

Purpose

The purpose of this project is to see whether or not if changing the type of livestock bedding that you use will have an affect on bacterial growth.

Hypothesis

If the type of bedding that you use is changed, then the amount of bacterial growth will be reduced. Sand has been proven to have the least amount of microbial growth.

Research

Many people use a variety of bedding for their cattle because they believe that the bacteria growth is less in some bedding types than others. Types of bedding that are commonly used are straw, from small grains, low quality hay, saw dust or wood chips/shavings, soybean residue or stubble, sand or dried compost, and shredded newspaper are just a few to mention.

The "Perfect" Bedding

A cattle rancher must look at all the variables when picking out the "perfect" type of bedding. Such as, comfortability, bacterial growth, moisture capacity, and of course cost, are all things ranchers keep in mind while they are searching (Carroll and Underwood, 2020).

Bacterial Growth

There should be minimal bacterial growth when picking out bedding because it's a way to keep good hygiene for cattle because it absorbs feces and urine, keeps the animal warm during the bad weather, and provides a comfortable bed to lay on. Another reason you might use bedding is to ensure a clean area and have healthy, safe meat products (Carroll and Underwood, 2020). Research has found that sand is proven to be the inert material that produces the least amount of microbial growth. Not only does the type of bedding that you use decrease the amount of bacterial growth, but it also must be managed correctly to ensure effective results. Many variables such as ventilation and how often your bedding needs to be changed will also play a role in the results. (University of Massachusetts Amherst, 2017).

Availability and Workload

Another thing ranchers look for in bedding is how labor intensive it is to use. For example, dispersing and cleaning up bedding, or the availability of the product in your area that you want to use. If you are going to use something repeatedly you aren't going to want to travel very far to get it because it becomes more of a hassle to get rather than benefiting from the use of it (University of Massachusetts Amherst, 2017).

Cattle Comfort

Comfort is especially important to factor in your decision because you are going to need to make sure that there is an easy impact for your cattle dropping on the ground. Cattle discomfort can lead to things such as swollen hocks, rubbed necks, or sore feet. (University of Massachusetts Amherst, 2017). Fine-grained sand is the most comfortable for cows to lay on and has advantages for leg and hoof health. Sand has also been proven to be a cleaning agent for removing manure from the cattle's hooves, legs, udder, and flanks. (Clark, 2019).

Testing Different Types of Cattle Bedding to Determine Which has the Least Amount of Bacterial Growth

Procedure

1. Prepare your Petri Dishes to put in agar
 1. Stir 16 grams of Nutrient Agar in 750ml Distilled Water at room temperature
 2. Stir Periodically and bring to a boil
 3. Cool to 50 degrees Celsius and portion equally into Petri Dishes
2. Draw quadrants onto your Petri Dishes
3. Gather four of the same plastic totes
4. Place the totes in a horizontal line
5. Label the totes according to what bedding type is going to go in it
6. Fill the bottom of all the totes with 4 inches of dirt
7. In the (sand) tote place 4 inches of sand on top of the dirt
8. Repeat step five except use the (straw) tote and use straw instead of sand
9. Repeat step five using the (wood chips/shavings) tote instead and wood chips/shavings instead of sand
10. Repeat step five using the (shredded newspaper) tote and use shredded newspaper instead of sand
11. Place a layer of cattle manure in each tote
12. Spray water onto the top of each tote
 1. (Repeat everyday left underneath heat)
13. Put the totes underneath heat (21 degrees Celsius) with thermometers in each of the totes
14. Test moisture percentage
15. Leave your totes for a couple of days, without touching them
16. Dress in your PPE (personal protective equipment)
17. Swab the bedding and put in a Petri dish with agar
 1. When you are swabbing the agar make sure that you close and open the Petri dish with care to make sure that outside agents do not get in and interfere with the bacterial growth
18. Repeat step 12 with each type of bedding
19. Check on the Petri dish and monitor the bacterial growth
20. Write the results you see after every time you check the bacterial growth
21. Review your results and form a conclusion

Materials

- Plastic totes
- Dirt
- Sand
- Straw
- Wood Chips/Shavings
- Shredded Newspaper
- Cattle Feces
- Petri Dishes
- Agar
- Swabs
- Parafilm
- Lab coat
- Gloves
- Safety glasses
- Thermometer
- Moisture tester



