

**An Investigation into Green Laundry Products**

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# An Investigation into Green Laundry Products

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## Abstract

The UBC Student Housing and Hospitality Services (SHHS) is looking for a more environmentally friendly laundry option for the students in residence. Using a triple bottom analysis, the problem is to find a product that fits in with UBC's Water Action Plan and Sustainability Plan. Looking at the environmental, social and economic aspects, which the stakeholder wanted weighted evenly, a detergent is to be recommended for use on the UBC campus.

The methods used for conducting the triple bottom analysis included student surveys, detergent testing, environmental assessment and economic analysis of four different detergents that varied from local to brand name. To cover the social aspect the detergents were rated from one to four on their effectiveness of cleaning as well as how well they fit into what students wanted. The economic analysis was done by calculating the price per load for each detergent and the environmental assessment was completed by researching certifications as well as contents of each detergent. While doing our analysis the conclusions found fit in approximately with our hypothesis. To make a final recommendation the rankings from the three categories were added up and totalled with no scaling between them to keep them evenly weighted.

After testing Tide Coldwater, Echoclean, Bio-Vert and Vancouver Only, a conclusion was reached through the final analysis. Bio-Vert, a Canadian made, EcoLogo certified laundry detergent with competitive pricing and effective cleaning abilities, is the final recommendation made to UCB Student Housing and Hospitality Services for use in UBC residences.

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## Glossary

EcoLogo	Tells the story of a product's environmental performance throughout its lifecycle, enabling purchasers to identify holistically greener products and meet their sustainability goals. These voluntary, multi-attribute, lifecycle-based environmental certifications indicate that a product has undergone rigorous scientific testing, exhaustive auditing, or both, to prove its compliance with stringent, third-party, environmental performance standards (UL, 2013).
Life-Cycle Assessment	A technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by compiling an inventory of relevant energy and material inputs and environmental releases, evaluating the potential environmental impacts associated with identified inputs and releases and interpreting the results to help you make a more informed decision (United States Environmental Protection Agency, 2012).
Phosphates	A nutrient commonly used for fertilizer as well as a cleaner, but can cause significant environmental damage if leached in large quantities into natural water bodies.
Post-Consumer Recycled	Material produced by the end consumer of a material stream, which is then recycled by a company that chooses to use this waste instead of new materials. This act keeps our landfills much less full.
Soft Water	Water containing less minerals and metals (usually magnesium and calcium) in it compared to hard water. Soap and cleaning products lather up much easier in soft water. Vancouver and most coastal area have soft water while the rest of Canada typically has hard water.

## 1.0 Introduction

The UBC Student Housing and Hospitality Services was interested in finding a more environmentally friendly laundry detergent to make available for the campus residences and to better fit in with UBC's Water Action Plan and Sustainability Plan. This recommendation was to be made by completing a triple bottom analysis that looked at the social, economic and environmental aspects of different laundry detergents.

We chose four different laundry detergents to test in the three categories. Tide Coldwater was our standard brand name detergent to compare the more environmentally friendly products with. Bio-Vert was a Canadian made, EcoLogo certified product. Vancouver Only was a locally made laundry detergent made specifically for Vancouver's soft water and our final product was a generic no name environmentally friendly product called Echoclean that came in many different scents.

In the following report, under each section a different aspect of the triple bottom analysis was considered and each product was given a ranking of one to four in each category. The final recommendation took each category, equally weighted to find the most suitable product for our stakeholders.

## 2.0 People

The social aspects of the laundry detergents are considered here. An effectiveness test was done first to rank the detergents and then a student survey was completed to find out which detergent best met the wants of the students.

### 2.1 Testing the Cleaning Capabilities of Selected Detergents

The testing of the different laundry detergents was performed so we could see what brand of laundry detergent actually cleans the fabrics the best. The test was performed at the Gage residence on November 2, 2013. This test will tell us which of the detergents cleans the fabric the best from such stains as grass, wine, oil and dirt. This test was performed at the most environmentally sustainable parameters to ensure that this is the best product at sustainable washing settings.

