How does milk affect earthworms burrowing time?

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Abstract

Milk is a very common household drink and a survey in 2017 proves this by showing that 58% of Americans used milk as a vital part of their diet. Milk starts out with having a lot of fat, like whole milk, and must be put through a certain process to reduce the amount of fat in it. Milk does actually add some nutrients to the soil if it is absorbed but will ultimately ruin the soil and ill plants. We used three types of milk, skim, whole, and 1% to test the worms. We put the worms on towels soaked with the milks and then timed how long it took for the worms to burrow after being covered in milk. The results of this experiment are that skim milk helped the worm burrow faster than the whole milk. This relates to the world because worms are similar to humans. We test worms to assume the effects on humans. The milk didn't really change the worms speed which is a good thing because there is milk in most foods we eat.

Introduction

How do different types of milk affect burrowing time? Milk is a very common drink for humans and holds many nutrients and proteins as well as fat. A 2017 survey showed that 58% of Americans use milk as a high protein source. (Shahbandeh, 2019) It is important to study milk because of how vital it is to daily life for humans. It is used in a lot of different types of foods and if dairy somehow affects our environment, it could be fatal. Since dairy basically runs the food world, we must be careful with it because if it is toxic we could accidentally be killing the environment and not want to stop because of its importance.

The chemical we are using for our experiment is milk. Milk comes from a cow's udders. At first, people solely used it to make other foods like yogurt. (Pat, 2020) Then, people started drinking just the milk. Milk does not have a chemical formula because it is simply a mixture of fat, protein, salts, lactose, enzymes, and vitamins (Mehta, 1970). Humans use this substance for

drinking and as an ingredient for many foods. The differences between the substances we are testing is the amount of fat in each type. Skim milk has no fat. 2% milk has 2% fat. Whole milk has a ton of fat. They are all edible and all come from cows.

Milk does not really have an effect on humans except quenching their thirst. It is edible and safe for humans. We are studying worms instead because they are cheap, easy to work with, and you can get a lot of them to test on. Milk is also a normal thing for humans to drink and it is not normal for worms. Earthworms and humans are similar in bodily nervous systems. They also have a brain. We both have a common ancestor. Because the worm is so similar to humans, the milk may have a similar effect on the worms. This can also help with research for humans if we first test things on worms. Worms don't walk, they slither. Therefore, we don't know if milk will affect them as much. (ucsb.edu, n/y)

Milk can get into the soil from pollution or spillage. People might let their milk go bad and throw it away, making it end up in a dump. This could seep into the soil and possibly affect it. It could also end up in the soil when the cow is getting milked. Milk does add nutrients to soil but it can cause problems in the soil and for plants. It can cause harmful bacteria to grow in the soil and cause plants to wilt and die. (All Science Fair Projects, N/Y) This would be bad for soil health because without plants, the soil will become loose and wash away with the rain. Without adequate soil, worms will move and avoid burrowing in that area. We should care about this because this would negatively affect our environment and cause issues with farming.

Our hypothesis is that Skim Milk will take the longest for the worm to borrow, then 2% will take the second longest, and then whole milk will take the shortest. We think our hypothesis is correct because, Skim Milk has zero grams of fat, two percent milk only has about five grams of fat, and whole milk has eight grams. (Types of Milk Explained, N/Y).

Methods

First, we gathered materials, which were Sassy Cow whole milk, Deans skim milk, Deans 1% milk, worms, paper towels, tweezers, stopwatch, disposable cup, and dirt. Next, we soaked paper towels in the three types of milk and the water. We filled a disposable cup with dirt. We then placed a worm on one of the soaked paper towels for 1 minute. Then, we transferred the worm into a cup of dirt and timed how long it took to burrow. We continued to test 4 more worms with each liquid. Next, we made a data table and graphed the data. Finally we analyzed the data using an unpaired T-test.

Results

In the graph it shows the tie it took the worms to burrow after being soaked in milk and water. There was no significant change as we compared the milks and water. For worm 1 and worm 3, skim made them the slowest. For worm 2, whole milk made it the slowest. And finally, for worm 4, 1% made it the slowest. Water proved to work well in making the worm go faster. Water took the worms very little time, except worm 3. The averages showed that skim made them the slowest, the 1%, then whole milk, and finally water was the fastest.

We had many variables in our experiment. Our independent variable is the types of milk. The dependent variable is how long it takes the worms to burrow. Controlled variable include the light, where the worm came from, amount of dirt, and how long they sit in the milk. For the statistical test we used an unpaired t-test. That test is used for comparing times and other things, just not choices. The worms did not have a choice to burrow so the t-test worked the best. We compared many of the results one on one, but none of them showed a huge change. The two that showed the most change were the skim and the water, which were the fastest and slowest times.

