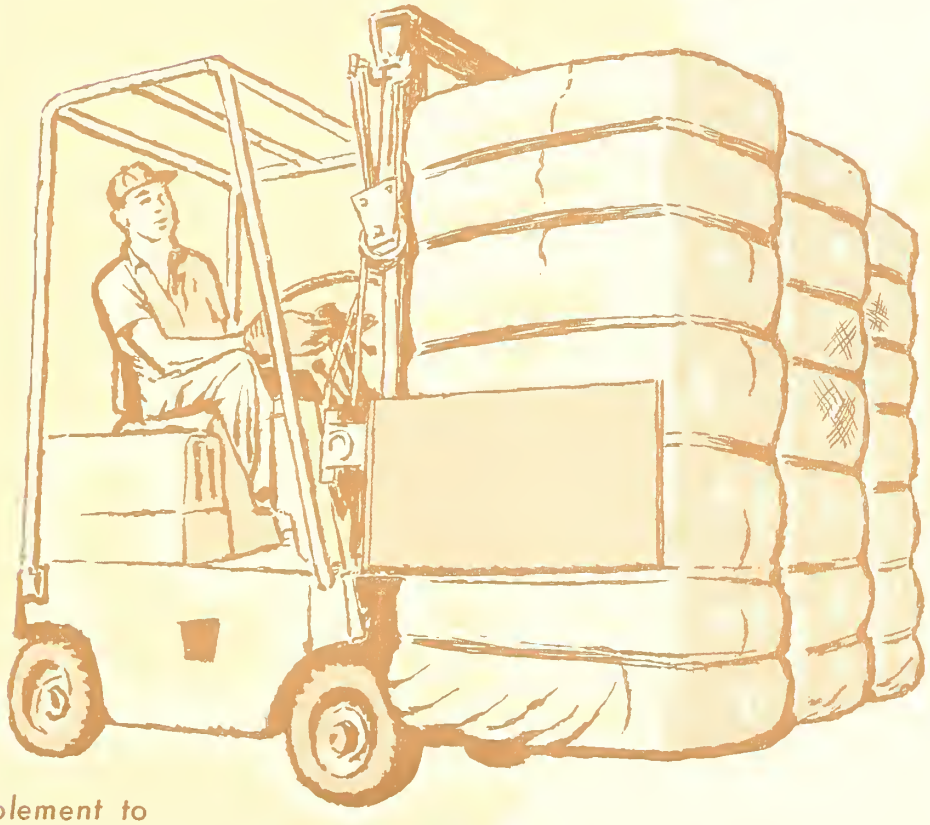
Statistical Supplement to

HANDLING BALES OF cotton IN PUBLIC WAREHOUSES

Methods and Equipment



Supplement to

Marketing Research Report No. 250

Agricultural Marketing Service
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STATISTICAL SUPPLEMENT TO HANDLING BALES OF COTTON IN PUBLIC WAREHOUSES

By Charles D. Bolt, industrial engineer, and
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INTRODUCTION

This supplement provides detailed technical and statistical data that are not included in the main report on this study, entitled "Handling Bales of Cotton in Public Warehouses--Methods and Equipment." Engineers, management consultants, and others will find this supplement a valuable addition to the main body of the report, which compares existing methods of handling cotton in warehouses, describes improved handling methods, and evaluates the improved methods in terms of current practice.

Labor-requirement values in this supplement were developed for specific operations which could be conveniently combined into alternative operational patterns. The labor requirements shown apply to a given piece of work done by one worker, or a crew of workers, in a series of coordinated, continuous, and uninterrupted movements.

Labor-requirement data included in this supplement were determined for various operations under the following general classifications: (1) Setup, (2) cleanup, (3) pickup and setdown, (4) transportation, (5) unloading road trucks or railroad cars, (6) weighing, (7) sampling, (8) stacking, (9) breakout, (10) loading road trucks or cars, and (11) feeding bales to the dinky press.

This supplement explains how handling and equipment requirements and costs shown in the main report were computed. It also includes tabulations of standard data on man-hours and elapsed time required for the individual handling operations. Man-hours developed from productive data were computed for specified operations. The combined man-hour and equipment-hour costs provide a basis for comparing the relative efficiencies of the specified handling methods described in the main report.