#### **Equipment**

- Huebsch washing machine located in the Gage residence building.
- Huebsch Dryer located in the Gage residence building.
- White bed sheet
- Measuring cups
- Sharpe permanent marker
- Hockey tape

#### **Staining material**

- Copper moon merlot (wine)
- Dirt from the garden outside gauge
- Grass dirt mix from the lawn outside of the Gage residence
- 100% pure Canola Oil Safeway brand

#### **Detergents**

- Tide Coldwater laundry detergents
- Bio-Vert laundry detergent
- Echoclean unscented laundry detergent
- Vancouver Only laundry detergent



### 2.1.1 Step-By-Step Description

#### **Prepare sheets for staining**

The sheets used for the testing was a bed cover that was cut into four equal sizes. The first task completed was to cut the elastic part of the sheet so that it could lay flat. We secondly marked out four equal areas on the bed sheet for cutting. The sheet was then cut into four smaller pieces of fabric which measured roughly 30" width by 40" length.

#### **Sheets were stained**

Each sheet was stained with equal amounts of staining material. The sheet was then placed over a plastic page to prevent that staining material from going through the sheet onto the floor. All liquids were poured from a height of approximately 100mm, the following is a breakdown of how each stain was applied and figures 1 through figure 4 show the bed sheets before they were put in the wash:

- 20 ml of Canola oil was poured on the bed sheet and labelled location A
- 20 ml of red wine was applied to the bed sheet and labelled as location B
- 1 Handfull of grass dirt mixture was rubbed on the bed sheet
- 1 Handfull of dirt was rubbed on the bed sheet

#### **Washing and drying of the sheets**

The sheets were put into four individual washing machines each filled with two t-shirts and two blankets to mimic a normal sized load. All four of the laundry machines were filled with the same amount of laundry to minimise any possible errors. All of the loads would be washed with the recommended amount of detergent for a normal load recommended by each brand. All four machines were set with following setting:

- medium sized load
- normal wash setting
- cold water
- Washing machine timer set to thirty minutes.
- Dryer timer set to thirty minutes

After the laundry was finished washing it was taken from the washing machine and placed into the drier after the laundry was completed the sheets were separated from the rest of laundry and laid out on the floor to take comparison photos. The ranking for how good the detergent cleaned the sheets was determined by human eye only. The figures 1 through 4 show comparisons between the sheets before and after washing.

**Before Washing**



**After Washing**



Figure 1: Image on the left shows the sheets prior to washing and the image on the left shows the sheets after being washed with tide cold water (Fryers, 2013).

**Before Washing**



**After Washing**



Figure 2: Image on the left shows the sheets prior to washing and the image on the left shows the sheets after being washed with Bio-Vert (Fryers, 2013).



Figure 3: Image on the left shows the sheets prior to washing and the image on the left shows the sheets after being washed with Vancouver Only (Fryers, 2013).



Figure 4: Image on the left shows the sheets prior to washing and the image on the left shows the sheets after being washed with Echoclean (Fryers, 2013).

### 2.1.2 Summary

During the test there we discovered that the best detergent over all was the tide cold water. This was followed by Bio-Vert in second and then Echoclean and Vancouver Only in third and fourth respectable. This test showed that the best laundry detergent for getting your clothes clean over all is the tide cold water. The following table summarizes all the results from our testing. Each detergent was given a ranking between one and four with one being the best and four being the worst at cleaning each particular stain.

Detergent	Wine	Oil	Dirt	Grass	Total	Overall Rank
Tide	1	2	1	2	6	1
echoclean	4	3	3	4	14	4
Bio-Vert	2	1	2	3	8	2
Vancouver Only	3	4	4	1	12	3

Table 1: Shows the ranking received by each detergent, one being the best and four being the worst. The total gives are level of scaling for each product the lower the total the better the detergent.

### 2.1.3 Sources of Error

The following is a list of areas where possible error could have occurred in our testing:

- For the adding of the dirt and grass stains it was hard to get a controlled amount of staining material on all the sheets.
- We used the cold water setting for all loads of laundry regardless of it was its recommended setting as we wanted to find which detergent works best with a lower amount of energy consumption.
- Some of the laundry used in the load was of different colour and material which could have caused an error because of not having the exact same load make up.
- The stains were only allowed to set for about twenty minutes because of this the stains were not allowed to fully set.
- The use of four different washing machines could cause a difference in quality as they could each provide a different level of cleaning ability.

## 2.2 Student Survey Results

We surveyed students that live in the Gage Residence to find out their thoughts on the laundry services in residence and their preferences for detergent. Also in our investigation we shared information with another research team who conducted surveys in the Vanier Residence. Using both these surveys we can get a better idea of what students like in both the Suite Style and Traditional Style residences. This section will explain our analysis of the results.

