Labor Performance Standards
in
Seed Warehousing

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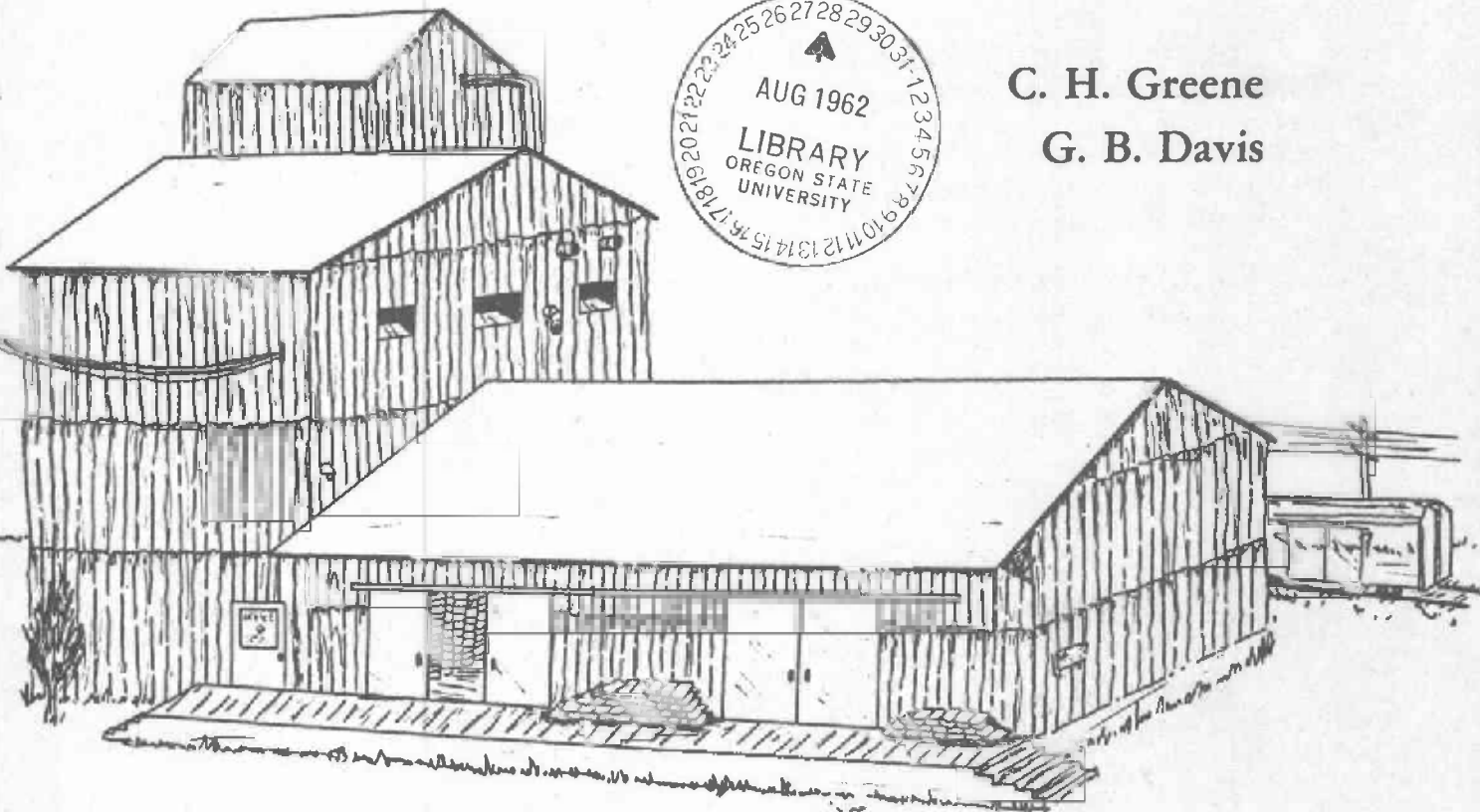
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This report, dealing with labor and equipment performance standards, is the first of a series on costs and efficiencies in seed processing. A later report will consider equipment and facilities costs. These and time standards will be used to synthesize models of seed processing plants to determine what effect length of season, annual volume, methods used, and kinds of seed have on costs of processing.

These studies are being carried out by Oregon Agricultural Experiment Station and the United States Department of Agriculture cooperating.

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LABOR PERFORMANCE STANDARDS IN SEED WAREHOUSING

INTRODUCTION

Oregon's turf and forage seed industry annually returns to growers an income in excess of $15 million. About $4 million is the value added by processing, storing, and related operations.

