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Firewood - Pickup Trucks, Cords, and Other Units of Measurement

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The household use of firewood has increased dramatically over the past few years. Confusion associated with measuring firewood has increased also. Terms such as cord, face cord, fireplace cord, rick, rack, rank, short cord, long cord, unit, pen, and stere have been used to describe quantities of firewood. The popularity of pickup trucks in obtaining and delivering firewood has made them common units of measurement.

The purposes of this paper are:
(1) to explain the common and not-so-common terms used to measure firewood;

(2) to present the results of a study that determined how much wood a pickup truck will hold.

Units of Measurement

The most common unit of measurement, the standard cord, is a stack of wood measuring typically 4'x4'x8'. The total volume of the stack is 128 cubic feet. This is not 128 cubic feet of solid wood. Rather, it is the total volume of wood and air in the stack. Crooked or knotty pieces of wood can affect the amount of solid wood in the stack. Likewise, the diameter or girth and the length of the pieces affect the amount of solid wood in a cord. In general, the smaller the diameter, the less solid wood in the stack. Also, since logs are not usually straight and cylindrical, the longer the piece of wood, the less solid wood in the stack.

A face cord, also called a short cord, rick, rack, rank, and fireplace cord, is a stack of wood 4' high by 8' wide by the length of the pieces of wood (less than 4'). A face cord of 18" wood measures 4'x8'x18" while a face cord of 24" wood

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measures 4'x8'x24". Obviously, a face cord of 24" wood contains more stacked volume and solid wood than a face cord of 18" wood. A face cord of 24" wood is equivalant to one-half of a standard cord while a face cord of 18" wood is slightly over one-third (actually .375) of a standard cord. A face cord, quite often, is erroneously called a cord.

A long cord is a stack of wood 4' high by 8' wide by the lengths of the pieces of wood when the lengths exceed 4'. A long cord measuring 4'x8'x5' and totaling 160 cubic feet or 4'x8'x5.25' and totaling 168 cubic feet is called a unit.

A pen is a hollow stack of wood 6' high consisting of 2 sticks to a layer with each layer at right angles to the one beneath. It is aptly named in that it resembles a pen in which an animal might be kept with the sticks of wood resembling the fence. When the sticks are cut 5' long, about 5 or 6 pens are assumed to equal a cord. The pen is an extremely variable unit of measurement whose volume of solid wood as well as its relationship to the standard cord varies considerably with the diameter of the sticks.

A stere is a stack of wood 1 meter high by 1 meter wide by 1 meter deep totaling 1 cubic meter.

Firewood is sometimes sold in stores by the bundle or box. There are no standards that can be applied to these units of measurement since they are defined by particular stores or firewood wholesalers.

Pickup trucks contain from less than one-fifth to slightly over one-half of a cord. The remainder of this paper discusses the capacities of pickup trucks in detail.

Pickup Trucks

The ubiquitous pickup truck has become todays' popular unit for measuring firewood. Few people know how much wood a pickup will hold and many tend to overestimate a truck's capacity. Theoretically, the firewood capacity can be calculated by multiplying the length, width, and height of the box. This assumes the wood is uniform and is stacked tightly in the truck level with the top of the box. But, how much wood will the truck hold if the wood is not cut to a convenient length to be stacked tightly, or if it is stacked above the top of the box, or if the wood is just thrown in the truck rather than stacked?

Procedure

In an earlier study, firewood users in South Carolina were asked how much firewood they used and were allowed to answer in terms of pickup trucks. They were also asked the lengths of the wood used and how the wood was stacked in the trucks. Based

on their responses, the most popular styles of trucks were then loaded with the most popular lengths of firewood. The wood was both stacked and randomly piled in each truck both to the top of the box and above the top (Figures 1-6). After each loading, wood was removed, stacked on a rack and measured (Figure 7). The purpose of measuring the stack was to relate the pickup trucks to a standard cord so that a reliable estimate of statewide firewood consumption could be made. The measurements obtained were of stacked volume, that is, wood and air. Two types of wood were used. One was an assortment of large and small round and split pieces somewhat typical of homeowner-cut firewood (Figure 7). The other consisted of all split pieces typical of a large scale firewood producer (Figure 6 - This wood was used with the cooperation of Smokey's Firewood in Greenville, S.C. Similar wood was made available by Quality Coal Co. of Greenville, S.C., Clemson University Forestry Club, and Robert Shaw of Clemson, S.C.).

The most popular type of truck used by those sampled was the shortbed standard pickup. The second most popular was the longbed standard pickup. Very few small trucks were used by those sampled when the survey was conducted in 1980. The most popular lengths of wood were 18" and 24".