Tables in this supplement show detailed productive data; labor and equipment used in operations are described in the main report. A cross-index on page iii is provided to relate chart numbers in the main report with corresponding detailed tables in this supplement.

COMPUTATION OF LABOR AND EQUIPMENT REQUIREMENTS AND THEIR COSTS

In the tabulations included in this supplement base time plus time for fatigue and personal allowances comprise the productive time. Time studies of actual operations provided the base-time data. Fatigue allowances as tabulated on pages 9 and 10 and a personal allowance of 5 percent are used in all productive time. The percentage for personal allowance was selected after checking with similar industries.

Total labor requirements are obtained when productive times for all operations comprising a cycle or group of operations are totaled and combined with appropriate unproductive time. This report is an analysis of methods based on a 100-bale unit, and only crew-interference wait time, machine-regulated wait time, and crew-balance wait time are applicable.

Crew interference results when several workers or machines, engaged in a common operation, interfere with or get in the way of each other. Machine-regulated wait time results when equipment or machines require constant attendance while being operated at full capacity, but do not keep the attendant fully occupied. Crew-balance wait time results from differences in productive time for the various people in an identified operation.

All labor and equipment costs used in this supplement were computed for performing identifiable bale-handling operations by use of specified methods and types of materials-handling equipment. These costs merely provide a basis for comparing the efficiency of different methods and types of materials-handling equipment.

Labor cost computations are based on the productive time required to perform the operation, plus the wait time inherent in the method. Wait time for workers moving from one job to another, moving to various sections of the warehouse, waiting for transportation equipment to arrive, and other wait time not inherent in the method, are not included in these costs.

Management, warehouse maintenance, overhead, and facility costs are not included. Therefore, cost data do not reflect total costs to the warehouseman, and warehouse managers and supervisors should not use these costs as representing a particular cotton warehouse. However, the labor and equipment costs given can be used as a guide to achieve cost reductions in various warehouse bale-handling operations.

Assumed wage rates used in computing labor costs.--A wage rate of $1 per hour is used as the average wage rate in computing costs for unskilled labor employed in manual and hand-truck operations. A wage rate of $1.25 per hour is used for computing costs for semiskilled labor such as clamp truck and tractor operators. A wage rate of $1.50 per hour for clerks and $2 per hour for weighers is used for computing costs for these trained and skilled workers.

Hourly rates used for computing equipment costs.--The elements of equipment cost which enter into computations when materials-handling equipment is used in cotton handling are: (1) Ownership costs, which are considered to be relatively constant from year to year; and (2) operating costs, which are variable, as they directly reflect the hours of use of the equipment.

Costs of ownership of materials-handling equipment, as shown, consist of depreciation, interest, taxes, and insurance. Using the straight-line depreciation method, the estimated cost of the equipment was divided by the estimated years of life to obtain the annual rate of depreciation. State and local taxes, insurance, and interest on capital investment are paid on an annual basis, regardless of hours of use of equipment. The hourly costs of these items were obtained by dividing each amount by the estimated hours of use.

The computed operating costs include fuel, oil, servicing, repairs, maintenance, overhauling, and inspection. These costs vary according to the hours of use of the equipment. Records are usually maintained on each machine so that management can estimate the operating costs for the next month or year.

The equipment costs of specified types of materials-handling equipment are based on an analysis of the costs of ownership and operation reported by cooperating warehousemen over a period of 2 to 6 years.

Hourly costs are based on assumed hours of annual use and other factors. Warehouses in which a specified type of equipment is actually used more than the assumed hours of use probably incur lower average hourly costs than those shown in table 1. Conversely, warehouses in which the actual hours of use are less than the assumed hours probably have higher average hourly costs. Equipment costs can be computed by any warehouseman by substituting his own costs and hours of use for the assumed hours and costs.

Interest on the average investment is computed at 5 percent, and 2 percent is allowed for insurance and taxes. Average cost of gasoline is assumed to be 25 cents per gallon and oil 25 cents per quart.