### 2.2.1 Gage Survey (Suite Style)

#### What type of detergent do you prefer?

This table shows that they preferred liquid detergent to powder. A few residents didn't have a preference but it was an insignificant amount and not necessary to take into consideration.



Answer Choices	Responses
Powder	5%
Liquid	80%
No Preference	15%

Table 2: Answers to survey

**Chose the most important factor of a detergent for you:**

You can see in the table below that the price was of greatest importance followed by effectiveness and then environmental impact. A value of 3 is the highest value a factor could achieve, whereas a value of 1 would be lowest and least valuable. The price was deemed to be greatest importance because it was chosen first 50% of the time, followed by effectiveness being chosen first 40% of the time and then finally 10% of the time environmental impact was chosen first. The overall rankings of factors of detergents were price being most important, then effectiveness of cleaning, and finally environmentally impact was of least importance.

Chosen	1st	2nd	3rd	Average Value
Price	50%	45%	5%	2.45
Environmental impact	10%	15%	75%	1.35
Effectiveness as a detergent	40%	40%	20%	2.20

Table 3: Ranking of importance to students

**Do you have any other comments or suggestions for UBC Residence with regards to the laundry services?**

Each of the respondents had the opportunity to comment on any other suggestions they had for laundry services. The bulk of the comments were concerning the machines that were provided. They said that they were costing too much and that they were either combining their lights and darks or not washing their clothes as often due to the high cost. They suggested that there should be more efficient machines or have drying racks available.

**Questions attached in Appendix A:**

We asked 3 other questions that will be explained in addition to the charts provided in Appendix A. The first chart shows that 95% of students prefer bulk purchasing rather than single. No respondents would prefer single packaging although the other 5% said they had no preference. These results could be due to the cost savings of buying in bulk, which we noticed were preferred in question one above. One of the other charts investigated the students' preference for scents or no scents in their detergent. It seemed to be if anything they prefer scented detergent with 40% of the population interested compared to 25% preferred unscented and 30% with no preference. Finally we asked these students how often they did their laundry to make sure that we surveyed the right population

### 2.2.2 Vanier Survey (Traditional Style)

Most of the survey questions we used from the other team did not help us in our effort to find what students really wanted. They asked a few questions such as where student already buy their laundry and what they already use.

#### Is using a sustainable detergent important to you?

This table shows that students' value sustainability, but it is not one of their top priorities. More than half of the respondents thought that sustainability was no more than somewhat important. This shows us that they are looking for more detergent that is effective and costs less for them, which agrees with the results from the Gage Residence.

<b>Very important</b>	<b>27%</b>
<b>Somewhat important</b>	57%
<b>Not important</b>	16%

Table 4: Importance of sustainability

#### Would you rather buy your detergent in bulk or pay per load?

Again we see that both the Vanier and Gage residents said that they prefer to buy their detergent in bulk. This again could be due to the fact that bulk purchases are also usually less expensive and the students would save money.

<b>Bulk</b>	<b>66%</b>
<b>Per load</b>	34%

Table 5: Bulk versus single distribution

### 2.2.3 Summary of Survey

The residents identified what was important to them in this survey. As you can see they rated their values and said that price was the most important factor to them, followed closely by effectiveness and lastly environmental impact was of least importance to them. All these results have been totalled in the table below to show the best detergent in relation to what the students want.

Detergent	Best Price	Bulk	Liquid	Sustainability Effort	Overall Rank
<b>Bio-Vert</b>	3	4	4	4	1
<b>Tide</b>	1	3	4	2	2
<b>Echoclean</b>	2	2	4	1	3
<b>Vancouver Only</b>	4	1	1	3	3

Table 6: Rating of detergents based on survey results

### 3.0 Planet

This section takes into consideration the environmental aspect of each product. An environmental background check was done into each product through the producing company as well as the company's environmental commitment and then the detergents were ranked one to four based on their impact on the environment.

Originally during WWII, the fats and oils that were used to make soap became scarce this was due to them being used to manufacture nitro-glycerine for explosives. Since we were finding petroleum all over the place by this time new chemical substitutes started being developed from petroleum for the use of cleaning. This is where the term laundry soap was changed to laundry detergent. Detergents then became household regular products by post war.

The use of these new petroleum based chemicals used in detergents supplied many adverse effects. The most noticeable chemical is the phosphate, are used in detergents and cleaners to suspend dirt particles, soften water and reduce spotting. However, the environmental hazard of phosphates cause excessive growth in aquatic plants which leads to the suffocation of fish & underwater life. Essentially this is due to an excess of phosphates, which remove oxygen from the water and alter the growth of these living things. A restriction on the amount of phosphates used in detergents has been reduced to .5% but this doesn't apply to commercial or industrial sources.

