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Biodegradable bedding pellets: a safer alternative for animals

Compared with traditional animal bedding materials, such as wheat straw, hay, sawdust, and shavings, wood or straw pellets are less dusty, easier to store, highly absorbent, which makes them popular and excellent bedding material for equine, poultry, pen or caged animals & livestock and the most readily available on the market today. Pellets are usually sold by the bag, which makes transporting and storage easy. With the addition of a cover or tarp, you may even be able to store them outside. However, do you know what bedding criteria is, what should be taken into consideration in choosing raw materials to make bedding pellets, and how to use livestock pellets?

Now, let`s make a thorough and detailed analysis on animal bedding pellets, especially for **equestrian bedding!**

I Equestrian Bedding criteria

The bedding you choose should offer improved time savings, space savings, cost savings, improved composting and fewer dust or allergy problems.



1. The primary consideration of equestrian bedding materials may be in the avoidance or reduction of mastitis problems in the horses. When we figure out what causes equine mastitis, it will be quite easy for people to have a subjective insight of pros of wood pellets as equine bedding.

Causes of equine mastitis:

- Trauma to udder--causing an open wound allowing infection to spread (e.g. kick from horse, insect bites)
- Dirty Bedding contaminate the open wound--in this case, the mare may be more susceptible to infection.

The bedding formed from the wood based product stays dry for a complete production cycle, and absorbs almost all moisture out of equestrian defecation and urination so that there is no moisture to attract flies. This lowers the likelihood of infection from open wounds.

2. Urine absorption is crucial; With stalling comes increased odors from urine and manure which may be hazardous to a horse's health. In particular, ammonia is a risk to a horse's upper respiratory system. One kilogram of wood pellets absorbs up to a massive three kilograms of urine (which is more than the commonly used straw), which means that labour costs and material costs are greatly reduced.

3. Dust. If the horse has heaves or other respiratory issues, or if you have allergies or asthma yourself, wood pellets, an absorbent bedding with low dust, mold and foreign object count, will be the best choice. Also, the greater the bedding's absorbency, the lower the ammonia level will be in your barn, and breathing ammonia can damage lung tissue in you and your horse.

4. Managing Waste. If you compost your stall waste, you may prefer bedding that will compost faster and more completely. Our top choices in this category are pelleted wood bedding.

5. Cost. Many products may be more expensive pound for pound, but if they are highly absorbent you won't need to use as much. Buying in bulk may save you some money, too. Wood pellets are less expensive because you use less than conventional bedding.

6. The compressibility, abrasiveness, roughness, and surface wetness of the bedding material all impact on animal comfort and ultimately to their health and productivity.

Thus, to sum up, wood pellets overpower conventional bedding materials with the following features:

- Suppresses odors
- Dust-free
- High absorbency
- Easy mucking, sifting
- Low manure result
- 100% natural



II Selection of raw materials for equine bedding pellets

For bedding pellets manufacturers and livestock farmers, some cautions are needed in choosing raw materials to make wood pellets.

It's hard to imagine that a natural part of our environment could possibly be harmful to our horses. However, many plants are not only poisonous,

but potentially deadly to horses. The gravest dangers arise with the few tree species that are toxic enough to sicken or kill horses when eaten.

Black Walnut Tree: Black walnut, are highly toxic to horses and should never be used as manufacturing of bedding pellets. Black walnut shavings will cause laminitis or founder, so all hardwood pellets and shavings are often avoided on the chance that walnut is mixed in.

Red Maple Trees: The red maple leaves while alive and on the trees are not poisonous, but once they fall off the tree and wilt, they can be deadly. If a horse eats red maple leaves, he will begin to act depressed and weak within two days. As the horse's body begins to have trouble transporting oxygen to the cells, his heart and respiratory rates will rise. Affected horses will also have icteric mucous membranes.

Cherry and Plum Trees: black cherry trees might have been a source of cyanide that led to early and late foal losses. Once the plant material is chewed and exposed to the acid within the horse's stomach, hydrogen cyanide is released and rapidly absorbed into the horse's bloodstream. As a result, an affected horse's blood is bright cherry red because it is overloaded with oxygen that cannot be utilized by the horse's cells.

Oak trees: Oak trees--more specifically, their acorns, buds, leaves, or blossoms--are toxic to all livestock, including horses.

And also, some others such as yew, oleander, black locust, Russian olive, those are used in landscaping, such as black locust, horse chestnut, etc.

All those woods mentioned above cannot be used as processed materials to make bedding pellets.

While **cedar and pine** seems to be a more suitable raw material. It is demonstrated that pine pellets are more popular in the horse bedding pellets market.

III Pelletizing Process

Bedding pellets are very similar to home heating pellets, but there are some difference in the pelletizing process, as bedding pellets are mainly designed specifically to expand into soft, dry bedding when exposed to moisture and are more absorbent and durable than fuel pellets.

For example, horse bedding pellets being made from pine shavings, there are several different processing steps being used than fuel pellets production, including double screening, kiln drying, treating with high heat (to remove tars, oils, hydrocarbons and other potential allergens), aspiration, and vacuuming.