The seed processing industry of the state is made up of approximately 400 plants including grower owned as well as commercial plants. These plants vary widely in many of the characteristics that have a bearing on processing costs. Some plants, for example, have a cleaning season of 2,500 hours while others clean only for about 50 hours per season. The hourly cleaning capacities of the individual plants vary almost as widely. In addition, some plants use bulk handling and mechanical methods for receiving and handling, while others depend on receiving and storing field run seed in bags transported by hand trucks. This wide variation in methods used and the volume of seed handled suggests that differences in efficiency and costs of operation also exist.[1]

This report, as well as subsequent ones to follow, is intended to provide seed processors with information they can use to improve their efficiency and reduce their costs. The current report is confined to labor performance standards for the more common methods used in seed warehousing. Also included are labor standards for some methods not now in general use but which appear to offer possibilities for reducing costs. These standards can be used to determine the labor requirements under efficient conditions for different methods. This can be helpful to management in selecting appropriate methods to use in these operations. Also the information presented represents an accumulation of materials handling standards previously unavailable to researchers and others interested in costs and efficiencies in the handling of bulk and bagged free flowing products.

Later reports will combine labor standards with equipment and facilities costs to demonstrate how seed processing costs are affected by such variables as length of operating season, hourly capacity, methods used, annual volume, and kind of seed.

SCOPE AND METHOD

Seed processing has four distinct but related stages: (1) receiving and storing field run seeds; (2) cleaning and bagging; (3) warehousing clean seed; and (4) shipping the clean seed (Figure 1). This report will emphasize warehousing operations as they are affected by alternative methods of seed handling. Information relating to storage space requirements is presented first and is followed by labor requirements for handling field run and clean seed in bags. Pallet box and bulk handling of field run seed will then be discussed with

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[1] Greene, C. H., and G. B. Davis, "Seed Processing in the Willamette Valley," Oregon Agricultural Experiment Station Miscellaneous Publication No. 81, 1959.

some consideration given to miscellaneous operations in the seed cleaning industry.

Labor standards presented in this report were developed from time and production studies made of the methods and equipment used in a sample of ten seed processing plants in Oregon. These plants were selected because they had particular operations that were above average in efficiency. As a consequence, the standards are actual measurements of better than average rates of performance. These performance rates, however, represent levels that can be achieved in well-organized and well-managed plants.

The standards to be shown in this report include an allowance of 20% for nonproductive time. This allowance is based on a standard developed from industrial engineering research, and represents time lost through brief periods of equipment down-time, normal rest periods, and minor stoppages while waiting for materials or work. The standards, therefore, represent a pace at which a trained worker can perform an operation through the course of a working day.

The standards have two labor components: (1) an amount varying with distance, measuring the time required to transport seed from one point to another, and (2) a fixed component measuring the time required to perform all elements of the operation except those included in (1) above. The zero entry in each section of the tables relating to movement of seed by hand trucks or lift trucks indicates this fixed component. The variable components, or transportation times used in computing the standards, are given below. The total transportation time is calculated by multiplying the one-way transportation distance in feet, as described in each table, by whichever of the following standards is appropriate for the operation.

Hand truck: .0330 man-hours per 1,000 bags
Lift truck: .0080 man-hours per 1,000 bags (20 bags/pallet)
             .0064 man-hours per 1,000 bags (25 bags/pallet)
             .0016 man-hours per pallet box

The above may be used to calculate standard times for travel distances not shown in the tables.

Procuring of needed tools and supplies, record keeping, setting up temporary work stations, adjusting equipment, and cleaning up after a job have been included in the standard times where appropriate, but no allowance for indirect labor of managers and supervisors is included.