Table 1. --Estimated costs of ownership and operation of specified types of materials-handling equipment in cotton compresses and warehouses

Type of equipment	Equipment cost[1]	Period of depreciation	Assumed annual use	Cost of ownership		Cost of operation[3] per hour	Total cost per hour
				Per year	Per hour[2]		
	Dollars	*Years*	*Hours*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
2-wheel hand truck	50.00	20	600	4.74	.008	.002	.01
2,000-lb. industrial lift truck equipped with the following attachments:							
2-bale clamp	4,000.00	8	1,000	680.00	.68	.52	1.20
Breakout device	3,800.00	8	1,000	646.00	.65	.50	1.15
Beam scale on a lift truck	3,800.00	8	1,000	646.00	.65	.45	1.10
3,000-lb. industrial lift truck equipped with the following attachments:							
3-bale clamp	4,800.00	8	1,000	816.00	.82	.53	1.35
Boom	4,700.00	8	1,000	799.00	.80	.60	1.40
Rotating 3-bale clamp	5,500.00	8	1,000	930.00	.93	.52	1.45
4,000-lb. industrial clamp truck with 4-bale clamp	5,400.00	8	1,000	918.00	.92	.88	1.80
6,000-lb. industrial clamp truck with 6-bale clamp	7,500.00	8	1,000	1,275.00	1.28	.97	2.25
Industrial tractor (3,000-lb. drawbar pull)	2,000.00	20	1,000	190.00	.19	.26	.45
Industrial trailers (total for 4 trailers)	1,000.00	20	1,000	95.00	.10	.20	.30
Beam scale (stationary)	230.00	20	400	20.00	.04	.01	.05
Beam scale (mobile, manually propelled)	375.00	20	1,000	30.00	.03	.04	.07
Beam scale (mobile, pneumatic hoist)	650.00	20	1,000	70.00	.07	.03	.10
Platform dial scale (installed)	1,100.00	20	1,000	100.00	.10	.10	.20
Platform dial scale (portable)	1,900.00	20	1,000	230.00	.23	.17	.40
Automatic dinky feeder (installed)	5,000.00	20	700	476.00	.68	.22	.90
Portable yard ramp (magnesium)	2,500.00	10	1,000	29.00	.29	.01	.30

[1] Equipment cost does not include freight or tax charges.
[2] Allowance for insurance and taxes, 2 percent; allowance on investment, 5 percent.
[3] Average costs, gasoline 25¢ per gallon, oil 25¢ per quart; maintenance and parts cost obtained from data accumulated from various-sized warehouses and compresses.

DESCRIPTION OF PRODUCTIVE DATA ON LABOR REQUIREMENTS

Setup

There are a few necessary operations before the handling job starts; grouped together, these are called "setup." Setup occurs before unloading a railroad car or before loading a car. These small operations occur only once or a few times in the larger operations previously mentioned. Labor requirements vary with the type of equipment used.

In unloading a car, setup begins when men and machines arrive at the car door and start preparing it for unloading and ends when men and machines start unloading the car. Included are such operations as picking up, handling, and placing a bridgeplate and moving a portable ramp into position. In loading a car, setup begins when men and machines start placing a bridgeplate or ramp in a car door, and includes moving a ramp and placing a bridgeplate. Setup ends when the men and machines have released the bridgeplate or attached the ramp in the car door, and are ready to remove the first bale.

Some cotton scales can be moved to any receiving or shipping area in a warehouse. When portable platform scales are moved, a setup operation is necessary before the weighing job can be performed. Setup for a portable platform dial scale begins when the crew stops the scale at a weighing location and starts preparing it for weighing bales, and ends when the scale crew is ready to weigh the first bale. Included are setting wheel locks, unfolding ramps, leveling the scale, and performing tare weight adjustments.

Cleanup

Certain operations remain to be performed after loading or unloading has been completed on railroad cars. Cleanup occurs only once for each car. All these operations are grouped in one labor requirement called "cleanup." For unloading, cleanup begins after the bales have been removed and when the men and machines at the bridgeplate or in front of the ramp and start preparing for its removal. After loading, cleanup begins when the men and machines stop at the bridgeplate or in front of the ramp and start preparing for its removal. Cleanup includes moving the ramp and handling the bridgeplate. Cleanup ends when men and machines release the bridgeplate or ramp and start moving to the next job.

