

Game Bag Material Testing

I'm constantly thinking of new ways to further my career in the Alaska *out of doors*. In doing so I find myself trying the strangest things to occupy my time when not hunting or guiding river goers into the wilderness. Anyway, my latest thoughts led me to ponder the use of conventional game bags, which are used to cover and house big game meat after hunters harvest animals in the field. These game bags serve to protect game meat from contaminants like dirt, sand, bacteria, and flies, to name a few. Now, game bag manufacturers produce thousands of bags each season to sell to diligent hunters who buy into the "protection" theory. However, likely to lower production costs for higher profit margins these manufacturers continue to make bags out of cotton fabric. Why? Because cotton is widely available, cheap to manufacture, and versatile. Unfortunately though, cotton is slowly becoming an ancient fabric for superior protection, because outdoorspeople have become well educated on the ill results of using cotton for personal protection from inclement climates. The fact is cotton is overly absorbent, non-wicking, unnecessarily heavy, and is useless when wet.

Putting some thought into the cotton "issue" forced me to question, as always, the way we hunters do business. By that I mean how we hunters rely on what products are available because we put faith into product manufacturers. Unfortunately for us, these manufacturers sometimes develop products that are only best for profit margins and not so great for the consumer. Game bags made of cotton are a prime example. So I question the fact that if cotton is ill-suited for human clothing in the out of doors, is it also ill-suited for game meat "clothing" in the out of doors? If so, then why? And what can we do to prove it, but also to resolve the problem? These are the questions I'll attempt to answer in this study.

Well, the answers came with surprising clarity, but I had to come up with a theory and then develop a plan to test that theory under believable conditions to produce anything close to scientific results. Given my very limited background in scientific testing and the fact that I had virtually no funding for such a project, I'd have to make do with my limitations.

Here's what I came up with:

THEORY: Since common game bag material is constructed "mostly" of cotton, microscopic molds, mildew, and other bacteria are allowed to freely develop and actually saturate and then impregnate game bag material fiber due largely to its moisture retaining attributes. If this is true, common game bags contribute to, even if to the slightest degree, surface spoilage of game meat that has remained wrapped in contaminated fabrics. This bacteria then multiplies at undetermined rates until game meat becomes consumed in bacteria and is rendered unfit to consume. This obviously doesn't happen overnight, and I'm assuming the worse possible scenarios with field handling techniques, warm and wet climate, poor stowage conditions, and improper techniques. That is, less diligent hunters will have greater degrees of meat spoilage than will highly diligent hunters; however, my theory suggests that cotton naturally opposes hunter efforts due to the fabric's inability to wick moisture, providing a perfect medium for bacterial growth.

TEST: I felt it was important to see how quickly mold and mildew, which are the most common bacteria in the early stages of meat spoilage, began to cultivate on cotton fabrics. I then needed to study direct comparisons of alternative materials under the same conditions applied to cotton. Therefore, I conducted mold studies of three types of fabrics: 1) A 100% cotton game bag material, 2) a blended material (heavy-duty game bag), and 3) a 100% synthetic fabric (200 denier non-coated nylon).

LIMITATIONS:

1. I had no access to technical laboratory machines or other technology due to budget constraints, but I felt that I could gain the necessary results using some intuitive thinking.
2. I had to perform these studies indoors due to outside climate conditions here in Alaska. I used a dark boiler room with ambient temps in the 70-79 degree F range, so the conditions weren't exactly like those found in actual hunting environments.
3. I planned to use sight and smell as the initial "testers" (24-48 hours) and a laboratory microscope at 48 hours, 4 days, 7 days, and 10 days.
4. I placed the fabric samples into separate plastic Zip-loc™ airtight containers to prevent airflow, which helped expedite the negative results (desired effect).
5. I'm not formally trained in the field of microscopic science, so my results could be severely inaccurate unless grossly obvious to the laymen, which I'm hoping for.
6. This will not be a solid scientific study because I won't be working with unbiased parties, will not pursue double-blind protocol, and will not be working in a controlled environment.