Although direct comparisons of the labor requirements for different methods of performing a given operation are possible, caution should be used in such comparisons. Consideration should also be given to the full cost of performing the operation, based on the relative equipment requirements as well as labor requirements of the various methods. Equipment requirements and costs will be presented in a later publication.
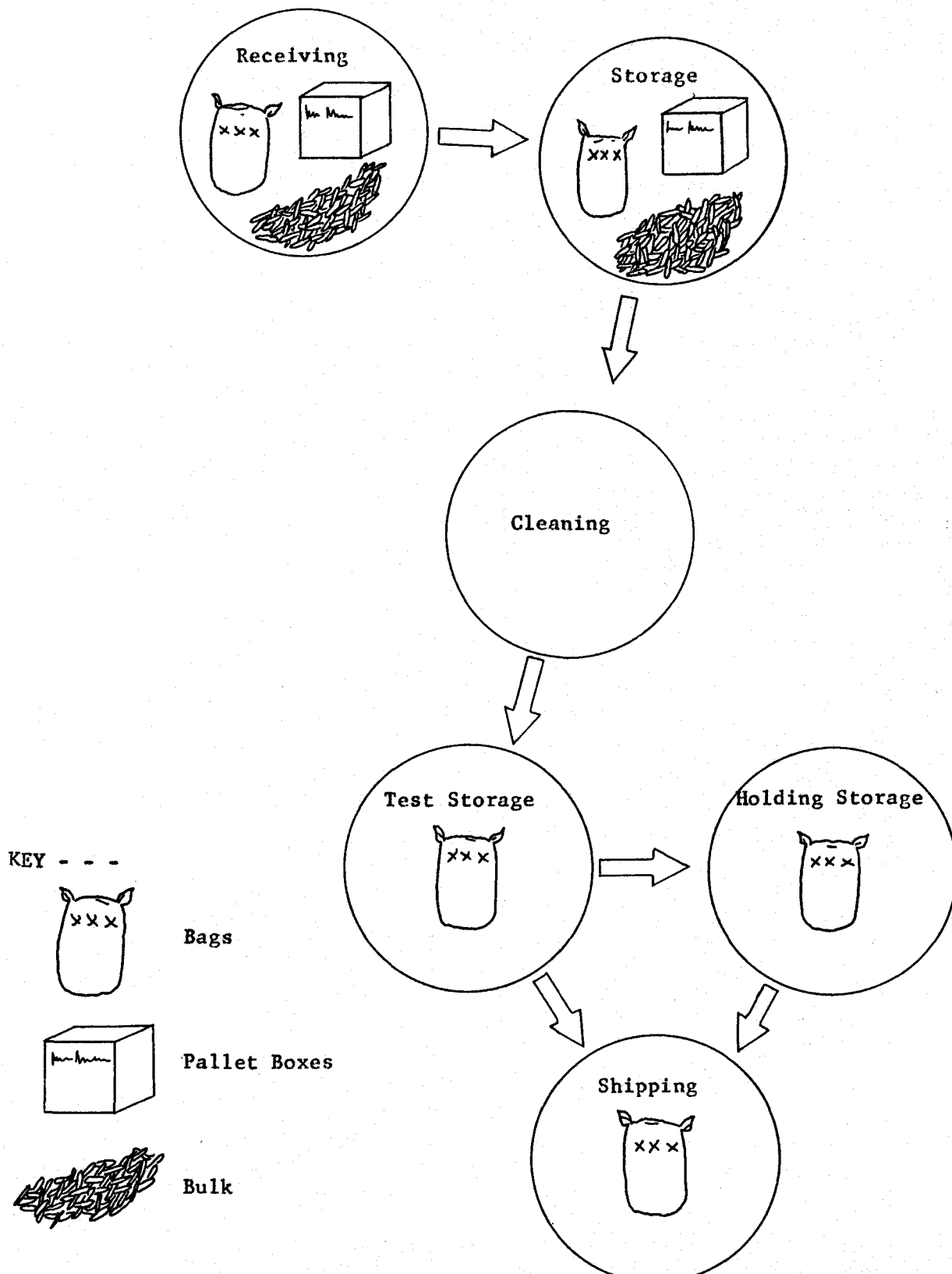
Figure 1. Flow Chart of Seed Processing Operations.

STORAGE REQUIREMENTS FOR BAGGED SEED AND PALLET BOXES

The question of storage requirements is always of major importance to seed processors. There is often a problem of determining the method of storage which will best utilize the existing storage space without sacrificing operating efficiency. The material in Tables 1 and 2 provide some basis for estimating storage requirements for several methods of handling seed. The information in Table 1 may be used both for field run seed and clean seed. The second table applies to pallet boxes of the three most common sizes in use in Western Oregon. Bulk storage of seed is not illustrated here, but will be included in the next report in this series.

Using the data in these two tables, a warehouse manager may estimate the storage requirements for a given volume of seed. In this manner, he may select the most appropriate method for the volume of seed he expects to handle. For example, storage for 10,000 bags would require 11,380 square feet for five-high stacks or 7,120 for eight-high stacks. If pallets are used 10,000 bags of seed would require 7,500 square feet of storage if two pallets high or 3,750 square feet if four high.

LABOR REQUIREMENTS IN WAREHOUSING SEED

Labor standards for warehousing are presented in the form of man-hours per 1,000 bags or in man-hours per 1,000 bushels in the case of bulk and pallet box handling. Each can readily be converted to a weight basis.

The minimum crew size required to achieve the performance rate specified in a given standard time has been included in the job specifications, where crew size affects rate of production. Where crew size is not specified, it may be assumed that a one-man crew is sufficient, or that crew size has no appreciable effect on the performance rate.

