seconds
7. Start with the dish towel control by positioning it into the graduated cylinder without touching the olive oil. Start your timer, wait 4 seconds, and then push the towel into the oil. Allow the dish towel to saturate in the olive oil for 10 seconds.
8. Remove and discard the dish towel. Measure how much olive oil is left in the graduated cylinder.
9. Note the measurement in your data table
10. Refill the graduated cylinder up to 50 mL with olive oil
11. Place a Brawny paper towel in the graduated cylinder for 10 seconds, saturating it with olive oil.
12. Note the measurement on the data table
13. Refill the graduated cylinder to 50 mL of olive oil
14. Discard the used paper towel in the waste container
15. Repeat steps 11-14 eight more times with Brawny
16. Repeat steps 11-14 nine times with Bounty paper towels
17. Repeat step 16 with Viva paper towels
18. Repeat step 16 with Scott paper towels
19. Repeat step 16 with Kirkland paper towels
20. Repeat step 16 with Seventh Generation paper towels
21. After the experiment is complete, wash the olive oil off your hands.
22. Clean up your materials and work space

PAPER TOWEL ABSORBENCY

Brand of Paper Towel					Mean	Mean of Means
Trial 1		11mL/50mL	12mL/50mL	14mL/50mL	12.3mL/50mL	14.067mL/50mL
Trial 2		13mL/50mL	13mL/50mL	17mL/50mL	14.3mL/50mL	
Trial 3		16mL/50mL	13mL/50mL	18mL/50mL	15.6mL/50mL	
Trial 1		20mL/50mL	16mL/50mL	16mL/50mL	17.3mL/50mL	17.767mL/50mL
Trial 2		15mL/50mL	20mL/50mL	19mL/50mL	18mL/50mL	
Trial 3		17mL/50mL	15mL/50mL	22mL/50mL	18mL/50mL	
Trial 1		15mL/50mL	14mL/50mL	8mL/50mL	12.3mL/50mL	13.767mL/50mL
Trial 2		14mL/50mL	13mL/50mL	15mL/50mL	14mL/50mL	
Trial 3		18mL/50mL	17mL/50mL	10mL/50mL	15mL/50mL	
Trial 1		16mL/50mL	18mL/50mL	17mL/50mL	17mL/50mL	15.867mL/50mL
Trial 2		18mL/50mL	13mL/50mL	14mL/50mL	15mL/50mL	
Trial 3		16mL/50mL	17mL/50mL	14mL/50mL	15.6mL/50mL	
Trial 1		18mL/50mL	13mL/50mL	15mL/50mL	15.3mL/50mL	14.633mL/50mL
Trial 2		15mL/50mL	12mL/50mL	13mL/50mL	13.3mL/50mL	
Trial 3		12mL/50mL	21mL/50mL	13mL/50mL	15.3mL/50mL	
Trial 1		17mL/50mL	13mL/50mL	9mL/50mL	13mL/50mL	10.867mL/50mL
Trial 2		9mL/50mL	12mL/50mL	10mL/50mL	10.3mL/50mL	
Trial 3		10mL/50mL	9mL/50mL	9mL/50mL	9.3mL/50mL	
Trial 1		28mL/50mL	—————>	—————>	28mL/50mL	32.667mL/50mL
Trial 2		29mL/50mL	—————>	—————>	29mL/50mL	
Trial 3		41mL/50mL	—————>	—————>	41mL/50mL	

Each paper towel was dipped into 50mL of olive oil in a graduated cylinder for 10 seconds.



