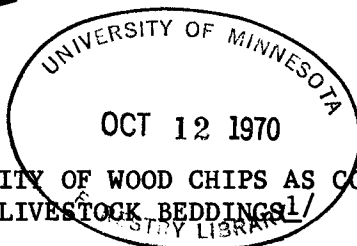


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THE WATER HOLDING CAPACITY OF WOOD CHIPS AS COMPARED WITH COMMON LIVESTOCK BEDDINGS^{1/}

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In the eastern part of the United States, wood chips have been used for livestock bedding on many farms. In the past, Minnesota farmers have had adequate supplies of straw for bedding. However, with changes in Minnesota agriculture such as an increase in row-crop acreage and a decrease in grain acreage and the use of combines to harvest grain (which leaves more straw in a field), it is possible that a supplement to present bedding supplies is needed. The use of hardwood chips for livestock bedding has been suggested.

This study was initiated to determine the absorptive ability of wood chips as compared with commonly-used beddings. Specifically, the objective was to determine the water-holding capacity of wood chips and other beddings expressed as a percent of the weight of dry materials. As over 50% of the nitrogen and 75% of the phosphate contained in cattle manure is found in the urine,^{3/} absorptive capacity was felt to be the factor warranting investigation first.

Materials and Methods

The following materials were selected for the experiment on the basis of individual merits in terms of common use, potential use, and/or suspected differences in waterholding capacity. These ten materials were:

- | | |
|------------------------------|--------------------|
| 1. Combined oat straw (long) | 6. Red oak sawdust |
| 2. Threshed oat straw (long) | 7. Jack pine chips |
| 3. Shredded cornstalks | 8. Red pine chips |
| 4. Ground corncobs | 9. Aspen chips |
| 5. Red oak planer shavings | 10. Birch chips |

All materials were dried to equilibrium moisture content in a dry-kiln for three weeks. Sample #10 cans were used to hold the materials while they were submerged in water at temperatures of 60°, 80°, or 100°F. (these three temperatures being the replications). Absorptive capacities were determined on the basis of the weight gained divided by the kiln-dry weight of the sample x 100 at 11 intervals during a 4-hour submergence time.

^{1/} This study was done as part of a Minnesota Station contributing project to the North Central Regional Project on Farm Woodland Marketing (NCM-17).
^{2/} Junior Scientist, Assistant Professor, Research Associate, and Assistant Professor, respectively.
^{3/} Attoe, O. H. "Shavings for Bedding Save Plant Foods," HOARD'S DAIRYMAN, January, 1949.

Results

The results of the test indicated that the 10 materials could be ranked in two groups, in terms of absorptive capacity. The combined and threshed straws and shredded cornstalks were in the upper group. The wood chips of all species, ground corn cobs, shavings, and sawdust were in the lower group. Mean and maximum absorptions are listed in Table 1.

Table 1: MEAN AND MAXIMUM WATER-HOLDING CAPACITIES FOR 10 BEDDINGS EXPRESSED AS A PER CENT OF THE DRY WEIGHT OF THE MATERIALS

| | <u>Material</u> | <u>Mean Absorption %</u> | <u>Maximum Absorption %</u> |
|----------|------------------|----------------------------------|-------------------------------------|
| Group I | Threshed straw | 294.5 | 323.8 |
| | Combined straw | 260.7 | 306.8 |
| | Corn stalks | 256.4 | 284.7 |
| Group II | Red oak sawdust | 149.4 | 160.4 |
| | Red oak shavings | 145.2 | 160.2 |
| | Jack pine | 138.1 | 148.5 |
| | Aspen | 135.1 | 146.7 |
| | Red pine | 126.3 | 137.0 |
| | Ground corncobs | 124.0 | 146.1 |
| | Birch | 99.4 | 109.4 |

An analysis of variance showed a significant (at the 1 percent level) difference in absorptive capacity between bedding materials. As was done in Table 1, the bedding materials can be ranked in two groups on the basis of mean absorption percentages. A further test of the differences between means^{4/} substantiated the difference between the two groups of materials at the 5 percent level.

Therefore, to obtain absorptive capacity equal to one pound of straw, it would require approximately three pounds of birch chips or two pounds of red pine, aspen, or jack pine chips. Ground corncobs, sawdust, and planer shavings showed no advantages over the wood chips.

Other information about wood chips such as cost, relative availability, insulation value, and soil amendment qualities also need investigation.

The need for bedding supplies to supplement those commonly used at the present time in Minnesota is the subject of a separate study.

^{4/} Snedecor, G. W. Statistical Methods (5th ed.), Iowa State College Press, Ames, Iowa, 1956.