

Animal Bedding Selection Criteria

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From type of product to dispensing, disposal, and animal welfare, bedding choice has an impact in your facility.

What criteria should be used when selecting your laboratory animal bedding for small animals?

Some of the important questions to ask include, will my bedding selection have any effect on my research results? Do the animals and researchers seem happy with the bedding? What are the costs involved, including the cost per cubic foot of the bedding itself, the cost of dispensing the bedding, and the cost of disposing of the soiled bedding?



Let's begin with an overview of available bedding products. There are essentially three categories of bedding products from which laboratories can choose: ground corn cobs, paper products, and wood products. Over 99% of all lab animal bedding falls into one of these three categories or is a mixture of two of them.

CORN COB

Corn cob products are the hardest of the beddings options and, because of this hardness, have the slowest absorption rates. They are also the heaviest of all the beddings, and do not give up moisture easily. Animal urine will flow to the bottom of the cage and very slowly absorb (bottom-up absorption). Cob beddings are also the freest flowing and most easily dispensed. Corn cob products come in three standard sizes; one-eighth inch, one-quarter inch, and a combination of both. Corn cob bedding is recommended by manufacturers not to be used right out of the bag; further processing by either autoclaving or irradiating is recommended. Corn cobs may become a food source for the animals and have been reported to affect studies where any fasting is required. Corn cob is the only bedding where animals have been observed to ingest their bedding in quantities larger than trace amounts. The corn cob is processed fresh during the growing season, and is taken from large piles of excess cob during the colder non-growing months. When corn cob sits for long periods before processing it can develop moulds, which in turn can create mycotoxins. These mycotoxins cannot be removed by either heating (autoclaving) or irradiation. Corn cobs are generally priced from the mid-range to the higher range in the pricing spectrum.

PAPER

Paper products are in general soft and highly absorbent and make for a good nesting material. Paper products can be used right out of the bag and are the lightest products available. They are not particularly free flowing for bedding dispensers and do not give up moisture easily. Paper products are manufactured primarily from wood chips which are then mechanically and chemically pulped to produce paper. They are either natural pulp (a brown colour) or they are bleached for either a white or grey colour. Every paper product has a chemical component from the chemicals used in the pulping or

bleaching process. Paper products come in many shapes and sizes. Alpha cellulose is a bleached paper that is cut into either small square pieces or ones with rounded edges. In some instances, these products can be manufactured into approximately 1-½" spirals that are a very good nesting material. Generally, the better the nesting qualities of a bedding, the more difficult it is to dispense. These products vary significantly in price from the middle of the price spectrum to the very top.

WOOD

Wood products also come in a variety of sizes and shapes, ranging from small, thin chips to shavings and shred. The wood chips are dried down to levels that kill harmful bacteria and are then sized down to whatever size chip a customer needs. Wood products are highly absorbent and also give up moisture more easily than any other bedding. When used with ventilated racks, the wood absorbs moisture on contact and then allows the air flow to dry the bedding, thereby allowing moisture to quickly leave the cage. This makes for a drier cage environment. Wood chips are freer flowing than paper for bedding dispensers, but less so than corn cob. Wood chips can be used right out of the bag and have a low enough bioburden that autoclaving and irradiation are not always necessary. Wood chips are environmentally friendly because they contain no additives and are only made from recycled wood residue. Shavings and shredded products are also manufactured from wood. These products are soft and make for a good nesting material, but they are difficult to dispense. Wood chips cost less than other bedding options.

MIX IT UP

Aside from just using one animal bedding, some facilities are mixing multiple beddings together. This can be done either in your facility by your staff or by certain bedding manufacturers. Options include mixing corn cobs and paper products, corn cobs and cotton products, and wood products and paper products. Combining beddings can improve the animal's option to nest and can sometimes make a poor flowing product flow better in a bedding dispenser. Generally these products are expensive, but in some instances they are a good compromise.

All bedding products also come in a pelletised form. Densification does not improve the nesting qualities of the bedding as it makes it harder, but it does improve the dispensability. Densification also slows down the ability of the bedding to release moisture and can add disposal costs.

HOW MUCH?

Now that we've gone over the animal bedding options, let's talk about the animals. Animal care is one of the most important aspects of today's research. Laboratory animals are in contact with their bedding nearly 100% of the time and therefore bedding should be considered one of the most important aspects of animal care. In many instances bedding is the main enrichment in an animal's environment. Breeders, whose sole concern is delivering a healthy animal, still use significantly more bedding per cage than research facilities. Most breeders feel that the quantity of bedding in the cage is a significant aspect of a healthy environment for the animals. The amount of bedding per cage has diminished over time. Presently under 0.32cm (1/8") of bedding per cage is the norm in the research community. Most research into the amount of bedding per cage has demonstrated that less bedding per cage has not affected animal health.