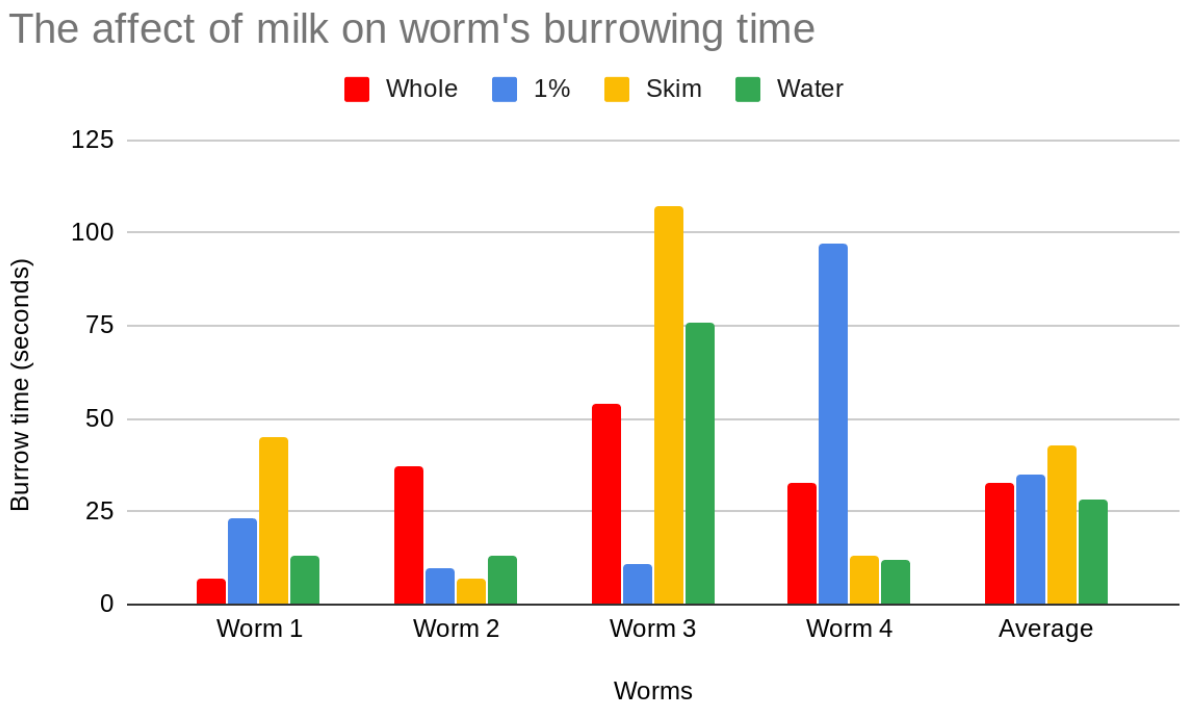
Their p-values were 0.13, which is not that big of a change, but was the greatest change out of all of them. The least amount of change was the whole and 1% milk. Their p-value was 0.92.

Data Table 1: Worm Burrowing Time

Milks	Whole	1%	Skim	Water
Worm 1	7	23	45	13
Worm 2	37	10	7	13
Worm 3	54	11	107	76
Worm 4	33	97	13	12
Average	32.75	35.25	43	28.5

We compared the times for the worms to burrow. We noticed that certain chemicals made them slower or faster. There were a few outliers for certain worms. We put the data from our table (Table 1) into a graph (Graph 1) to show the data.

Graph 1: The effect of milk on worm's burrowing time



Conclusion

Overall, the worms didn't show too much change between the milks and water like we hoped they would. Skim definitely made them the slowest. Water was still the fastest. There were the occasional worms who went much slower than expected which messed up some of the data. The hypothesis was correct because it did take longer for the worm to burrow in skim milk, then 1%, after 1% then whole milk. We predicted skim would take the longest. The results did not support our data because we thought the whole would be the shortest, but water actually took the least amount of time. Water didn't take a lot of time for all of them. Whole milk also made the worms slightly faster. Otherwise we really didn't have many trends in the data. The worms were hard to get out of the bucket and were kept using worms that the other groups already tested on. The milk did not affect the worms that much at all compared to the water. This makes sense

because milk doesn't have a huge effect on humans, and it is said worms are like humans. We test on worms to relate the results to humans. There is milk in many foods we eat, not just drink. It is a good thing that milk doesn't affect them that much otherwise we would have to be careful when we eat it. People care because almost everybody drinks milk and they want to know the effects on their bodies. In the future we want to test different types of milks or liquids to see how different things affect earthworm's burrowing time.

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