Portable platform scales are sometimes moved after the weighing operation is completed. Portable platform scales are moved by adjusting the ramps and wheels. Cleanup begins after weighing has been completed and the scale crew starts to lower the wheels and lift the ramps. Cleanup ends when the scale comes to a stop in a new location and the scale crew starts to set up the scale. Cleanup includes folding the ramps, releasing the jacks, and lowering the wheels on a portable platform scale.

Pickup and Setdown

Pickup and setdown of bales of cotton are necessary in conjunction with most handling operations in cotton warehouses. Separate man-hour labor requirements were determined for pickup and setdown because the times required for these operations are not always related. Labor requirements depend on the area, equipment, and number of workers in the pickup and setdown crews. Pickup begins when a worker stops his forward motion to begin loading a bale on a hand truck, or when forks, clamps, or hooks pass the front edge of a bale. Pickup consists of positioning forks, clamps, or hooks of the materials-handling equipment; engaging the bales, raising or lifting the bales to travel position, and tilting the mast backward; or loading a bale on a hand truck with or without aid and moving the bale clear of storage position. Pickup ends when the bale is clear of storage position or the transport operation begins. Setdown begins when transportation ends, or when materials-handling equipment stops at the setdown location. Setdown consists of positioning, and lowering and withdrawing materials-handling equipment clamps, forks, hooks, or toeplates. Setdown ends when the bale has been set down and the materials-handling equipment has moved free of the bale.

Transport

Transport begins when the worker, manually or with materials-handling equipment, has ended the pickup operation and bales are clear of storage position. "Transport-loaded" ends when materials-handling equipment reaches the setdown location and starts to maneuver to set down the bale. Transport includes any necessary turns of the transport equipment in the direction of travel toward the setdown location, traveling from pickup to setdown, and all turning maneuvers while en route. "Transport-empty" is combined with transport-loaded so that all labor requirements apply to a round-trip cycle. All distances between pickup and setdown are given in feet.

Unloading

The operations performed in unloading bales of cotton from railroad cars and road trucks vary with the type of materials-handling equipment used and the warehouse facilities available for receiving. In this report, labor requirements are expressed in terms of man-hours per 100 bales unloaded, regardless of the number of bales handled in any given operation.

Setdown and transport of bales from a car or road truck require the same man-hours as other intrawarehouse transportation. Unloading requires more man-hours than normally are required for pickup and transport operations elsewhere in the warehouse.

Unloading a car with a clamp truck begins when the empty truck contacts the bridgeplate or ramp at the door; it ends when the loaded clamp truck clears the bridgeplate or ramp. Unloading includes entering the car, moving to the stack of bales inside the car, picking up bales, raising or lowering the clamps to travel position, and moving the loaded clamp truck out of the car.

Unloading a car with hand trucks and manual labor begins when the hand trucker with an empty hand truck crosses the bridgeplate into the car door, or when breakout men start pushing bales out of the car door; it ends when the hand trucker with a loaded hand truck leaves the car door and crosses the bridgeplate, or when the bale pushed out of the car door has been lowered to the ground.

Unloading a road truck with a clamp truck begins when the empty clamp truck stops at the edge of the road truck and starts to pick up bales, and ends when the loaded clamps have cleared the edge of the road truck. Unloading includes raising the clamps, grasping the bales, and lifting and withdrawing the bales clear of the truck.

Unloading a road truck with a hand truck begins when the empty hand truck contacts the truckbed and ends when the loaded hand truck leaves the road truckbed. Unloading includes moving the empty hand truck to the stack on the road truck, loading the bales on the hand truck, and moving the loaded hand truck off the road truckbed.

Unloading a road truck manually begins when the men on top of the truck grasp the first bale and ends when the men remove the last bale from the truck. Unloading includes the work of the men on top of the truck in moving the bale to the edge of the truckbed and pushing, dumping, or sliding the bale to the ground while the man on the ground guides the bale to an on-head position.

