

Wood Pellet Bedding for Equines Demonstration

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Situation: In a survey of equine owners conducted during the summer of 2000, 82 responses out of the 204 total responses received either hire or secure someone else to haul their manure away or have no removal plan at all. Many horse farms report problems with the huge volume of manure that they have to dispose or spread. Some horse keepers pay others to have their horse manure removed from the premise. Few if any have completed nutrient management plans.

The most recent **New England Agriculture Statistics** estimates that Maine has an estimated horse population of 17,000. This does not include most off-farm animals. The **Maine Nutrient Management Training Manual** estimates that horse manure and bedding is produced at a rate of 75 pounds or 3.7 cubic feet per animal unit per day in full confinement. This document also estimates the average animal weight for horses at 1000 pounds. If we estimate that horses are maintained in confinement 50% of the year, then the estimated volume of manure produced by equines in the State of Maine would be 116,344 tons or 425,157 cubic yards per year.

This project attempted to measure the different manure outputs from two different bedding materials. The traditional fresh sawdust bedding and a new pelleted wood product bedding was used.

Method:

There were two groups in this project, horses in stalls bedded with the control bedding material used on the farm (fresh sawdust) and horses in stalls bedded with wood pellets (Woody Pet™). The project period was two weeks, with horses maintained with their regular turnout schedule for exercise during the day. Five mares and five geldings were used in this project. Stalls were initially bedded with four buckets of bedding. The same volume of bedding was used for each stall using 20-gallon muck buckets as a measure. Although the pelleted bedding manufacturer recommended that a bucket of water be added to a freshly bedded stall, this was omitted for the project. The initial weight of the bedding was also recorded. All stalls had rubber mats on top of cement flooring. Average weight of horses used in this project was 1044 pounds (mares averaged 1018 pounds and geldings averaged 1069 pounds).

Each day the soiled bedding and manure was removed and measured by volume and weight. After one week the soiled bedding and manure was removed and measured. The stalls were then completely cleaned and the remaining bedding was measured by volume and weight. The second week the two groups of horses were reversed. Horses bedded on wood pellets the first week were bedded with the control bedding and visa



versa. Grab samples of the bedding materials, soiled bedding and manure and "clean" material remaining in the stalls were taken for moisture and nutrient analysis. The University of Maine Witter Research Farm horse barn was the site for this project. And the services of a study student worker were used to bed, clean stalls and measure bedding & manure.

Results:

Amount of Manure Removed From Stalls

Six days of data were collected for manure removed from stall. Mares and geldings produced different amounts of manure. Mares produced less manure with sawdust bedding than geldings and geldings produced less manure with pelleted bedding than mares. But both mares and geldings produced less manure with pelleted bedding than sawdust bedding.

[Table 1](#) shows that mares produced an average of 55.4 pounds of manure per day when bedded on sawdust and 46.6 pounds of manure per day on pellets. Geldings produced 61 pounds and 40 pounds of manure respectively. On a volume basis mares produced 1.04 cu.ft. of manure per day on sawdust and 0.78 cu.ft of manure per day on pellets. Geldings produced 1.19 cu.ft and 0.65 cu.ft of manure respectively. Combined all horses produced an average of 58 pounds or 1.12 cu/ft of manure on sawdust, compared to 43 pounds and 0.72 cu.ft. of manure on pellets.

The weight of manure removed per day from pellet bedded stalls was 15 pounds less and 0.4 cubic feet less than the manure from sawdust bedded stalls. If this was extrapolated over a year it would result in 2.7 tons or 5.4 cu.yd. less manure that would need to be disposed of by the horse keeper.

Table 1: Manure and Soiled Bedding Removed from Stalls						
	Weight			Volume		
	Pounds/Day			Cu Ft/Day		
	Mares	Geldings	All	Mares	Geldings	All
Control Bedding						
Average	55.4	61	58	1.04	1.19	1.12
Range	81 to 48	78 to 43	81 to 43	1.5 to .83	1.7 to .67	1.7 to .67
Pellet Bedding						
Average	46.6	40	43	0.78	0.65	0.72
Range	51 to 37	53 to 31	53 to 31	.88 to .63	.96 to .5	.96 to .5
Difference in amount of Bedding Removed						
Per Day	8.8	21	15	0.26	0.54	0.4
Difference in amount of Bedding Removed		Tons/ Year			Cubic Yards/ Year	
Per Year	1.6	3.8	2.7	3.5	7.3	5.4

Change in Nutrients and Moisture

Nutrient analysis was made on the bedding materials at the start of the project (initial), grab samples from stalls at the end of week one and week two and grab samples from the accumulated manure piles for each bedding material were taken at the end of week two.

Table 2 shows that the change in percent of Nitrogen, Phosphorous and Potash were essentially the same for both types of bedding material. The initial values for the pelleted bedding were lower in P and K than in the sawdust.

The major difference in the analysis was in the amount of solids, which also represents the amount of moisture in the samples. The initial moisture level for the sawdust was 55% while the pellets had a value of 4%. The sawdust started with over 10 times as much moisture as the pellets.

At the end of the project the manure pile from the pellet bedded stalls had a moisture level of 50.2%, still not as wet as the initial sawdust moisture level. At the end of the project the sawdust manure pile had a moisture level of 63.9%. The pelleted bedding picked up 45% more moisture compared to the sawdust bedding that picked up only 8.5% more moisture. This indicates that the pelleted bedding had not been fully utilized as an absorbent material.