Cost
per Roll

Quantity

Absorbency

BRAWNY®

\$1.92

120 sheets
2-ply

14.1 mL

Bounty®

\$2.50

128 sheets
2-ply

17.8 mL

Viva®
Soft & Strong Like Cloth

\$8.77

91 sheets
1-ply

13.8 mL

Scott®

\$3.30

102 sheets
1-ply

15.9 mL

**KIRKLAND
Signature**

\$1.92

160 sheets
2-ply

14.6 mL

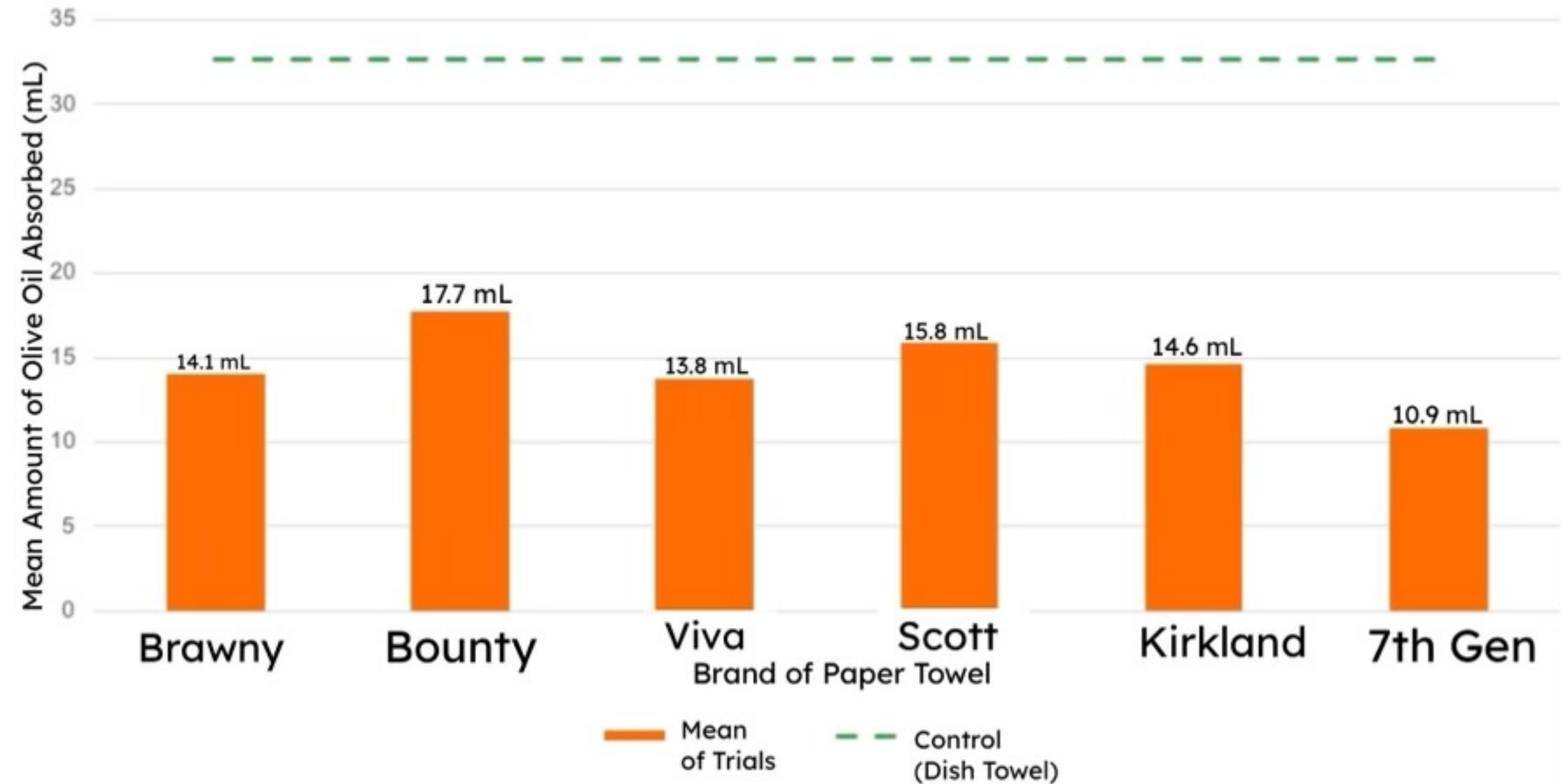
**Seventh
GENERATION**

\$4.79

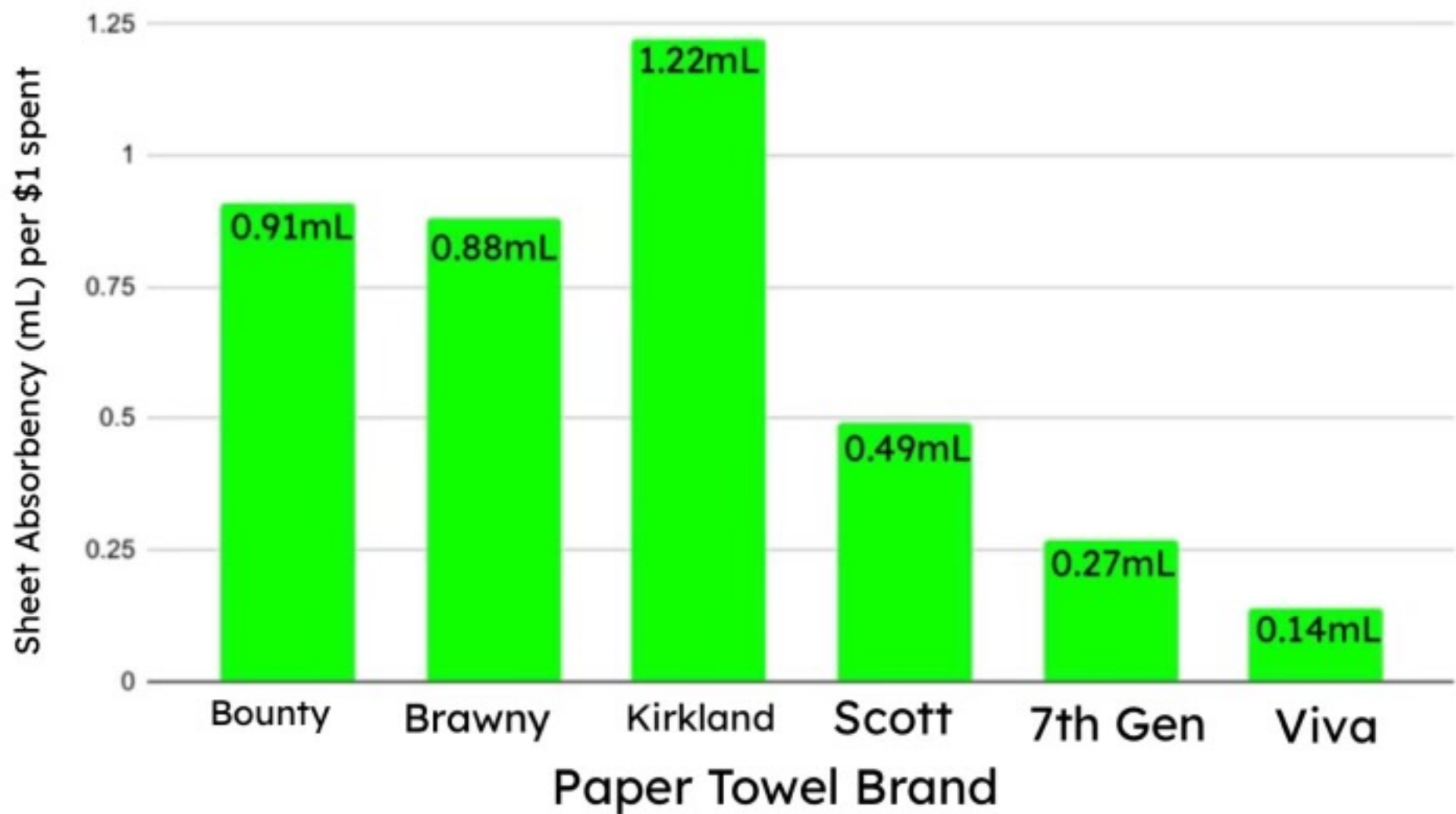
120 sheets
1-ply

10.9 mL

PAPER TOWEL ABSORBENCY



COST ANALYSIS



	Cost per roll	Sheets per roll	Absorption MOM (mL)	Absorbency (mL) per \$1 (Roll)	Sheet Absorbency (mL) per \$1
Bounty	\$2.50	128	17.767	7.11	0.91
Brawny	\$1.92	120	14.067	7.33	0.88
Kirkland	\$1.92	160	14.633	7.62	1.22
Scott	\$3.30	102	15.867	4.81	0.49
7th Gen	\$4.79	120	10.867	2.27	0.27
Viva	\$8.77	91	13.767	1.57	0.14
* Each roll has a different quantities of sheets					
* Each sheet size varies					
* Numbers are based on the actual purchase price. This price varies on different websites					
In order to standardize, cost can be calculated per 1000 sheets					
MOM= Mean of Mean					

Kirkland paper towels from Costco had the highest absorbency per \$1 spent followed by Bounty, Brawny, Scott, 7th Generation, and Viva.

ERROR ANALYSIS

Systemic errors:

- A specific method on how to dip the paper towel samples into the graduated cylinder was not defined, which means that some samples may have had more surface area exposed to absorb the olive oil than others.
- Each of the six different paper towel brands' sheets and the dish rags used in the experiment were not originally the same size. In order for this experiment to provide objective data regarding absorbency, each paper towel had to be cut by hand to match the size of the smallest sheet, which was Brawny. The properties of each cut sheet may have been altered, causing the results to be impacted.
- The paper towel samples being tested may have been dipped in the olive oil for more or less than 10 seconds given the 4-second countdown. This error can be corrected by conducting the experiment with a partner starting the timer without a countdown.
- The procedure did not mandate washing hands in between samples. Because of this, some paper towel samples were exposed to olive oil even before it was dunked inside the graduated cylinder.
- There was also olive oil residue on the sides of the graduated cylinder, which means that the paper towel samples may have absorbed olive oil during the countdown.

Random errors:

- Measurement of olive oil relied on human perception of the meniscus inside the graduated cylinder. If the meniscus was not read at exactly the same angle each time could contribute to erroneous data.

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