QUALIFYING FACTORS: I felt that this semi-controlled and warmer environment would allow me to expedite mold and mildew development, which would serve to produce adequate results for the purpose of personal education. After all, I was ultimately trying to determine whether cotton fabric contributes to game meat spoilage by fostering bacterial growth within the fabric itself. I am merely interested, at this point, in obtaining preliminary findings that will aid in my research and development stage of product discovery. This test, though grossly laymen, will serve the purposes of my study and will likely result in the development of new Game Bag Technology, which will help improve hunter performance with field care concerns.

RESULTS: Once the mold studies were initiated I had to estimate how quickly and at what rate mold began to develop at certain stages (in hours and days), just like a field environment.

24 Hours:

1. 100% Cotton fabric: No visible discoloration noted, but a faint "smell" of mildew was present. Fabric completely saturated with moisture.
2. Blended fabric (unstated ratio of cotton:synthetic): No change in color or smell. Fabric completely saturated with moisture.
3. 100% Synthetic fabric: No change in color or smell. Fabric nearly dry, moisture collected at the bottom of the test container. This leads me to believe in the wicking traits of synthetics.

48 Hours:

1. 100% Cotton fabric: Slight discoloration. Stronger "smell" of mildew was present. Fabric still completely saturated with moisture.
2. Blended fabric (unstated ratio of cotton:synthetic): No change in color with only a slight odor of mildew. Fabric still completely saturated with moisture.

3. 100% Synthetic fabric: No change in color or smell. Fabric completely dry and all moisture still in the bottom of the test container. Material forced to set in moisture by setting weighted steel ball on top of fabric sample.

4 days:

1. 100% Cotton fabric: Yellow discoloration was evident and strong ammonia-like odor present. Microscopic bacterial develop was approximately four times more abundant (wide spread and layered) than found on the blended fabric and “much greater” growth than the synthetic fabric. Juices in test container are yellow-brown and very odoriferous.

2. Blended fabric (unstated ratio of cotton:synthetic): Yellow discoloration was slight and ammonia-like odor present but not overwhelming. Microscopic bacterial develop was evenly distributed but not layered. Juices in container are turning yellow and have developed an odor.

3. 100% Synthetic fabric: No odor changes and no discoloration visible. Only minute trace bacterial growth found under microscope. However, areas where test fabric was unsaturated by juices had no growth or discoloration.

7 days:

1. 100% Cotton fabric: Yellow discoloration was immense and overwhelming ammonia-like odor present. Bacterial develop consumed the fabric. No microscope needed.

2. Blended fabric (unstated ratio of cotton:synthetic): Yellow discoloration was evident and strong ammonia-like odor present. Microscopic bacterial develop was beginning to become wide spread and layered like the 4-day sample of the 100% cotton fabric. Juices in test container are yellow-brown and very odoriferous.

3. 100% Synthetic fabric: No odor changes and no discoloration visible. Microscopic bacteria only present where moisture collected near the corner of the fabric. Juices in container had no smell or discoloration.

10 days:

No additional tests performed due to indisputable 7-day results. Test was cancelled after the 7-day results were concluded.

CONCLUSION: A cross-section analysis (microscope) of individual cotton fibers suggested that the cultivated growth appeared to be part of the original composition of that fiber. The same analysis performed on a fragment of nylon indicated that the minute growth was attached to what appeared to be the outer wall of the plastic fiber. My evidence of this was limited by my lack of knowledge in this area of scientific research. However, it was enough to convince me that my initial beliefs were accurate.

Common game bag materials made of cotton do actually foster mold and mildew growth within the fabric itself and do not provide adequate moisture wicking attributes, which likely contribute to surface bacterial

development and meat spoilage to some degree. I believe this condition to be very similar to a mildew marinade, which impregnates cotton fibers and releases bacteria on a constant interval, especially when the cotton fabric is not kept dry. Once surface areas of game meat begin to grow bacteria, such as mold and mildew, cotton fabric provides no wicking protection or resistance to this process.

The simple fact that cotton “**fosters**” negative results proves my theory and is thereby inadequate for “**pre-venting**” spoilage, and even if to the slightest degree it should be considered unfavorable material for game meat protection.

It is the hunter’s responsibility to provide the best care of the animals he or she harvests. That includes taking every measure to prevent or reduce the slightest chance of losing edible meat resulting from preventable forces.