Phosphates haven't been the only source to impact the environment in a negative way. As the global economy has grown and global trade as well the shipment distance to the end users of products has increased enormously. The effects of this are an increased carbon footprint that will have a negative result on our atmosphere. Carbon footprint is a gage used to determine the amount of carbon dioxide released while producing and shipping a product. This footprint on average can be from 0.5kg to 1.0kg per load depending on the product and the other entire factor leading up to the detergents consumption.

Between the introductions of phosphates in detergents to the increased carbon footprint these two factors have a huge effect on our environment. Still to this day laundry detergent producers still are not legally required to list their ingredients, which is a sign of concern. Due to this reason finding any other source of chemicals that could be hazardous to the environment became impossible other than phosphates. This was since all products investigated from Tide to Echoclean, Vancouver Only, and Bio-Vert only mentioned they were phosphate free and from research found that was the most common used chemical that has a negative effect to the environment. Add reduction in the carbon footprint by finding a product that works both efficiently, environmentally friendly, and is produced as locally possible as your able to find a higher level of sustainability may be achieved.

### 3.1 Company History

Tide laundry detergent was originally designed to be specifically heavy-duty machine cleaning. Tide was first introduced in U.S. test markets in 1946 as the world's first heavy-duty detergent. Initially came as a white powdered bead but then changed over to liquid form. Tide is part of a huge global distribution chain that produces a competitive price point due to its vast size. The ownership group is Proctor and Gamble and yet nothing was found with regards to awards for sustainability they do strive for better sustainability efforts.

Bio-Vert is an environmentally friendly laundry soap that is manufactured by Savons Prolav Inc. The company is a family owned and operated business that is located in Laval, Québec. Savons Prolav has

been has been in the production of green household cleaning supplies since 1984. In 2011, Savons Prolav was recognized in the Recognition Gala in environment and sustainable development of the Board of Trade of Metropolitan Montreal for having a cleaning product with low environmental impact.

Savons Prolav has a sustainability policy that implements a structure to reduce the impact of human activity on the environment. They believe that being environmentally friendly does not just mean how production and marketing are conducted, but also how being green is implemented. There are five categories, which they believe this can be accomplished. The first is operations and product development, which means things like complying with environmental laws and regulations, conducting life cycle of products, pollution prevention, and using material that has been recycled. Next is employee awareness and involvement by providing environmental protection training and incentives for coming to work in a green manor. Then there's the use of suppliers, which they always try to use locally to minimize shipping distances for reduced CO2 emissions into the atmosphere and also suppliers that instill the same kind of commitment to being environmentally friendly. Communication and transparency is next by being honest with reporting their environmental performance, provide environmental facts about their products with the consumers, and having information published on annual reports by a third party. Lastly, corporate social responsibility by having community incentives directed at improving environmental quality is the last of Savons Prolav five categories.

Vancouver Only is a Vancouver based product designed solely for the use in the Vancouver Area. The product is developed around the type of water qualities found in the Lower Mainland to help maximize efficiency and environmental impact to the surrounding area. However, finding additional information on ingredients and company background was unsuccessful since this information was not accessible.

Echoclean is an environmentally friendly product that is manufactured V.I.P. Soup Products located in Western Canada. Their commitment is to providing cleaning products have little to no impact on the environment by continuous research and development. The use of reverse engineering is implemented within house chemists to insure guaranteed quality. Being located in close parameters of the Vancouver harbor allows them to have access to some of the cheapest shipping costs.

### **3.2 Environmental Background**

Echoclean is laundry soap that is advertised as environmentally friendly. However, finding information with regards to the ingredients of the product was not available since it was not publicized. The only bit of information that was found in regards to the ingredients of this product was through the use of the MSDS data sheet. The MSDS mentioned the Echoclean laundry soap contained lauryl alcohol ethoxylate, which some ethoxylated materials have been controversial due to the toxicity to aquatic life of their breakdown products.

Tide uses biodegradable soaps and is phosphate free. It also uses concentrate so that helps in the usage of plastic. They have actually reduced their plastic by 43% (Tide, 2012). It also helps in transportation since they don't have to transport such a large capacity of detergent. Unfortunately on their website there was a section that says, "Read more" but that was unavailable.