Receiving and Storing Field Run Seed in Bags

Handling Seed with Hand Trucks - The Trend in seed warehousing is toward the use of more merchanized and bulk handling and away from use of hand trucks. Many plants, however, still use hand trucks for seed handling operations. Labor performance standards for this method are shown in Table 3. These data can be used to estimate the labor requirements of a particular operation under efficient conditions. The following is an example of their use.

Assume a warehouse anticipates receiving approximately 100,000 pounds of field run ryegrass, 70,000 pounds of Chewings fescue, and 80,000 pounds of bentgrass. This would be about 1,150 sacks of ryegrass, about 900 of Chewings fescue, and 950 of bentgrass -- a total of about 3,000 sacks of field run seed. It is assumed that hand trucks will be used for unloading and storing, and that the warehouse has no sack elevator for high piling (Table 3). If warehouse space is not a problem, the seed can be stacked on the floor in five-high piles. Approximately 3,400 square feet of floor space would be required under this method, as opposed to 2,100 if the bags were stacked in eight-high piles (Table 1). If the distance from the truck bed to the point of storage averages 80 feet, the labor requirement is 4.29 man-hours per 1,000 bags. Multiplying 4.29 man-hours times 3 (for 3,000 bags) gives 12.87 man-hours.

Table 1. Storage Requirements for Bagged Seed/1

Manner in which bags are stored	Floor space required per 1000 bags/2
	(square feet)
5-high stacks	1,138
6-high stacks	949
7-high stacks	813
8-high stacks	712
20-high piles	585
4' x 5' pallets, 20 bags per pallet	
2 pallets high	750
3 pallets high	500
4 pallets high	375

/1 Assumes bags contain 100 pounds of clean ryegrass and that a single bag occupies approximately five square feet of floor space.

/2 Includes the following allowances for aisles: stacked on floor five to eight high, 15%; high piled, 30%; palletized, 20%.

Table 2. Storage Requirements for Pallet Boxes

Size of box	Floor space required per box/1		
	2 high	3 high	4 high
(feet)		(square feet)	
4 x 6 x 4	15	10	7.5
4 x 6 x 3	15	10	7.5
4 x 4 x 4	9	6	4.5

/1 Includes 20% allowance for aisles.

This is the estimated labor requirement for receiving and storing this quantity of seed. Of course, the rate at which the seed is delivered at the warehouse as well as the volume delivered will determine the total labor needed for receiving if a separate receiving crew is used.

No allowance has been made for variations in the weight of bags of field run seed. Time studies indicated that effects of such variations were not significant within the weight limits normally found in bags of field run seed.

Handling Seed with Lift Trucks - The standards for this method of seed handling are presented in Table 4. These standards are based on the following conditions:

1. Pallets are 48 by 60 inches, double-faced.

2. Bags of field run seed are stacked on pallets in layers of five bags each, four or five layers per pallet.

3. Clean grass seed in bags of 100 pounds is stacked on pallets in four layers of five bags each, or 2,000 pounds per pallet.

4. Clean grass seed in bags of 50 pounds, and 100 pound bags of legume seed are stacked in layers of six bags, with four or five layers per pallet. Plants specializing in legumes generally will have a 48 by 48 inch pallet and stack four layers of five bags each.

Under the above conditions, pallet loads will weigh from 1,000 to 3,000 pounds depending on the type of bag and the kind of seed. Since most warehouses using pallets usually have a 4,000 pound (sometimes a 2,000 or 3,000 pound) capacity forklift truck, these weights are within their handling abilities. The manner in which the seed is stacked on the pallet has more effect on the handling time than the weight of the loaded pallet, within the above limits.

Receiving and Handling Field Run Seed in Pallet Boxes

The use of pallet boxes is a fairly recent innovation in seed handling, apparently stimulated by their potential to reduce costs, as indicated by their use in other industries and for agricultural commodities such as pears, apples, green beans, and other products.

The pallet boxes used for seeds in the Pacific Northwest are generally of plywood on a two-way entry pallet. Heavy sheet metal boxes on two or four-way entry pallets are common in the legume seed processing areas of California.

The usual procedure with pallet boxes is to load them on the grower's truck to be filled at the combine in the field. The full boxes are then returned, unloaded and exchanged for more empties. The unloading and loading operations at the plant are described in Table 5, in the top section.