Weighing

Bales are weighed separately as they are received at a warehouse. Some warehouses are requested to weigh bales again when shipped overseas or to mills. There are various methods of weighing bales, dependent partly on whether the bale is a flat or compressed bale. Flat bales are weighed on stationary or mobile bean scales and on dial platform scales. Compressed bales are weighed on stationary beam scales and on dial platform scales. Stationary beam scales and dial platform scales require hand trucks to move the bales to and from the scales. Mobile beam scales require pre-positioning of bales in a row and moving of the scale over the row.

Setup and cleanup operations are required with portable platform scales.

Weighing with a stationary beam scale requires a weigher, a recorder, hookman, rope man, and a varying number of hand truckers depending upon the distance involved. Weighing begins when the front of a bale carried on a hand truck passes the nearest scale frame support, and ends when the bale has been weighed and the hand trucker is clear of the scale frame supports. This scale weighs flat or compressed bales.

A mobile beam scale is usually used to weigh only flat bales, pre-positioned on-head in a row. Weighing with a mobile beam scale usually employs a crew consisting of a weigher, a recorder, 2 hookmen, and a rope man. No hand truckers are needed with this method. Weighing begins when the hookmen contact the bale with the scale hooks and ends when the hookmen contact the next bale with the hooks. It includes moving the scale over the top of the bale, attaching hooks, lifting, weighing, moving the loaded scale backwards about 3 feet, and lowering and releasing the bale.

Weighing methods for a stationary or a portable platform dial scale are the same. The difference in labor requirements occurs because a portable platform dial scale has a setup and removal time. Using a platform dial scale requires 1 man to weigh and record data, 1 man to call previous bale tag numbers and drop the warehouse tag on the bale, and hand truckers to move bales on and off the scale. Platform dial scales are used to weigh compressed or flat bales. Weighing begins when the wheels of the loaded hand truck contact the scale platform or scale ramp, and ends when the hand trucker clears the scale platform or scale ramp. It includes moving the hand truck onto the scale, weighing the bale, and moving the hand truck off the scale.

Sampling

Sampling of bales of cotton is generally a separate, independent operation, but is sometimes integrated with weighing and unloading in the receiving cycle. Sampling time consists of the time it takes to cut, pull, and wrap samples from bales on hand trucks and in temporary blocks.

Sampling flat bales in a temporary row block begins when the sampler stops at a bale and starts to cut the bale for a sample, and ends when the sampler stops in front of the next bale. It includes sharpening the cutting knife, cutting and pulling the sample and placing it on top of the bale, and moving to the next bale.

Sampling flat or compressed bales on hand trucks begins when the loaded hand truck stops in front of the sampler, and ends when the sampler has placed the sample on top of the bale and the hand trucker starts moving the loaded hand truck away from the sampler. It includes sharpening the knife, cutting and pulling the sample and placing it on top of the bale, and hand trucking the bale away from the sampler.

Sampling compressed bales in a temporary block begins when the sampler stops in front of a bale and ends when the sampler stops in front of the next bale. It includes sharpening the knife, cutting and pulling the sample, and placing the sample from one side only on top of the bale, turning the bale 180 degrees, and moving to the next bale. Sampling a bale in a second temporary block begins when the sampler stops in front of the bale. It includes sharpening the knife, cutting and pulling the sample and placing it on top of the bale, removing the sample stub number from the warehouse bale tag and placing it with the complete sample, and moving to the next bale.

Trimming loose cotton on a bale starts when the trimmer stops in front of the bale and grasps the loose cotton in the sample cut, and ends when the trimmer stops in front of the next bale. It includes pulling loose cotton from the sample cut, putting the loose cotton in a container, and moving to the next bale.

Wrapping samples individually in paper begins when the sample wrapper picks up the sample and wrapping paper, and ends when the wrapper places the wrapped sample aside

and moves to the next sample. It includes picking up the sample and positioning it on the wrapping paper, removing the bale stub number, wrapping the sample, clipping the stub on the outside of the wrapper, moving the wrapped sample aside, and moving to the next sample.

Rolling and placing the sample in a container begins when the sample wrapper stops in front of a sample on a bale and ends when he stops in front of the next bale. It includes tearing the stub from the warehouse tag, picking up half of the sample, placing the stub between halves of the sample, rolling the sample, placing the rolled sample in a container, and moving to the next bale.