Bio-Vert has a detergent formula that has the EcoLogo certified (worldwide certification), is eco-friendly and biodegradable in 28 days, septic tank friendly and easy on sensitive noses and skins. They have committed to sustainability in the environment by using bottles that are made of 25% post-consumer recycled plastic and have labels made of 30% post-consumer recycled paper (Bio-Vert, 2013). Like Tide, Bio-Vert does not have any phosphates in their detergent and they have also indicated that they do not have any chlorine, nonylphenol, optical brightener, dye or fragrances (Bio-Vert 2013). As a company



they have opted to have thorough investigation of its products environmental impact. This investigation is referred to as the Life Cycle Assessment and it determines the life cycle phases of a product that can be improved.

Vancouver Only is a detergent that is designed specifically for BC’s soft water but can also be used elsewhere. Vancouver Only, like the other detergents, are phosphate free and have also added that they are nitrate free (Alliance Mercantile Inc., 2013). Their packaging is recyclable and their condensed formula means that you also don’t need to transport as much so that saves on emissions. The detergent is also safe for septic tanks like the Bio-Vert. Their product information also indicates that it is multi-use and can be helpful for washing dishes. Finally they are 100% biodegradable like the Bio-Vert and they seem to have everything in place but for some reason don’t have the EcoLogo certification yet.

### 3.3 Summary of Environmental Impact

From the history and information we researched on each of the products we can see that Bio-Vert is the best product for environmental impact. Vancouver Only came in second and then Tide followed this in third. Unfortunately, no information could be found for Echo Clean online. The following table summarizes all the results from our testing.

Detergent	Phosphate Free	Septic Tank OK	Concentrate/ Condensed	Recycled Plastic for Containers	EcoLogo Certified	Overall Rank
Bio-Vert	Yes	Yes	Yes	Yes	Yes	1
Vancouver Only	Yes	Yes	Yes	Yes	No	2
Tide	Yes	N/A	Yes	No	No	3
Echoclean	N/A	N/A	N/A	N/A	N/A	4

Table 7: Environmental rating of laundry detergents

## 4.0 Profit

The basis of economics is very important aspect when choosing which detergent to use as this is usually a major governing factor that any company looks at before choosing a product. The price of the product for Student House and Hospitality (SHHS) will depend on the quantity of detergent that is purchased. We had contacted all four of the different detergent companies and they informed us that they do provide discounted rates for bulk purchase, based on the quantity that is ordered. Unfortunately SHHS does not know their order quantities at this time so we are unable to find out the price that they would be purchasing the detergent at.

The cost of the laundry detergent products is very important to students as many are living on a pre-set budget. The cost of the detergent was calculated using the non-discounted store bought price for each detergent. SHHS also informed us that the cost of the laundry detergents could be subsidised if a more environmentally friendly product is used. From comparing costs we find that the cheapest product per load is Vancouver Only laundry detergent followed by Bio-Vert, Echoclean and Tide in that order.

Detergent	Type	Cost per Container	Number of loads	Cost per load
Tide	liquid	\$16.65	52	\$0.32
Echoclean	liquid	\$9.39	50	\$0.19
Bio-Vert	liquid	\$13.85	75	\$0.18
Vancouver Only	powder	\$4.29	35	\$0.12

Table 8: Economic rating of laundry detergents (IGA Grocery Store)

## 5.0 Conclusion and Recommendations

After completing our triple bottom analysis of the economic, social and environmental aspects of the four selected laundry detergents we were able to make a final ranking for the detergent. Each detergent received four points for a first place in a category, three points for second etc. The final score received for each detergent can be seen in Table 9: Final rankings for laundry detergents

Detergent	People	Profit	Planet	Total
Bio-Vert	3	3	4	10
Vancouver Only	2	4	3	9
Tide	4	1	1	6
Echoclean	1	2	2	5

Table 9: Final rankings for laundry detergents

Our final recommendation to UBC Student Housing and Hospitality Services is to use Bio-Vert in the residences. It is Canadian made, EcoLogo certified as well as moderately priced and effective to wash with. This recommendation is made with an equal weighting for all three categories, therefore if the stakeholder were to choose to make one category more important this could potentially change our recommendation.