Variation in Measuring Stacked Wood

If the same pieces of wood are stacked several times, several different measures of stacked volume will result. In order to obtain some idea of the variation present in the stacking process, the same wood was stacked 10 times and the stack was measured each time. In eight of the trials, the wood was stacked tightly as it had been during the pickup truck measurements (Figure 8). In two trials, the stackers were instructed to stack the wood loosely (Figure 9). The range of volumes for all 10 trials was 43.42 cubic feet to 46.25 cubic feet for a difference of 6.5% of the lower figure. The mean was 44.88 cubic feet and the standard deviation was .9607. For the 8 trials in which the wood was stacked tightly, the range was 43.42 to 45.46 cubic feet and the difference was 4.9% of the lower figure. The mean was 44.53 and the standard deviation was .7192. The differences were lower than expected. Nevertheless, they should be considered if the data in this paper is used to make conversion factors.

Results

The results of the study are summarized in Table 1. A shortbed standard size truck with fenders outside of the box held 37.89 cubic feet or .30 cords of 18" wood when the wood was randomly piled in the truck above the top of the box (Figure 2). It held 51.52 cubic feet or .40 cord when wood was stacked in the truck above the top of the box (figure 4). Stacking resulted in 13.6 cubic feet or 36% more volume in the truck than random piling. When the truck was randomly piled to

Figure 1. Randomly piled to the top of the box. (1975 Dodge - 18" wood)

Figure 2. Randomly piled above the top of the box (1975 Dodge - 18" wood)

Figure 3. Stacked to the top of the box. (1975 Dodge - 18" wood)

Figure 4. Stacked above the top of the box. (1975 Dodge - 18" wood)

Figure 5. Randomly piled above the top of the box. (1981 Ford - 18" wood)

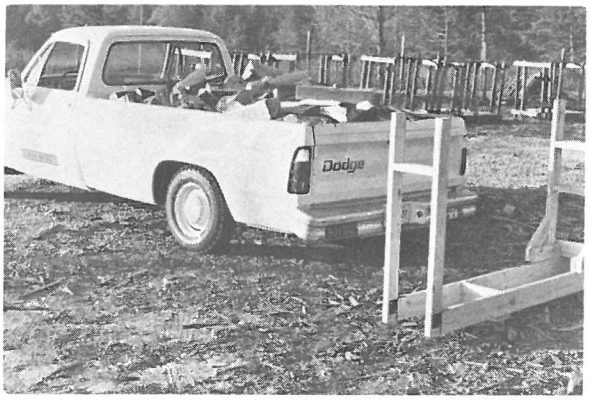

Figure 6. Randomly piled above the top of the box. (1978 Dodge - 24" wood)

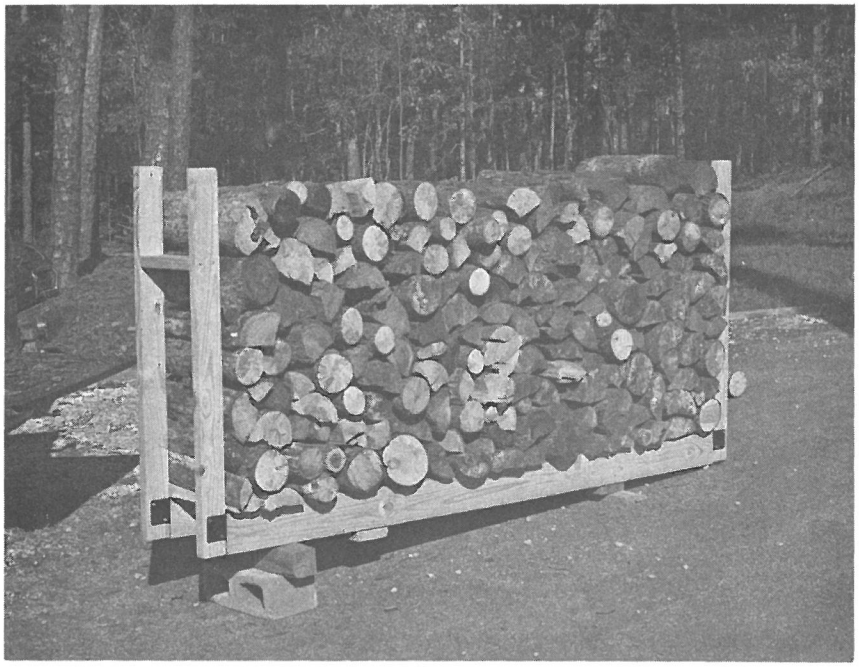

Figure 7. Wood stacked for measurement. (18" wood)

Figure 8. Stacking trial. Wood stacked tightly.

