Coffee Consumption Among Graduate Students Writing Dissertations

by

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Dissertation

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Abstract

The abstract must be placed immediately after the title page. There is no word limit for the abstract. No images or footnotes should appear in the abstract.

Acknowledgements

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A dedication is optional.

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Chapter 1 Coffee Consumption Mathematics

Coffee extraction occurs when hot water is poured over coffee grounds, causing desirable compounds such as caffeine, carbohydrates, lipids, melanoidins and acids to be extracted from the grounds.

Extraction yield refers to the solubles dissolved during brewing. This is often expressed as a percentage of the coffee's mass. It is also known as solubles yield or simply extraction. The extraction yield percentage describes the mass transferred from coffee grounds to water, expressed as a percentage of the initial mass of the grounds. It is given by (1).

$$Y = \frac{M_2 \cdot t}{M_1} \tag{1}$$

where Y is the extraction yield expressed as a percentage, t is the total dissolved solids expressed as a percentage of the final beverage, M_1 is the mass of the grounds in grams, and M_2 is the final beverage's mass in grams. This means that an extraction yield of 20% can be obtained by brewing 18 grams of coffee, resulting a 36-gram final beverage with a t of 10%. Yield can also be expressed as total dissolved solids, or parts-per-million (ppm).

Chapter 2 Coffee Berries

A coffee bean is a seed from the Coffea plant and the source for coffee. This fruit is often referred to as a coffee cherry, but unlike the cherry, which usually contains a single pit, it is a berry most commonly found having two seeds with their flat sides together.

Figure 1: Clumps of coffee berries growing on a tree (Photo by Brian Smith)

2.1 Characteristics of Coffee Berries

The two most economically important varieties of coffee plants are the arabica and the robusta; approximately 60% of the coffee produced worldwide is arabica and some 40% is robusta.

Table 1: Common Coffee Species Comparison

Species	**Flavor Profile**	**Global Production**
Arabica	Smooth, complex, with fruit notes	60%
Robusta	Strong, bitter, earthy	40%

The following table summarizes key information about coffee berries:

Table 2: Key Characteristics of Coffee Berries

Color at Ripeness	Bright red, yellow or pink depending on variety
Size	Approximately 15 mm in diameter
Weight	300–330 mg dry
Seeds per Berry	Typically 2 seeds; 10–15% are peaberries (single seed)
Time to Maturity	6–11 months depending on variety and growing conditions
Caffeine Content	1.0–2.5% by dry weight
Growing Conditions	Altitudes of 600–2,200 meters; temperatures of 15–24°C
Shelf Life (Fruit)	2–3 weeks if left on tree after ripening

Chapter 3 Coffee Chemistry

Caffeine $C_8H_{10}N_4O_2$ is a central nervous system (CNS) stimulant of the methylxanthine class and is the most commonly consumed psychoactive substance globally.

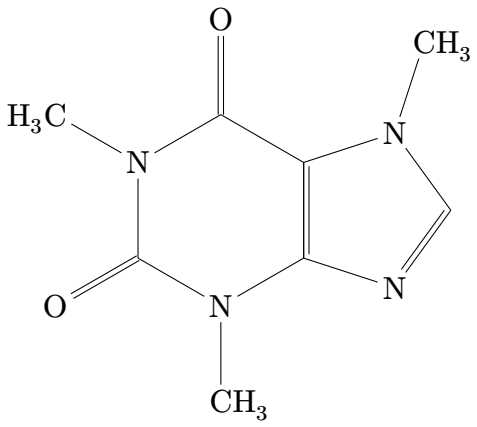

Figure 2: Molecular structure of caffeine ($C_8H_{10}N_4O_2$)

Some people [1] drink beverages containing caffeine to relieve or prevent drowsiness and to improve cognitive performance. To make these drinks, caffeine is extracted by steeping the plant product in water, a process called infusion.

Overall population mean coffee consumption was stable from 2003 to 2012 [2].

[1] Over 90% of American adults consume caffeine daily [1].

Chapter 4 Coffee Charts

Data visualization is an important aspect of understanding coffee consumption patterns and production statistics. The following chart displays typical daily coffee consumption at different times (see Appendix A.1).