Picture taken By Misty Steeke

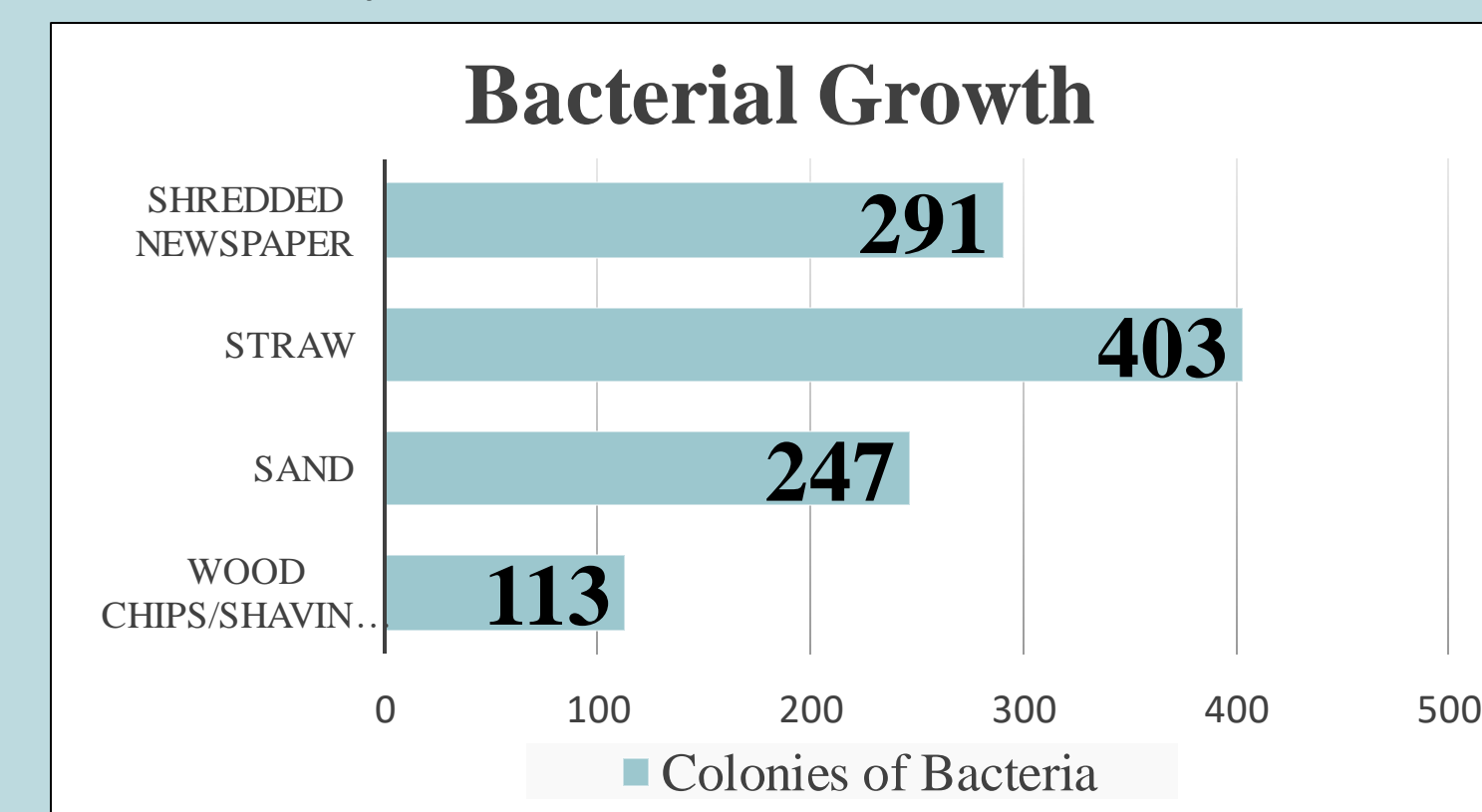


Figure 1: The bacterial growth by colonies for each type of bedding.