Figure 9. Stacking trial. Wood stacked loosely.

TABLE 1 - SUMMARY OF STACKED VOLUMES OF 18 AND 24 INCH FIREWOOD*

TRUCK TYPE	DIMENSIONS OF BOX (INCHES) AND BOX VOLUME (CU. FT.)	LOADING METHOD	MEAN STACKED VOLUME TO FILL TRUCK TO TOP OF BOX (CU. FT.)	(CORD)	MEAN STACKED VOLUME TO FILL TRUCK ABOVE TOP OF BOX (CU. FT.)	(CORD)	PHOTO NO.
18 INCH SUMMARY							
1975 Dodge shortbed (wheel wells outside box)	78.5x54.75x 19.5 inches 48.5 cu. ft.	random stacked	29.80 40.83	.23 .32	37.89 51.52	.30 .40	1,2 3,4
1981 Ford shortbed (wheel wells inside box)	82.5x69.75x 19.5 inches 62.1 cu. ft.**	random stacked	38.16 49.47	.30 .39	48.00 61.23	.37 .48	5
1975 and 1976 Datsun (wheel wells inside box)	76.5x61.62x 15.5 inches 38.6 cu. ft.***	random stacked	23.62 31.23	.18 .24	29.64 39.57	.23 .31	
1978 Dodge longbed (wheel wells inside box)	98.25x70.0x 19.0 inches 72.8 cu. ft.**	random stacked	45.23 60.59	.35 .47	56.54 73.98	.44 .58	
24 INCH SUMMARY							
1975 Dodge shortbed (wheel wells outside box)	78.5x54.75x 19.5 inches 48.5 cu. ft.	random stacked	29.78 39.27	.23 .31	37.29 48.11	.29 .38	
1981 Ford shortbed (wheel wells inside box)	82.5x69.75x 19.5 inches 62.1 cu. ft.**	random stacked	37.98 50.56	.30 .39	47.27 62.14	.37 .49	
1978 Dodge longbed (wheel wells inside box)	98.25x70.0x 19.0 inches 72.8 cu. ft.**	random stacked	46.22 59.98	.36 .47	57.54 73.08	.45 .57	6

* Wood length was measured as the mean of at least 30 pieces of wood selected at random from the wood piles used for the tests. Means varied from 17.75 inches to 18.85 inches for 18 inch wood and from 22.14 to 24.17 for 24 inch wood.
** 2.8 cu. ft. subtracted from volume to allow for wheel wells.
*** 3.7 cu. ft. subtracted from volume to allow for wheel wells.

the top of the box, it contained 28 cubic feet of stacked wood. When stacked to the top of the box, it contained 40 cubic feet. Both of these figures are lower than the capacity of the truck which is 48.5 cubic feet. This held true for all loads evaluated and was due primarily to the lack of uniformity of the wood. It was due to a lesser extent to the stacking variation in the trucks and on the measuring rack.

Twenty four inch wood was evaluated to determine whether wood length (18 or 24 inch) affected the firewood capacity of the three larger trucks used in the study. The effect on volume of the 18 and 24 inch lengths can be calculated from Table 1. The volume differences are small and inconsistent. Of the 12 cubic feet values obtained for 24 inch wood, 7 were lower and 5 were higher than the corresponding values for 18 inch wood. Also, since almost all differences were within the limits of the sampling errors, wood length in the ranges tested had no measurable effect on the firewood capacity of the trucks.

A graph of stacked wood capacity plotted over truck capacity is shown for 18 inch wood in Figure 10. It can be used to estimate the amount of wood that could be loaded into pickup trucks whose capacities fall between the two extremes on the graph. The mid-sized trucks introduced in 1982 are potential candidates for this interpolation. The graph will not necessarily provide reliable estimates of capacities of trucks larger or smaller than the extremes shown. This information could also be used as an aid in estimating trailer capacities provided that the trailer has the same shape (the same proportion of length, width, and height) as a pickup truck box and its capacity lies between the extremes shown on the graph. This information should not be used to estimate the capacity of trailers with disproportionately high or low sides.

Weight

Weight was not considered in this study. Wood is heavy! A cord of green (wet, unseasoned) hardwood such as hickory or oak weighs over 6000 pounds. Even one-third of a cord will overload a half-ton pickup truck. A close look at some of the photos in this paper shows that blocks were placed under the frames of the trucks to protect the springs and axles from the weight of the wood.