The advent of the ventilated rack is one of the reasons that the amount of bedding per cage has decreased. Before the ventilated rack, many facilities changed bedding as often as once a day and at least once per week. Ammonia levels and wet bedding were the primary consideration for changing the bedding. Today, the life of the bedding, as defined by wet bedding and unacceptable ammonia levels, has been extended and bedding can now be changed either once a week or every second week.

Management makes the decision as to when the bedding should be changed, and fecal content is now becoming one of the major considerations. There is no question that the ventilated rack has allowed the change interval to be extended and this has improved animal care by allowing the animals to stay in their manipulated environment longer. Wet bedding and ammonia levels have been significantly reduced. With static caging, ammonia levels and bedding wetness are still a primary concern. The type of bedding, the type of caging, the quantity of bedding per cage, and the cage change schedule should all be carefully considered.

DISPENSING

The dispensing of bedding into cages has also been mechanised in recent years. Automated bedding dispensers save both time and labour and provide an accurate amount of bedding in each cage. Some facilities still distribute bedding in a wheeled container with a scoop, but the move in recent years has

been toward automation. Some bedding is freer flowing than others but all bedding can be dispensed mechanically.

It's important to never allow an engineer or architect to determine the type of bedding that you use because of the equipment they recommend. You are the animal care professional, and you should be the one to specify the bedding you would like to use. It's the engineer's job to help you dispense your bedding of choice. All bedding manufacturers move their bedding pneumatically or mechanically during the manufacturing process, so there should be no issues.

PACKAGING

Traditionally animal bedding has been packaged in paper bags, which are then stacked on pallets. This remains the most popular delivery method. These bags range in size anywhere from 1 cubic foot to 3.5 cubic feet. The weights of the bags will also vary drastically depending on which type of bedding you use (paper being the lightest, followed by wood, with corn being the heaviest). The weight of the bag is only important in that a heavier bag will be harder for your staff to maneuver. Since bedding is placed in a cage by volume and never by weight, lighter bedding will be easier to carry. Almost all bags are able to be irradiated or autoclaved.

In addition to paper bags, bulk bags and bulk containers are available to help cut down on material handling costs and the labour required distributing the bedding to the cages. In recent years, bulk bags have become more widespread. Many bulk containers or bulk bags allow for bottom discharge so bedding dispensers may be filled directly. Alternatively, bulk bedding can be emptied into an in-house storage facility for mechanical loading at a future time. Dispensing technology and bag configuration should also be considered in the bedding selection process. Most bedding manufacturers offer a variety of bagging choices to meet your needs.

DISPOSAL

Disposal of soiled bedding is becoming an ever larger issue. In many instances this is the most significant cost in the cost analysis formula. Some facilities have the luxury of incineration as a disposal means, while others may allow the waste bedding to be ground and sent through the sewer systems, and others are forced to send the waste to a landfill. The costs of disposal, in all instances, are on a per pound basis. If you require the landfill option, the tipping fee is weight based. Therefore the lighter, dryer the bedding waste component is the less expensive it is to dispose of. Many facilities that incinerate feel they do not pay any cost for in-house incineration, but burning wet bedding is actually a net energy drain. As the cost of bedding disposal rises it will become a more important factor.

OTHER CHALLENGES

Overall costs in the laboratory are becoming more and more significant. A well-thought out bedding program can be an excellent way of stretching a budget. The price of a bag of bedding is often mistakenly thought to go hand in hand with the level of quality of that bedding. This is simply not the case. Bedding price can be affected by factors such as manufacturing and transportation expenses. Lower cost products generally do not compromise the quality of animal care or negatively impact the animal's welfare. The cost of bedding should be an important consideration in the selection process. Bedding has always presented significant material handling and inventory challenges. These include maintaining a sufficient inventory of your selected bedding, finding adequate storage space, ordering with enough lead time, and having the ability to move it around your facility with ease. You must decide on the proper amount to put in each cage, have a plan for removing the bedding from the cage, and lastly have a plan to dispose of the soiled bedding. It's advisable to maintain a bedding reserve in case of emergency. This should be at least a one week supply beyond your usual usage, which should be enough to get you through any problems or delivery delays.

CONCLUSION

The selection of bedding is one of the most important but often overlooked considerations in running a facility. When selecting bedding, you should think about type of bedding, price of bedding, inventory controls, cage change schedules, nesting quality, the ability to absorb and give up moisture, cost of dispensing and disposal, microbiological cleanliness, and comfort levels for both the animals and the staff. That's quite a list of requirements for a disposable product that will become part of an animal's environment. In the end it's best to do a side by side comparison of different bedding types, compare all their specifications, and make the choice that's right for you.