Even if the most diligent hunter provides top-quality care of their game meat kept inside common cotton game bags, there is a good chance that surface areas of game meat will become “spoiled” by mold and mildew within 48 hours. There is also a great likelihood of substantial bacterial growth compounding severely after undetermined periods, depending on the climate, when proper measures are not taken to prevent contributing factors (i.e., poor ventilation and moist game bags coupled with warm temperatures). I am not suggesting that hunters are doomed for failure by using common game bags, but that the attributes of cotton are not worth the risks now that a more advanced and proven alternative is available. Furthermore, toss in “natural” conditions like warm weather, wet conditions, and decreased air circulation and game care results rapidly degrade and the prognosis for the game meat becomes grim.

Common Question: If this is such a big deal, why hasn’t anyone (namely hunters) learned of these concerns on their own?

Best Answer: I believe the reason why hunters don’t know much about meat spoilage is two fold: 1) we have found comfort in the fact that there is an “acceptable” level, or at least a small degree, of meat spoilage resulting from remote hunting scenarios in inclement climates, and 2) most hunters aren’t aware that surface molds and mildew are one of the greatest contributors to meat spoilage besides the natural process of post mortem decomposition. However, the molds that were produced in this study do not have the same characteristics (odor and composition) as what hunters see on their game meat, simply because the natural odors of game meat conceal those of “common” molds and mildew, and the process of decomposing flesh coupled with surface bacteria create an entirely different bacterial process. Therefore, I’m suggesting that we hunters do recognize (by smell) the different degrees or intensities of game meat spoilage each day it remains afield, but that we are largely unaware of the levels of decomposition. Furthermore, the type of bag we choose to protect our game meat impacts its edible quality and will also influence the overall amount of spoilage to be trimmed and discarded when processing it for the freezer. In laymen terms, superior bag technology provides **better results** for less diligent hunters and **superior results** for more diligent hunters.

The truth is, many hunters will continue to effectively use common game bags without much game meat spoilage. This is due to their personal knowledge of game care issues and their willingness to go the extra mile with meat care concerns. For these folks, synthetic bags will only sharpen their results. Still, these hunters benefit by using synthetic game bags because of the many tangible attributes of this fabric (see below).

This was truly a fascinating study, albeit a non-specific and highly subjective (non-technical) method. It allowed me to better understand the “unseen” but often smelled degrees of meat spoilage and I proved to myself that cotton fabrics truly have no right to be used in the field environment, especially for the care of

game meat. Hindsight is perfect vision, and I now clearly see that if cotton fabrics are not suitable as human clothing in inclement conditions, it stands to reason that cotton is unsuitable for game meat *clothing* as well.

Benefits of using cotton game bags:

Highly permeable material which allows superior ventilation (very important)

Cheap to manufacturer

Widely available

Re-usable

Negative attributes of cotton game bags:

Highly absorbent

No moisture wicking protection

Fosters bacterial growth by absorbing it into the fibers

Material is unnecessarily heavy

No mildew or mold resistance

Trace residue of bacteria (blood and molds) remains impregnated in fabric, even after repeated washes with bleach.

Benefits of synthetic game bags:

Superior moisture wicking protection

Superior resistance to mold and mildew

Provides adequate ventilation

Extremely lightweight material

More durable than cotton

Longer lasting material strength

Virtually no shrinkage compared to cotton

Negative attributes of nylon game bags:

Extremely heat sensitive (open flames)

Slightly more expensive than cotton

Less permeable than cotton

I learned that synthetic fabrics allow superior ventilation, greater bacterial resistance, are roughly 5X lighter in weight than comparable cotton strengths, and still very much affordable. I believe that synthetic game bags are now the new standard issue for big game hunters who demand high-level protection from spoilage! By the way, 6 standard canvas-type game bags weigh over 10 lbs., while 6 synthetic bags weigh less than 2 lbs. If two hunters go afield with 12 quality cotton game bags, the total weight exceeds 20 lbs. With 12 synthetic game bags they'd save themselves over 15 lbs. of gear weight, which is a huge benefit when weight limits are concerning (i.e., fly-in hunts).

Contact me directly for product availability and pricing.

bartlett@pristineventures.com

Larry Bartlett

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