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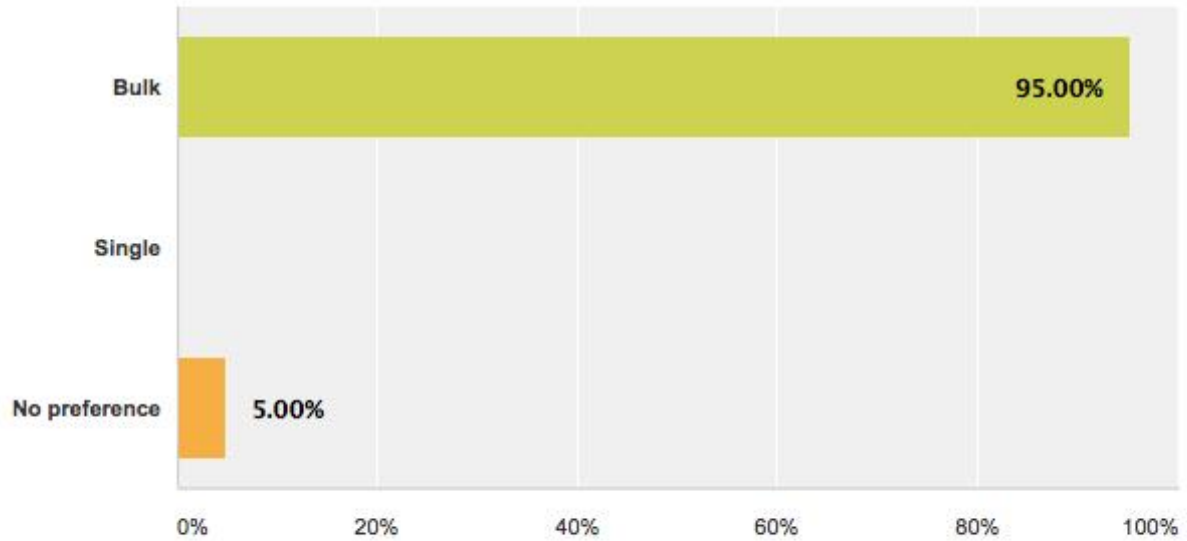
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## **Appendix A**

### *Survey Results*

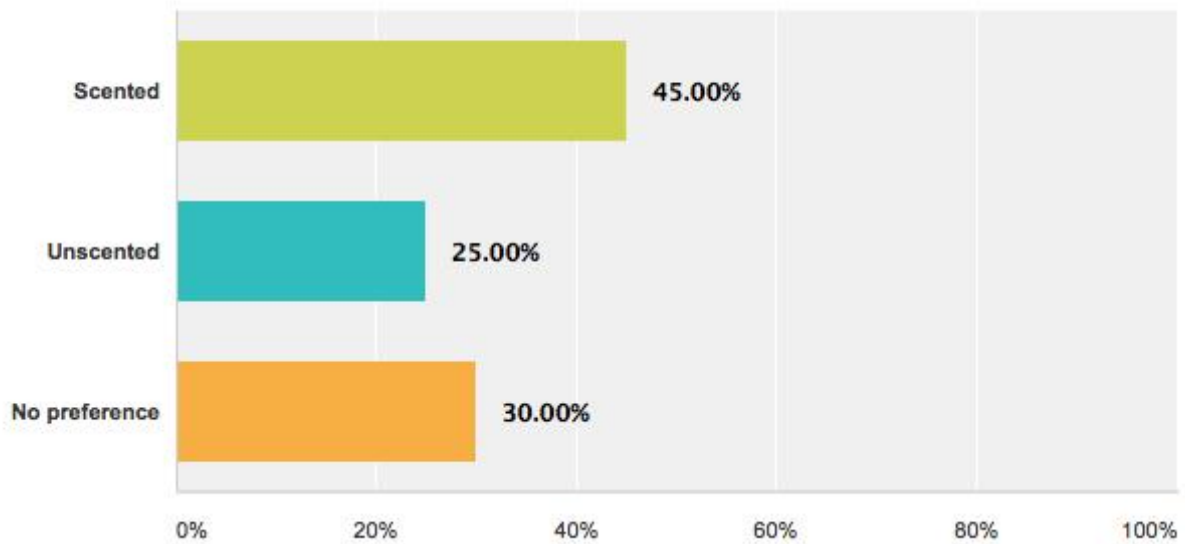
## Would you rather buy bulk or buy single use packages?

Answered: 20 Skipped: 0



## Do you prefer scented or unscented laundry detergent?

Answered: 20 Skipped: 0



# How often do you do your laundry?

Answered: 20 Skipped: 0