We can divide the whole processing (pine and cedar as raw materials) into 9 parts: initial grinding, drying, fine grinding, pelletizing, cooling, screening, vacuuming, packaging, storage

- **Initial grinding of the biomass material**

Initial size reduction occurs in the primary grinding hammer mill that takes care of getting the materials down to a workable size for reuse.

Hammer mills have achieved merit because of their ability to finely grind a greater variety of materials than any other machines.

- **Drying the material to approximately 10% moisture content**

The initial ground materials are transformed into a dryer to lower the moisture content to 10% for finely grinding.

- **Secondary grinding of the dry material (fine grinding)**

Final size reduction occurs in the secondary hammer mill which is equipped with the same controls as the primary mill. The mill reduces particle size as needed for pelleting.

- **Pelletizing**

NO potentially harmful additives or chemicals are allowed to be used in the process.

Sending the ground material through a high pressure, high-temperature pelletizer. The high temperatures cause the release of natural lignin in the wood, which acts as a glue to hold the pellets together. Materials are compressed into small condensed wood pellets, resulting in highly absorbent (5 times more absorbent than traditional shavings), easy to sift, softwood bedding.

- **Cooling**

In most cases pellets will exit the pellet mill hot (100-170 degrees) and must be cooled. This is done with a pellet cooler by pulling ambient air through the pellets. Once the pellet is cooled to ambient temperature, the

pellets are screened to remove any fines that may have been created during the process. The pellets are now ready to be packaged, stored or sold in bulk.

- **Screening**

Horse stall pellets are more carefully screened for contaminants and dust than ordinary pellets because they are used for horses, and then aspirated to remove harmful dust particles, eliminating respiratory problems in animals. Multi-screened to control dust leaving only the clean, beautiful, functional small pine flakes. Improved methods of dust screening and particle texture control provide for the most advanced bedding pellet on the market today.

- **Vacuuming**

Animal bedding doesn't allow dust, requiring a more efficient method, vacuuming (for dust and particle texture control.), to be done. Pellets are vacuumed prior to bagging to remove virtually all the dust.

- **Packaging**

The bedding is also packaged differently from fuel pellets. To save space, they are ultra compressed in vacuum packages, in contrast to most fuel pellets, which are packaged in bags of various sizes for residential, retail and international customers, or super sacks or bulk delivery for industrial facilities, boilers or utility companies.

- **Storage:**

All bedding pellets should be stored in well-ventilated areas to remain as dry as possible prior to use.

Typical Animal Bedding Pellet Characteristics:

- Pellet Diameter: 6mm
- Pellet length: 5mm to 35mm
- Moisture Content: <5%
- Bulk Density: >675kg/m³ (>42 lbs/cu ft.)
- Fines content: <1%, Ash content=0%, mould content=0%
- Moisture Absorption: >400%
- Packaging: easy-to-handle 40 lbs per bag
- Raw Material: Pine shavings and sawdust from lumber operations using timber from certified forests.
- bedding standard: 4-5 bags of pellets for an average 10×10 stall; 5-6 bags for a 12×12 stall



IV Use of bedding pellets -- step by step instruction

- Clean out the stall down to the floor (dirt, wood, concrete, rubber mats).
- Place the contents of three to five bags (40-pounds each) in the center two-thirds of the stall, and spread the pellets out to an even depth of roughly 2 inches. Alternatively, you may also locate the bedded area where the horse prefers to “go”. The number of bags used will depend on the size of the stall, climate, horses’ habits, and personal experience from working with the bedding.
- Next, lightly moisten the pellets with 2 to 3 gallons of water to initiate their opening to a "fluffy" consistency. The water serves to break down the resin sheen on the sides of the pellet. The amount of water used will depend on the humidity of your area and may vary at different times of the year.

Why add water?

Adding water to the pellets actually increases the absorbency. The pellets expand into smaller particles and create a larger surface area to absorb fluids. An entire 40 lb bag can absorb about 47 litres or 12.5 gallons of liquid. By adding fresh water to pellets, they are softened into a highly absorbent, comfortable, dry bedding for your horse.

- For deeper bedding, you may choose to add one or two more bags on top and again moisten with 1 to 2 gallons of water. Deeper bedding is not always advantageous, and therefore some experimentation is appropriate

to optimize product use. Because they are highly absorbent, it's OK to be stingy with wood pellets.

- Within 20 minutes of wetting, the bedding will expand to approximately 3 to 4 times its original depth and it will take on a much softer texture and a whitish color. It will continue to “grow” somewhat over the course of the first week.
- Open up the wet areas to the stall floor and mix the dry product from the edges and then remove manure on a daily basis.
- After 7-15 days depending on your horses habits and personal preferences wet areas will appear to "cake together". At this point remove saturated areas.
- At this time you can add a small amount or up to 1 bag of pellets to refresh the stall for optimum usage.
- Experiment to find out what works best for you and your animals!