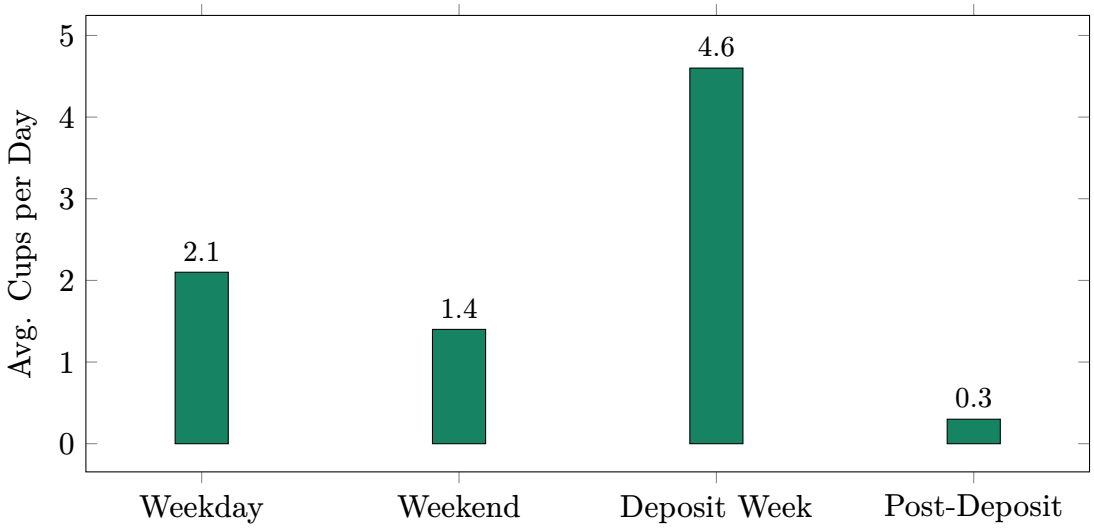

Figure 3: Average Daily Coffee Consumption By Period

The following line chart illustrates the trend of coffee consumption throughout a week. There is a noticeable increase in consumption during the middle of the week, peaking on Thursday and Friday, followed by a decline over the weekend.

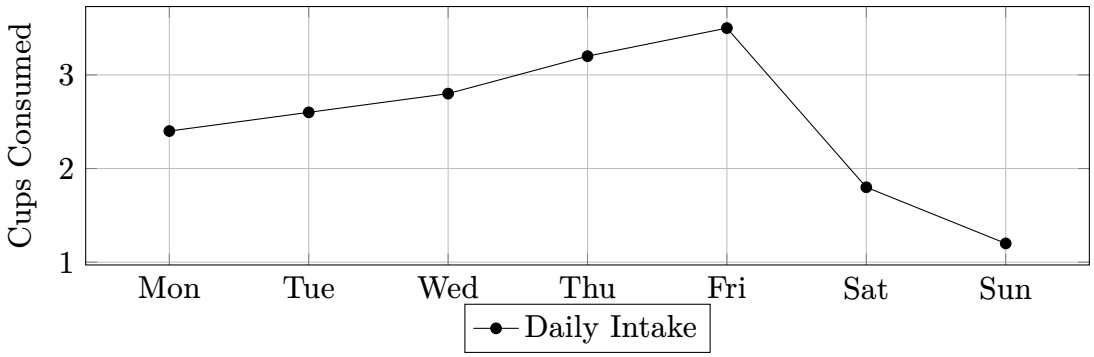

Figure 4: Coffee Consumption Trend Throughout the Week

References

[1] SleepFoundation. "94% of us drink caffeinated beverages. but what does it do to our sleep?" Accessed: Feb. 17, 2025. [Online]. Available: https://www.sleepfoundation.org/sleep-news/94-percent-of-us-drink-caffeinated-beverages

[2] E. Loftfield et al., "Coffee drinking is widespread in the united states, but usual intake varies by key demographic and lifestyle factors123," *The Journal of Nutrition*, vol. 146, no. 9, pp. 1762–1768, 2016, ISSN: 0022-3166. DOI: https://doi.org/10.3945/jn.116.233940 [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0022316623007046

Appendix A: Coffee Survey

A.1 Survey Questions

1. How many cups of coffee do you consume on an average weekday?

2. How many cups of coffee do you consume on an average weekend day?

3. How many cups of coffee do you consume during deposit week?

4. How many cups of coffee do you consume after deposit week?

Appendix B: Coffee Survey Data

B.1 Survey Respondent Statistics

A total of 100 graduate students participated in the coffee consumption survey. The average age of respondents was 28 years, with a range of 22 to 35 years.

B.2 Survey Opinions

When asked about their coffee preferences, 70% of respondents indicated a preference for dark roast coffee, while 30% preferred light roast.