Protection Against Leakage

For protection against liquids seeping or beating through wooden construction, No. 1 Common is suitable. This grade and the select grades are usually drier than the lower grades and therefore shrink and open less at the joints. Where tightness against leakage of grain is required, No. 2 Common, with a small amount of cutting to eliminate occasional knot holes, may be used. For temporary protection against the weather, No. 3 Common is satisfactory even though knot holes and other open defects occur.

Clear wood wears more evenly than that containing knots. A Select is the only grade entirely free of knots, but B Select, although containing a few small knots, withstands wear excellently. C Select has sufficient limitations on defects to assure good results. D Select and No. 1 Common limit the size and character although not the number of knots, and are satisfactory where uniformity of wear is not required.

Resistance to Decay

Except in the "all heart" grades, the lower grades are more resistant to decay than the higher grades. This is because the decay-resistant heartwood and the larger and more numerous knots occur in the same portion of the log. The lower grades, however, include more pieces containing original decay, which sometimes counteracts the effect of the larger heartwood content. So small an amount of advanced decay is allowed in No. 2 Common that the probable resistance to further decay of lumber of this grade is greater than that of the higher grades from the same species and producing region.

C. V. SWEET.

MACHINERY Plays a Vital Rôle in Making Agriculture Efficient

Development and use of improved farm machinery in the United States closely followed the opening of large fertile tracts for settlement. This development has come about largely since the middle of the last century; during the last 60 years production per farm worker has more than doubled. The practice of planting grain by hand, cutting with the cradle, and threshing with the flail has given way to improved methods with the introduction of seeder and drill, the reaper, the binder, the mechanical power-driven thresher, the header, and the combined harvester-thresher. Production of other farm commodities has been similarly speeded up by the development of large units of motive power and large tillage, planting, and harvesting machines.

No measure is available of how much of the increase in production per farm worker is due to the use of more power, to the working of larger areas of land, and to general improvements in the technique of production. It is a fact, however, that from 1870 to 1925, the average acreage of improved land per farm worker increased from about 32 acres to approximately 49 acres, an increase of more than one-half. At the same time the value of machinery on farms in terms of the 1913 price level increased nearly ten times, or from $270,000,000 in 1870 to more than $2,666,000,000 in 1925. The number of agricultural workers increased also, but, the value of machinery on farms (in terms of the

1913 price level) increased from $36 per farm worker in 1870 to more than $200 per worker in 1925. In less than 60 years the value of farm machinery per worker increased five and one-half times.

Production Per Farm Worker

The American farm worker produces from two to five times as much as do similar workers in the important European countries. His high production capacity may largely be attributed to the use of large units of machinery and power and to the relatively small amount of field work done by hand.

Even with these increases in the value of machinery, and in acreage handled and physical production per worker, there is room for a further increase in the efficiency of labor on many farms through the extended use of larger machines and units of power and improved methods of production. But not all farms are suited to the use of the largest or even the larger machines and units of power. One man and two horses operating a 2-section harrow will cover only 12 to 15 acres per day whereas the same man with a 4-section harrow and tractor will cover 40 to 45 acres per day; but the saving of labor and the performance of operations on time do not alone determine the wisdom of using the larger outfit. The lay of the land, the cost of the machinery, and the amount of work done each year must be considered. Small farmers have nothing to gain and much to lose in buying expensive machinery larger than is needed. Where the saving of labor is practicable, the following examples of machine performance for operations common to most farms may be used as a guide. The indicated machine performances are only approximate, because wide variations exist in the physical and climatic characteristics of different sections of the country.

The usual day's work for a 12-inch walking plow drawn by two horses is 1½ to 2 acres; for a two 14-inch bottom gang plow drawn by four horses, 3½ to 4 acres; and for a three 14-inch bottom gang drawn by tractor, about 8 acres. The two larger outfits require from one-fourth to one-half as much labor to plow a given acreage as is required by the 12-inch walking plow.

One man and four horses with a 1-row lister can normally list 6 acres in a day, whereas the same man with a 2-row lister drawn by tractor will list 16 acres a day, an actual saving in labor of over 60 per cent.

The Performance of Cultivators

The performance of cultivators varies widely depending upon the number of rows cultivated and unit of power used. In cultivating corn and cotton under usual conditions, a fair day's work for a 1-horse cultivator making two trips to the row is 4 acres; for a 2-horse 1-row cultivator, 8 acres; and for a 4-horse 2-row cultivator about 15 or 16 acres. Two-row and 4-row cultivators drawn by general-purpose tractors cover daily around 20 and 40 acres, respectively, under favorable conditions. Each of these cultivators is operated by one man. Ten days of one man's time are required with the 1-horse outfit to cultivate the same acreage that the 4-row outfit cultivates in one day; with the 1-row machine a man cultivates in one week what he can cultivate with the 1-horse cultivator in two weeks.

There are so many sizes of harrows, drills, planters, mowers, rakes and other machines that the farmer needs only to study his require-

ments and farm organization to determine and install the size best suited to his purpose.

The use of different sizes of machines and units of power is only partly responsible for variations in the amount of labor devoted to the production of each farm commodity. Some soils need more work than others. Production methods differ under different geographic and economic conditions. Introduction of new types of machines for performing certain operations and combinations of operations has resulted in a distinct saving of labor. About 1830 the farmer used a crude plow, seeded his wheat by hand, cut it with a sickle, and threshed it with a flail. From 30 to 35 hours of labor were then used in producing 10 bushels of wheat. In recent years, those farmers in the central Great Plains States who cut their wheat with a binder and thresh from the shock use about 8 or 9 hours of labor for producing and hauling to elevator or shipping point 10 bushels of wheat. Farmers of the Northwest who grow wheat on land that was summer fallowed the previous year and harvest with a combine use only 3 hours for each 10 bushels.

Variations in Requirements

Different practices and labor requirements prevail even in the same region. In the Great Plains wheat region, the total labor for harvesting and threshing is reduced from about 4.6 hours per acre for cutting with a binder and threshing with a stationary thresher to about 3.8 hours for cutting with a header and threshing with a stationary thresher, and further to about three-fourths of an hour per acre for harvesting with a combine. In Illinois wheat harvested with the binder and the stationary thresher requires about 6.5 man hours per acre. If it is harvested with the combine only 1.5 hours are required.

The husking and cribbing of corn from the standing stalk requires from 6 to 8 hours of labor per acre, compared with 25 to 35 hours when cut by hand, shocked, husked by hand, and the corn and stover hauled to the crib and feed lot.

Hay cut with two 6-foot mowers drawn by a tractor and stacked with push rakes and stacking equipment is handled with about one-half the labor required when it is mowed with one 5½-foot mower, raked, loaded from the windrow with a hay loader, hauled to the barn, and unloaded with a mechanical fork or sling; and with one-third of the labor required when cut with a 5½-foot mower, raked, cocked, and loaded and unloaded by hand.

Economical labor-saving equipment and practices are increasing in all lines of crop and livestock production, and the point of maximum efficiency is still distant. Continued improvement is expected, and any changes made by the individual farmer should be made with a full understanding that a corresponding change must be made in the organization of the business. Labor is only one of the numerous items of cost, and the saving of labor is but one of many ways of increasing the income from the farm. The farmer's task is to select wisely the equipment and method of production best suited to his conditions after considering probable expenses and returns incident to contemplated changes.

M. R. Cooper.

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