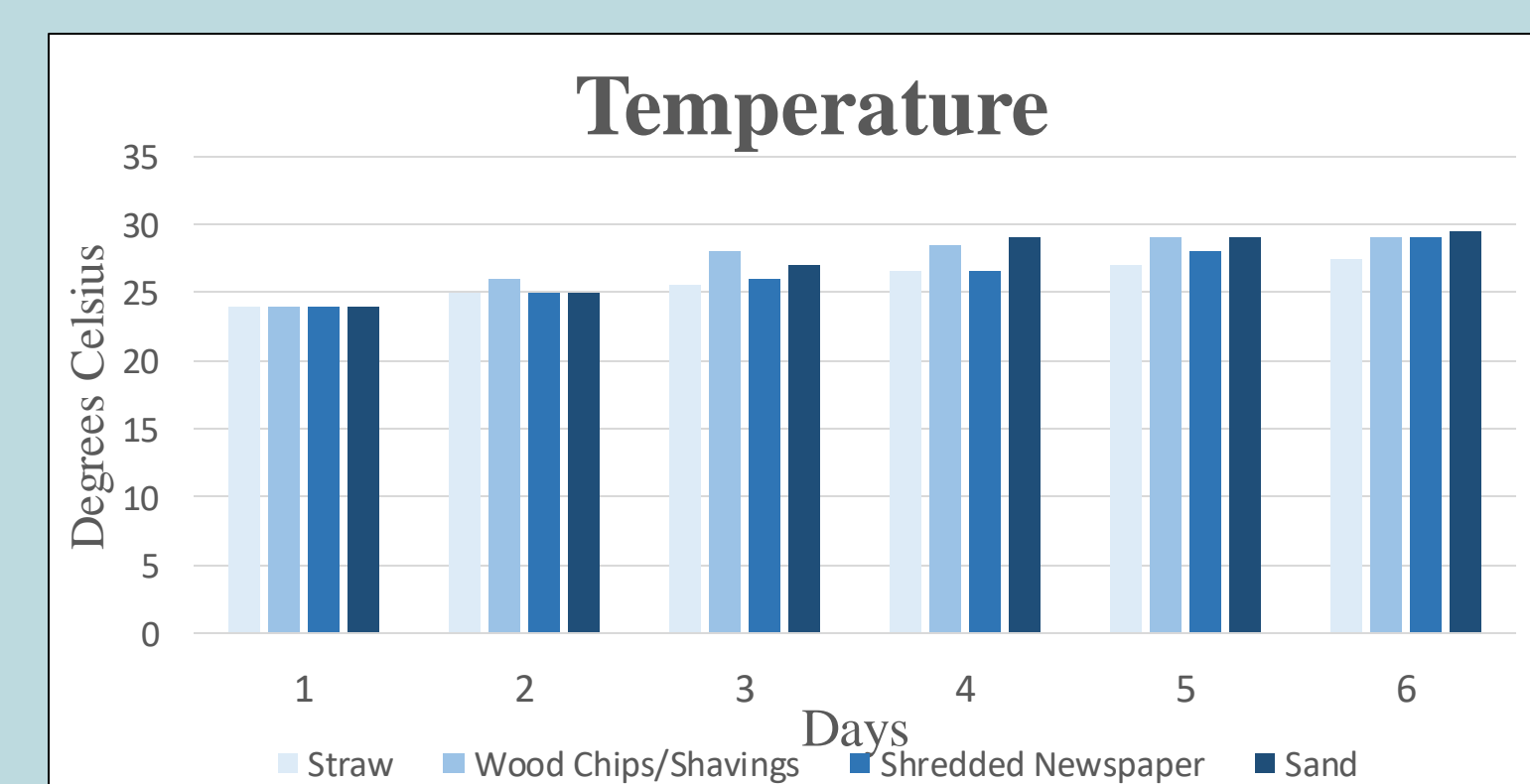


Figure 2: The temperature increase by each day.

Results

The woodchips/shavings had 113 bacteria colonies, the sand had 247, the shredded newspaper had 291, and the straw had 403 colonies. The temperature for day one for all of the types of bedding and all continued to raise in temperature, but not staying the same. Much like the temperature the moisture percentage was the same the first day and continued to increase each day, but was not the exact same as each type of bedding.