Stacking Bales

Bales of cotton are picked up and transported with several types of materials-handling equipment. Bales are stacked in various patterns, depending mostly upon whether they are flat or compressed. Flat bales may be stacked on head 1, 2, or 3 bales high, or in a cordwood stack 5 or 6 bales high. Compressed bales are generally stacked on-head 1 high or in a cordwood stack 5 or 6 bales high. Bales are stacked with boom trucks, 2-, 3-, or 4- bale clamp trucks, portable elevators, or hoists, or by hand.

Stacking bales with clamp trucks begins when transport ends and the loaded truck starts maneuvering into position to set down the bales into a stack; it ends after the bales have been set down and released in the stack and the clamps are clear of the bales. Stacking includes raising to tier height, positioning the bales, tilting the mast forward, lowering and releasing the bales, and withdrawing the clamps clear of the bales.

When bales are stacked with a boom truck or hoist, the bales are usually transported by hand truck or trailer to the stacking equipment. Stacking begins when the worker or workers grasp the bale hooks and start attaching the hooks to the bale. The operation ends when the bale has been released in the stack and the bale hooks have been returned to their original position. Stacking includes attaching bale hooks, raising and positioning the bale in the stack, releasing the bale hooks from the bale, and lowering and returning the hooks to their original position.

Portable elevators and fork trucks use essentially the same methods for stacking. Bales are transported to the stacking machines by hand truck, and then raised and placed in storage stacks. Stacking bales with a portable elevator or fork truck begins when a worker with a loaded hand truck starts to maneuver to set the bale on the forks or elevator platform and ends when the empty forks or elevator platform returns to its original loading position. It includes loading the bale, raising the bale to proper tier, removing the bale from the forks or elevator platform, and lowering the empty forks or elevator platform to the original position.

Sometimes bales are stacked by manually lifting and positioning them. Hand truckers move the bales to the stacking crew, who manually lifts the bales to the desired tier. Stacking begins when the hand trucker comes to a stop in front of the stack and the lifting crew grasps the bale. It ends when the bale has been placed in position in the stack and the crew is ready to grasp the next bale. Stacking includes grasping, lifting, positioning, and releasing the bale in the stack. Sometimes 2 men work on top of the first tier and roll the bale to position in the stack. The operation ends when the 2 men on top of the first tier return to their original position for the next bale.

Breaking Out Bales

Breaking out bales from stacks is done manually or with various types of materials-handling equipment. Labor requirements are stated in terms of 100 bales broken out, and not of 100 bales handled. Often 300 or more bales are moved to break out 100 bales; this is especially true when cordwood stacking pattern is used. Labor requirements for the various breakout operations are presented in such a way that the overall labor requirements for different combinations of methods can be determined.

Breaking out bales from a cordwood stack with a boom truck begins when the truck stops at the stack containing the bale to be broken out; it ends when the boom truck stops at the stack containing the next bale to be broken out. Breaking out includes raising the bale hooks on the boom to the desired height, attaching the hooks to a bale, lifting and moving the obstructing bale to a position in the stack or aisle, releasing the hooks, returning the hooks for the next obstructing bale to be moved, or lowering the desired bale to the floor and releasing the hooks, then attaching the hooks to the head of the bale, lifting and placing the bale on-head in the aisle and releasing the hooks, moving the boom machine and returning the hooks to their original position, and stopping the machine at the stack containing the next desired bale. This method can be used for flat or compressed bales.

Flat bales can be stacked 2 or 3 high on-head. With this stacking pattern, it is possible to employ a breakout device on a lift truck to remove bales from the storage tiers. Breaking out flat bales of cotton stacked 1, 2, or 3 bales high begins when the breakout hook attachment contacts the bale in the stack and ends when the truck stops in front of the stack containing the next desired bale.

Many of the smaller warehouse facilities are such that mechanical materials-handling equipment cannot be used in bale-handling operations. Workers handle the bales manually in these warehouses. Breaking out bales from stacks begins when the breakout crew stops at the desired bale and ends when the crew has positioned the desired bale in the aisle and starts moving toward the next bale to be broken out. It includes grasping the sides of the bale, rolling the bale to one side or lifting it out of the block, and rolling it over the top of other bales, if necessary, or pushing it out of an upper tier into the aisle, or using a hand truck to "pinch" the bale out of the stack into the aisle, and positioning the bale on-head in the aisle.