Table 3. Labor Requirements for Receiving and Handling Field Run
Seed in Bags with Hand Trucks

Transportation distance/1	5-high piles	6-high piles	7-high piles	8-high piles	20-high piles/2
		(Man-hours per 1000 bags)			
(feet)		Receive, unload, transport, and store/3			
0	1.65	4.11	4.37	4.62	7.75
20	2.31	4.77	5.03	5.28	8.41
40	2.97	5.43	5.69	5.94	9.07
60	3.63	6.09	6.35	6.60	9.73
80	4.29	6.75	7.01	7.26	10.39
100	4.95	7.41	7.67	7.92	11.05
		Transport from storage to cleaning line/4			
0	11.66	11.92	12.69	13.01	13.72
20	12.32	12.58	13.35	13.67	14.38
40	12.98	13.24	14.01	14.33	15.04
60	13.64	13.90	14.67	14.99	15.70
80	14.40	14.56	15.33	15.65	16.36
100	14.96	15.22	15.99	16.31	17.02

/1 Distance one-way from truck bed to point where hand truck is unloaded.

/2 Assumes a sack elevator with a belt speed of approximately 60 feet per
minute capable of handling 550 to 600 bags per hour.

/3 Operation consists of unloading seed in bags from highway truck, trans-
porting to storage and piling on floor. It is assumed that (1) 20
percent of the bags are loaded from truck onto hand truck by hand and
80 percent by sticking load (2) hand truck unloaded by bucking five-bag
loads against pile and placing those above 5 high by hand in the case of
6, 7, and 8-high piles, (3) bags placed by hand on elevator in case of
20-high piles, (4) and a crew of two men on pile and three on floor
for 20-high piles.

/4 Consists of one man breaking down piles, loading hand truck, opening
bags and dumping seed into floor hopper of cleaning line.

Table 4. Labor Requirements for Receiving and Handling Seed in Bags
on Pallets with Forklift Truck

Transportation distance[1]	20 bags per pallet	25 bags per pallet
	(Man-hours per 1000 bags)	
(feet)	Receive and store[2]	
0	5.91	5.73
20	6.07	5.86
40	6.23	5.99
60	6.39	6.12
80	6.55	6.25
100	6.71	6.38
	Transport from storage to cleaning line[3]	
0	11.57	9.18
20	11.73	9.31
40	11.89	9.44
60	12.05	9.57
80	12.21	9.70
100	12.37	9.83

[1] Distance one-way from point forklift enters pallet to point forklift disengages from pallet. These standards also apply to receiving and storing bags of clean seed.

[2] Bags on highway truck transferred to pallet, transported by forklift to storage and stored 3 pallets high. Assumes crew of two to four men.

[3] One man with forklift transfers palletized seed from storage to cleaning line and dumps bags by hand into floor hopper.

Table 5. Labor Requirements for Handling Seed in Different Size
          Pallet Boxes

Transportation distance/1	Man-hours per box	46 bushel box (4'x4'x4')	52 bushel box (4'x6'x3')	69 bushel box (4'x6'x4')
		(Man-hours per 1000 bushels)		
(feet)			Receive and store/2	
0	.032504	.7067	.6250	.4710
20	.035704	.7762	.6866	.5174
40	.038904	.8457	.7482	.5638
60	.042104	.9153	.8097	.6102
80	.045304	.9849	.8712	.6566
100	.048504	1.0544	.9328	.7030
		Transfer from storage area to cleaning line and mechanically dump		
0	.026750	.5816	.5144	.3877
20	.029950	.6511	.5760	.4341
40	.033150	.7207	.6375	.4804
60	.036350	.7902	.6990	.5268
80	.039550	.8598	.7606	.5732
100	.042750	.9293	.8221	.6196
		Transfer from storage area to cleaning line and dump with lift truck/3		
0	.024097	.5269	.4633	.3492
20	.027297	.5934	.5249	.3956
40	.030497	.6630	.5865	.4420
60	.033697	.7325	.6480	.4884
80	.036897	.8021	.7096	.5347
100	.040097	.8717	.7711	.5811

/1 Distance one-way from point forklift enters pallet to point forklift
    disengages from pallet.

/2 Includes moving boxes from highway truck to open shed, and place empty
    boxes on truck.

/3 Forklift equipped with turning head attachment on forks.

Table 6. Estimated Weights of Field Run Seeds in Specified Pallet
Boxes/1

Kind of Seed	Size of Box		
	46 bushels (4'x4'x4')	52 bushels (4'x6'x3')	69 bushels (4'x6'x4')
	(pounds per box)		
Ryegrass	1,050	1,200	1,600
Fine Fescue	700	800	1,000
Bentgrass	1,300	1,450	1,900
Merion Bluegrass	600	675	900
Crimson Clover	2,300	2,600	3,500

/1 Assuming 90% utilization of total storage capacity.