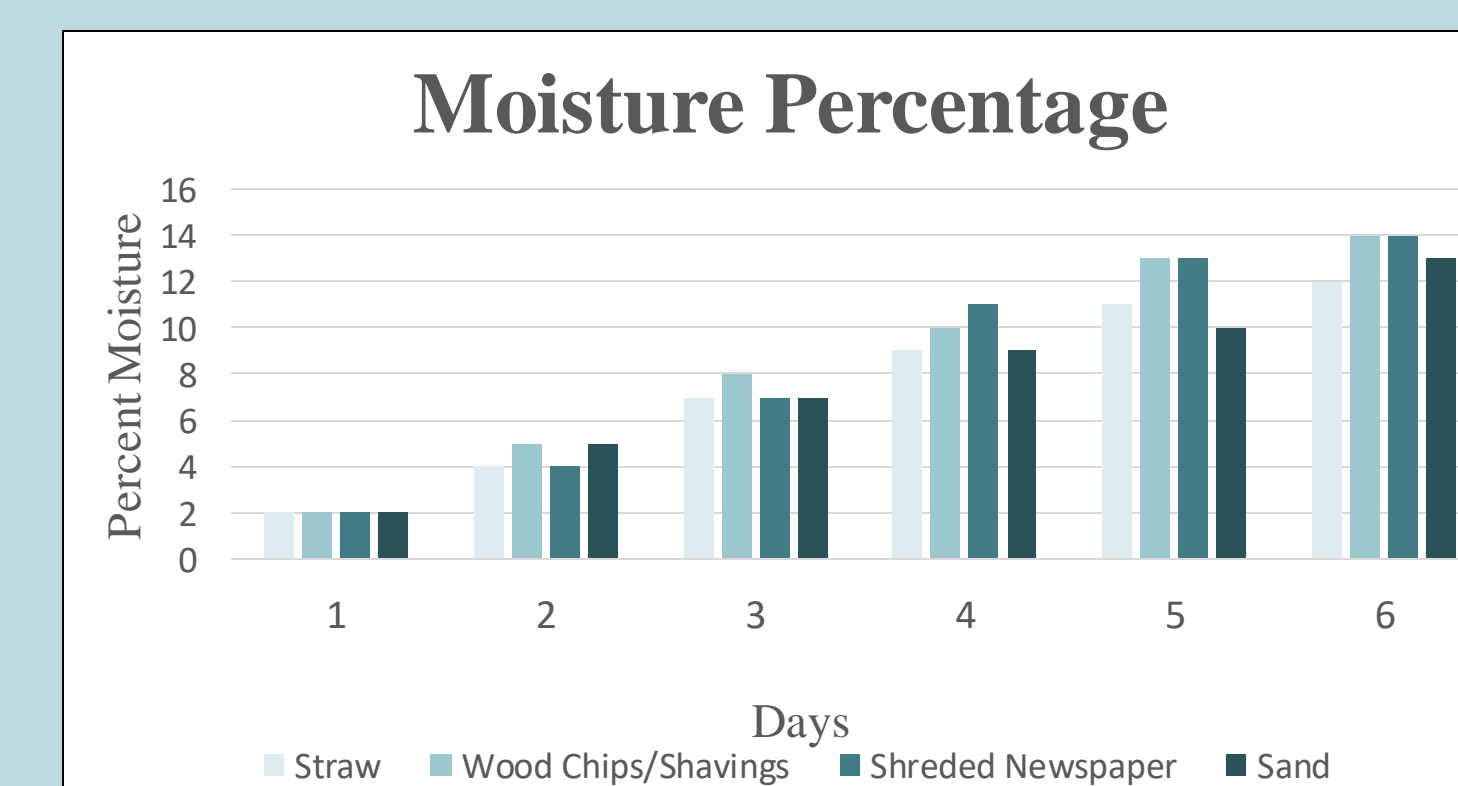
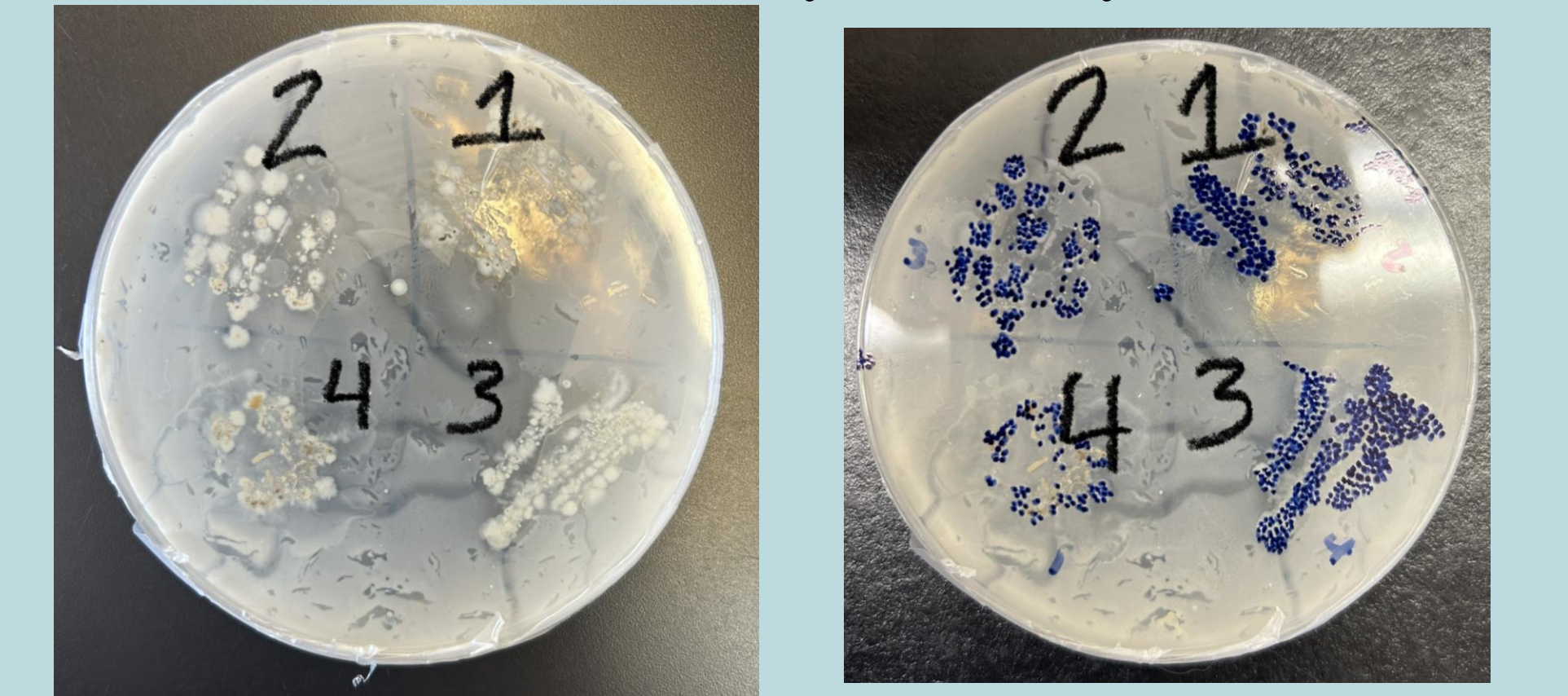


Figure 3: The moisture percentage change by each day.



Pictures taken by Dani Maychrzak



Conclusion

After doing this project, I found that my hypothesis was wrong. I found this by counting the colonies of bacteria for each one placing them from least to most amount of bacterial growth, woodchips/shavings, sand, shredded newspaper, and straw. On day one, the day I started my project, the tubs weren't holding a whole lot of water and weren't keeping heat well. On day two, there was not much of a difference, but had minor increases in temperature and moisture percentage. For day three, I saw the temperature and moisture doing the same thing as on day two. On day four, I found that I had a noticeable difference with both temperature and moisture percentage increasing. For day five I had the same results from day four, increasing temperature and moisture percentage. On day six I swabbed the bedding and put the petri dish in the incubator. Day seven, the bacteria had grown a significant amount, picture 1. For day eight, the bacterial growth was very little, almost not noticeable. On day eight I also counted the colonies of bacteria for each type of bedding. The woodchips/shavings had the least amount of 113 colonies, sand with 247 colonies, shredded newspaper with 291 colonies, and lastly straw with 403 colonies. If I were to continue this project some things that I would do this several different times, with different time lengths underneath heat. Changing variables to mimic outside conditions.

References

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