Table 2: Analysis of Sawdust and Pellet Bedding					
	%N	P	K	%Total Solids	% moisture
Sawdust					
Initial	0.00	897	46	44.6	55.4
Manure pile	0.51	6120	1790	36.1	63.9
Difference	0.51	5223	1744	-8.5	8.5
Percent change	100	85	97		
Pellet					
Initial	0.03	571	23	95.6	4.4
Manure pile	0.54	3840	1260	49.8	50.2
Difference	0.51	3269	1237	-45.8	45.8
Percent change	94	85	98		
Comparison of Sawdust & Pellets	Similar	Similar	Similar	-37	37

[Cost Comparison of Bedding Materials](#)

When comparing the cost of the two bedding materials several items were considered. [Table 3](#) lists the cost of getting the bedding material into the barn storage area. The initial cost of the pelleted bedding for this project was 15 times more expensive than the sawdust bedding on a weight basis but only 6 times more expensive on a volume basis

	Sawdust	Pellet
	7.5 ton load	130 bags (30#)
	(840 cu.ft.)	(133 cu.ft.)
Labor	\$ 20.00	
Transportation	\$ 10.00	
Material	\$ 116.25	\$ 552.50
Total	\$ 146.25	\$ 552.50
Cost per ton	\$ 19.50	\$ 283.33
Cost per cu.ft.	\$ 4.86	\$ 112.16

[Table 4](#) shows the amount of sawdust used for bedding on a weight basis was almost 1.5 times as much as the pellets, while on a volume basis 4 times as much sawdust was used. The difference in amount of bedding used for the year was calculated at 20 cubic yards.

	Sawdust		Pellets	
	Weight	volume	weight	volume
	lbs.	cu ft	lbs.	cu ft
Total for week	2173.0	139.0	1498.0	33.5
Average for week	217.3	13.9	149.8	3.4
Mare Average for week	222.6	13.6	164.0	3.5
Gelding Average for week	212.0	14.2	135.6	3.2
Average per day	36.2	2.3	25.0	0.6
Average for year	11300	723	7790	174
tons	5.6		3.9	
cu.yd.		26.8		6.5

The amount of labor to clean the stalls shown in [Table 5](#) was only slightly different with the sawdust taking about half a minute more per day to clean. A greater discrepancy in time was observed between mares and geldings. It was observed that at the end of the week the pelleted bedded stalls were dustier than the sawdust bedded stalls

Table 5: Time to Clean stalls		
	Minutes	
Per stall per day	Sawdust	Pellets
Mare	12.6	12.2
Gelding	14.8	14.5
Average	27.4	26.7
Sawdust vs. Pellet	0.7	Minutes per day
	4.3	Hours per year
Gelding vs. Mare	4.5	Minutes per day
	27.4	Hours per year

When considering the initial cost, the amount of bedding used and the amount of manure removed from stalls; the breakeven cost of manure disposal would be \$350 per ton or \$110 per cubic yard.

Table 6: Comparison of Total Cost per Year		
	Sawdust	Pellets
Weight Basis (Tons)		
Initial Cost	\$ 19.50	\$ 283.33
Amount Used	5.6	3.9
Final Cost	\$ 109	\$ 1,105
Volume Basis (Cu.Yd.)		
Initial Cost	\$ 4.86	\$ 28.89
Amount Used	26.8	6.5
Final Cost	\$ 130	\$ 188

Conclusion:

The pelleted bedding material is extremely dry and can absorb more moisture than the fresh sawdust that was used in this project. While the cost of the pelleted bedding is more on an initial basis, individual situations must be considered to determine if it is more economical to use in an operation. Factors that would impact the decision to use the pellets would be the cost of hauling and storing bedding as well as the cost of manure storage, removal and spreading by the farm. For this project it was calculated that the pelleted bedding would cost 40% more than the sawdust bedding on a volume basis.

The pelleted bedding comes in water proof bags that can be stored outside in inclement weather, so a farm would not need the added storage area for clean bedding. Also, the pelleted bedding is delivered to the farm and so labor costs associated with going to the sawmill to pickup and haul the sawdust as well as the truck to transport the clean bedding would not be necessary with pelleted bedding.

Using the pelleted bedding produced only 3/4 of the weight of manure compared to manure from sawdust bedded stalls. Also, 2/3 of the volume of manure was produced from pellet bedded stalls compared to sawdust bedded stalls. Storage structures for manure could be significantly downsized if pelleted bedding were used. In this project the type of bedding material did not affect the amount of time to actually clean the stall, but labor savings would result from the time to take bedding to the stall.

Horse-keepers need to determine the average amount of bedding they use and manure they remove from stalls to be able to accurately size manure and bedding storage areas. There can be a great variability in the amount of bedding used and manure removed from a horse stall depending on the gender of the horse and variations among the horse-keepers themselves.

When using pellet bedding, it would be important to follow manufacturer's recommendations to add a bucket of water to the newly bedded stall to prevent dust build up.

The nutrients captured by the sawdust and pellet bedding materials were essentially the same. The difference in the materials was in the initial moisture level and the resulting decrease in the volume and weight of manure removed from the pellet bedded stalls.

¹Lamb, D. C., Review of 2000 Equine Survey Results for Maine, unpublished report, Piscataquis County Extension Office, Dover-Foxcroft, ME, December 2000.

²New England Agricultural Statistics, New England Agricultural Statistics Service, Concord, NH, 1999, page 77.

³Kersbergen, R., Developing Nutrient Management Plans for Maine Farms in Accordance with Chapter 565, University of Maine Cooperative Extension and Maine Department of Agriculture, Food and Rural Resources, December, 1998, page 3.

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