Table 7. Labor Requirements for Receiving Field Run Seed in Bulk
Trucks/1

Operations	Hourly capacity of elevator			
	500 bushels per hour	1600 bushels per hour	5000 bushels per hour	10,000 bushels per hour
	(man-hours per 1000 bushels)			
Weigh in, select bin, lift and lower truck/2	.125	.125	.125	.125
Delay to empty hopper and elevator leg/2	2.375	.708	.292	.083
Total man-hours per 1000 bushels	2.500	.833	.417	.208

/1 Assumes that trucks have a capacity of 400 bushels of field run seed.

/2 These standards have been adjusted to allow for overlapping of above
operations between consecutive lots of seed.

The two lower sections of that table compare two methods of dumping the seed from the boxes. The first method utilizes a mechanical dumper which may be either stationary or mobile. The second method utilizes a turning head attachment for the forks of the lift truck.

The second column in Table 5 gives the man-hours required per box handled, irrespective of size of box, at varying distances for each method. The last three columns of the table show the man-hours per 1,000 bushels for each of three sizes of boxes in common use in Western Oregon.

Some representative weights for field run seed in each of these boxes are given in Table 6. This table may be used in conjunction with Table 5 to determine labor requirements for handling a given volume of a specified seed, or conversely to determine the amount of a given seed which can be handled in a specified time.

Receiving Field Run Seed in Bulk Trucks

Bulk receiving operations are common to larger seed processing plants equipped with bulk storage. This type of operation permits a high receiving rate with a minimum of labor but also requires a substantial investment in facilities.

The standards for labor used in bulk receiving are shown in Table 7. They assume that the average truck received will contain 400 bushels of field run seed, and that the trucks are dumped by means of a front-wheel cradle hoist into a hopper set in the ground separately or into a truck scale./1 The standards in Table 7 include weighing in and out, since these operations must be performed to keep records of receipts. If weighing is not performed at the warehouse, the amount of labor required for dumping will decrease correspondingly. Man-hours required per 1,000 bushels will be reduced by .042 making the maximum receiving rate 6,000 bushels per hour instead of 4,800. However, if the scales are operated at the warehouse, but are separated from the dumping arrangement, the performance rate for receiving will be increased to 6,000 bushels per hour, but the effective rate per man-hour expended will be 4,800.

These standards are based on the assumption that dumping the seed into the hopper and conveying it out of the hopper into bins begin simultaneously. Then the capacity is limited by clean-up time, weighing, lifting, and lowering the truck. However, the capacity of the conveying and elevating equipment will further restrict the over-all capacity of the receiving setup, as indicated in the table.

/1 Time studies have indicated that at least five minutes are required to weigh the truck and record the weight, select the bin which is to receive the seed, raise and lower the truck with the front wheel cradle hoist, and clean up the area between loads. This standard applies only if the receiving hopper is large enough to hold a 400 bushel load, or the conveying and elevating system is of sufficient capacity to handle 400 bushels in about two minutes.

Handling, Storing, and Shipping Clean Seed

Bagging - The time required for bagging seed is shown in Table 8. These standards do not include an estimate of the time spent in tending machinery. This can vary greatly depending on the kind of seed being cleaned and the kind and amount of contaminants. For the same reasons, no estimate was obtained for time lost in changing from one lot of seed to the next.

Table 8. Labor Requirements for Sacking and Handling Clean Seed

Method of Sewing	Man-hours per 1000 bags/1
Bags sewn by hand	37.15
Bags sewn by mechanical stitcher	32.47

/1 Includes the following operations performed by one man:

(1) Place bag on hopper and fill with clean seed.
(2) Remove filled bag, weigh, sew, stencil and place on hand truck or pallet.
(3) Get supplies.

If it is assumed that the cleaning line has a capacity of 800 pounds of clean seed per hour, with one man sewing bags by hand, he would be busy only 30 percent of his time. His remaining time is available for moving the bagged seed or tending to the equipment in the cleaning line.

This is calculated as follows: express the line capacity as a percentage of 1000. Multiply this percentage by the labor required per 1000 bags. The result is the percentage of the cleaner man's time devoted to this operation. In this example, 8 is 0.8% of 1000. Multiplying 37.15 man-hours per 1000 bags by 0.8% shows that the operator requires about 30% of his time for this operation.