Conclusions

The pickup truck, on the average, will hold anywhere from less than one-fifth cord to slightly over one-half cord. Size of the truck, stacking method, and how high wood is stacked in the truck affect the amount of wood a pickup truck will hold. Using the volume calculated from the box dimensions to estimate firewood capacity of trucks will result in an overestimate.

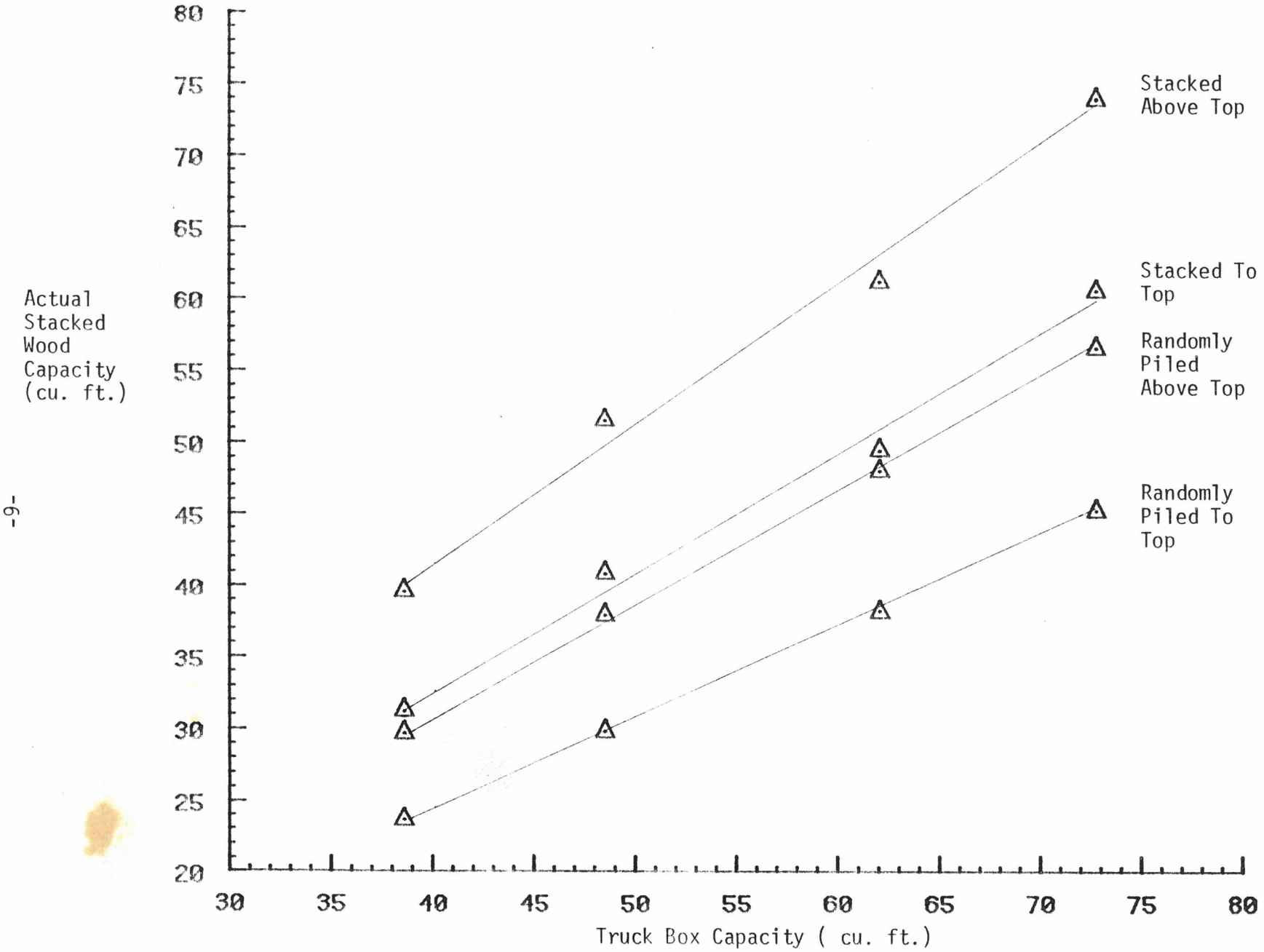

Figure 10. Relationship Between Capacity of Trucks and Actual Volume of Wood

The figures presented in this study should be viewed as guidelines for estimating only the volume capacity of trucks. Weight should always be considered when trucks are being loaded.