Handling and Storing - Another example in the use of the standards is illustrated by the operation consisting of transferring clean seed from the cleaning line to test storage (Table 9). The term "test storage" here refers to temporary storage of the bagged seed while waiting for samples to be taken and the analysis performed. When hand trucks are used to transport bags from the cleaning line, the five-bag loads are bucked from the hand truck into double rows of five-high stacks, so that the sampler has access to each bag. The standard is 4.89 man-hours per 1,000 bags, assuming the point of storage averages 40 feet from the loading point. The maximum rate at which one man could perform this operation with 40 feet transport distance is 204 bags per man-hour (1,000 divided by 4.89). That is, one man could keep up with a cleaning line with a capacity of 20,400 pounds per hour. Standards for moving seed already placed on pallets to test storage and from test

storage to other storage are shown in Table 10. These standards apply also to field run seed handled under the same conditions.

Table 9. Labor Requirements for Handling, Transporting and Storing Bags of Clean Seed with Hand Trucks

Transportation distance/1	Move from cleaning line to test storage/2	Transfer from test storage to 20-high storage/3	Move from cleaning line to 20-high storage/4
(feet)	(man-hours per 1000 bags)		
0	3.57	6.89	9.43
20	4.23	7.55	10.09
40	4.89	8.21	10.75
60	5.55	8.87	11.41
80	6.21	9.53	12.07
100	6.87	10.19	12.73

/1 Distance one-way from point hand truck is loaded to where it is unloaded.

/2 Consists of one man loading bags at bagging station, transporting to test storage and bucking 5 bag load into floor stacks.

/3 One man loads hand truck in test storage by sticking pile, transports and unloads onto elevator. Two men make 20-high piles.

/4 One man transports from cleaning line, unloads onto elevator and two men make 20-high piles.

Table 10. Labor Requirements for Moving Palletized Seed in Bags
          to Storage

Transportation distance/1	Move from cleaning line to 2 pallet high test storage	Move from 2 pallet high test storage and store 3 or 4 pallets high
(feet)	(man-hours per 1000 bags)/2	
0	.72	.51
20	.88	.67
40	1.04	.83
60	1.20	.99
80	1.36	1.15
100	1.52	1.31

/1 Distance one-way from point forklift enters pallet to point forklift
    disengages from pallet.

/2 Assumes bags of seed are placed on pallet prior to their operation.

    Carloading - Labor standards for loading cars with clean seed in bags
are shown for two common methods--hand truck loading, Table 11, and--forklift
loading with seed palletized Table 12. To illustrate the use of the forklift
standards, assume that the car is loaded with 600 bags of annual ryegrass
from a ground level plant using a ramp for the lift truck to enter the car.
Shipping tags are attached prior to the start of the loading operation but
the labor required for this is included in the standard. More time is shown
for loading certified seed than for noncertified because of the difference
in tagging requirements. Each bag of certified seed has two tags but non-
certified has one. The appropriate standard to use is in the top section
of Table 12. At a distance of 60 feet from the foot of the ramp to the
point at which the seed is stored the standard is 6.12 man-hours per 1,000
bags or 3.67 man-hours for loading the 600 bags of noncertified seed in the
car. To this should be added the time required to prepare the car for
loading, handling the dock plates, and closing the car. This can be found
in Table 13, and is .767 man-hours (.751 plus .008 and .008). The total
time for loading one 60,000 pound car is therefore 4.437 man-hours. This
is .44 man-minutes per 100 pound bag. For an 800 bag car, at the same
distance, the total time would be 6.12 x .8 plus .767, or 5.663. This is
.42 man-minutes per bag as compared to .44 per bag for the 60,000 pound
car.

Table 11. Labor Requirements for Loading Rail Cars with Clean Seed
by Hand Truck

Transportation distance/1	Noncertified Seed/1		Certified Seed/2	
	Pretagged	Tagged by loaders	Pretagged	Tagged by loaders
	(Man-hours per 1000 bags)			
(feet)	Loaded from 5 high test storage/3			
0	5.26	7.15	6.68	10.07
20	5.92	7.81	7.34	10.73
40	6.58	8.47	8.00	11.39
60	7.24	9.13	8.66	12.05
80	7.90	9.79	9.32	12.71
100	8.56	10.45	9.98	13.37
	Loaded from 20 high storage/4			
0		8.87		11.79
20		9.53		12.45
40		10.19		13.11
60		10.85		13.77
80		11.51		14.43
100		12.17		15.09

/1 Distance one-way from storage pile to rail car door.

/2 Noncertified seed has one tag per bag while certified has two.

/3 Includes sticking 5 high test piles of seed, transporting to car, tagging
and loading rail car. Assumes four man crew. Additional labor is re-
quired for car preparation, handling dock plate, and closing and sealing
car. See Table 13.

/4 Includes removing bags from 20-high piles with elevator, loading hand
trucks, transporting to car, tagging, and loading car. Assumes two men
on high pile and two men hand trucking and car loading. Additional
labor is required for car preparation, dock plate handling, and closing
and sealing car. See Table 13.

Table 12. Labor Requirements for Loading Rail Car with Palletized
Seed in Bags

Transportation distance/1	Noncertified	Certified

(Man-hours per 1000 bags)/2

Ground level plant using ramp

0	5.64	7.06
20	5.80	7.22
40	5.96	7.38
60	6.12	7.54
80	6.28	7.70
100	6.44	7.86

Car level plant

0	5.10	6.52
20	5.26	6.68
40	5.42	6.84
60	5.58	7.00
80	5.74	7.16
100	5.90	7.32

Ground level plant using pallet dolly in car

0	6.46	7.88
20	6.62	8.04
40	6.78	8.20
60	6.94	8.36
80	7.10	8.52
100	7.26	8.68

(feet)

/1 Distance one-way from point of storage to foot of ramp for first method
and to door of car for the last two methods.

/2 Operations consist of tagging, moving palletized seed (20 bags to a
pallet) from storage into car for the first and second methods above, un-
loading the pallet, loading the car and returning empty pallet to ware-
house. One man operates the forklift and assists either one or two men
in the car. In the third method above, pallet is placed on dolly in car
and driver assists one or two men in loading. Labor requirements for all
three methods do not include time for preparing car for loading and closing
car door. See Table 13

Table 13. Labor Requirements for Preparing Rail Car for Loading
and Shipping/1

| Operation | Method of loading car | |
	Hand-Truck Loaded	Lift-Truck Loaded
	(Man-hours per car)	
Prepare car, close and seal	.895	.751
Place or remove dock plate	.005	.008
Place or remove pallet dolly	--	.008
Place or remove conveyor	.038	--
Reset conveyor for next tier	.009	--

/1 Adapted from data furnished by Midwest Feed Manufacturers Association, Kansas City, Missouri.

Such operations as handling conveyors or pallet dollies are not included in the standard times for car loading. These standards, given in Table 13, must be added to the car loading standards wherever appropriate. For instance, in car loading with hand trucks, if a sack conveyor is used in the car an allowance must be made for placing it in the car (.038 man-hours) moving it between tiers (.009 man-hours per move) and removing it from the car (.038 man-hours). The conveyor might be reset six times while loading, (three times in each end of the car) so that total time for the use of the conveyor would be (6 x .009) + (2 x .038), or .130 man-hours per car in addition to the loading operation.

Miscellaneous Operations

The preceding discussion has been centered around labor performance rates for some of the more common operations in the seed processing industry. Less common operations, however, frequently are required in some plants, because of facilities that may prove to be inadequate for the volume of seed to be processed.

Tables 14 and 15, describe the labor requirements for transferring field run seed from bulk bins to pallet boxes or bags and then storing. These operations occur in bulk storage plants with bulk storage facilities too small for the amount of seed to be received.

Table 14. Labor Requirements for Transferring Field Run Seed From
Bulk Bins to Pallet Boxes and Storing

Transportation distance/1	Man-hours per box/2	Size of box		
		46 bushels (4'x4'x4')	52 bushels (4'x6'x3')	69 bushels (4'x6'x4')
(feet)		(Man-hours per 1000 bushels)		
0	.0626	1.3609	1.2039	.9073
20	.0658	1.4305	1.2654	.9537
40	.0690	1.500	1.3270	1.0000
60	.0722	1.5696	1.3885	1.0464
80	.0754	1.6392	1.4500	1.0928
100	.0786	1.7087	1.5116	1.1392

/1 Distance one-way from point box is filled to point where box is
stored.

/2 Includes getting empty box, positioning and filling, and storing
full box. Assumes two-man crew with one man filling boxes and
one lift truck operator.

Table 15. Labor Requirements for Transferring Field Run Seed from Bulk Bins to Bags and Storing/1

Transportation distance	Stacking height				
	5-high piles	6-high piles	7-high piles	8-high piles	20-high piles
(feet)	(Man-hours per 1000 bags)/2				
0	31.15	33.60	33.86	34.11	37.25
20	31.81	34.26	34.52	34.77	37.91
40	32.47	34.92	35.18	35.43	38.57
60	33.13	35.58	35.84	36.09	39.23
80	33.79	36.24	36.50	36.75	39.89
100	34.45	36.90	37.16	37.41	40.55

/1 Includes the following operations:

(1) Place bag on hopper and fill.
(2) Remove bag, sew, stencil and place on hand truck.
(3) Get supplies.
(4) Hand truck to storage area and store.

/2 Based upon hand truck operation with 5-man crew including two stacking 20-high piles with elevator assistance.