Loading Out Road Trucks or Railroad Cars

The time required to load 100 bales depends on whether the bales are flat or compressed, on the materials-handling equipment used, the loading pattern, and the size of the carrier. Road trucks generally carry a load of 50 flat bales or 60 compressed bales. Railroad cars generally carry 60 flat bales, 100 standard-density bales, or 135 or more high-density bales. Time elements are presented so that overall labor requirements for different combinations of loading operations can be determined.

Loading bales into a car with a clamp truck begins when the loaded clamp truck contacts the bridgeplate or ramp at the car door; it ends when the empty truck clears the bridgeplate or ramp at the car door. Loading includes entering the car, moving to the stack in the car, setting the bales down in the stack, raising or lowering the clamps to travel position, and moving the empty truck out of the car.

Loading bales into a car with hand trucks and manual labor begins when the hand trucker with a loaded hand truck contacts the bridgeplate, or when the loaders grasp the bale to lift it into the car door. It ends when the hand trucker with the empty hand truck crosses the bridgeplate, or when the stackers return to the car door for the next bale. It includes entering the car to the stack, placing the bales in the stack, and returning empty to the car door.

Loading bales onto a road truck with a clamp truck begins when the loaded clamp truck stops at the edge of the road truck, and ends when the empty clamps clear the edge of the bales. Loading includes raising the load to truckbed level, setting the bales down, releasing the bales, and backing away until the clamps are clear of the bales.

Loading bales onto a road truck at platform level by hand truck begins when the loaded hand truck contacts the edge of the road truck, and ends when the empty hand truck leaves the road truck. Loading includes moving the loaded hand truck over the truckbed to the stack, setting the bale down in the stack, moving the empty hand truck to the edge of the road truck, and leaving the truckbed.

Loading bales onto a road truck from ground level with manual help begins when the worker on the ground and workers on the road truckbed grasp the bale, and ends when the workers on the road truckbed return to the edge of the truck for the next bale. Loading includes grasping and lifting the bale onto the road truckbed, placing the bale in the stack, and returning for the next bale.

Dinky Press

Compresses use a dinky press to compress flat bales enough to loosen the bale bands; then the bands are released from the buckles and removed from the bale. A hand truck or clamp truck is usually employed to move bales and place them in the dinky press. The pickup and transportation involved require the same labor as similar operations in other intrawarehouse transportation. The setdown operation requires more labor when hand trucks are used and less when clamp trucks are used.

Feeding the dinky press begins when the hand trucker stops the loaded truck in front of the press, and ends when the hand trucker with the empty truck starts to leave the press. It includes setting the loaded hand truck down parallel to the front of the dinky; rolling the bale into the press, done by 2 men, or dumping the bale directly from the hand truck into the press; and moving the empty hand truck away from the press.

Feeding flat bales into a press with a clamp truck begins when the loaded clamp truck starts maneuvering to position the bale into the press, and ends when the clamps of the truck are free of the bale in the press. It includes positioning, placing, and releasing the bale in the press, and moving the empty clamp truck backward until the clamps are clear of the bale and press.

Feeding flat bales into an automatic dinky press feeder with a truck equipped with a rotating clamp begins when the loaded camp truck stops in front of the bale holder on the dinky press feeder, and ends when the clamps on the truck clear the bale holder. It includes positioning, placing, and releasing bales in the bale holder of the automatic dinky press feeder.

FATIGUE ALLOWANCES

The fatigue allowances used in this study are:

	Percent
Manual unloading	
Road truck: Unloading by manually pushing bales off road truckbed onto ground	10
Railroad car: Unloading by manually sliding bales out of a car door to ground level	10
Unloading plant trailers:	
1-man crew lifts and pushes bales off trailers	10
2 or more men in crew, 1 man pulls and rest of crew lift and push	5
Manual loading	
Loading road trucks from ground level, 6- to 8-man crew. Half of crew lift and half pull bales onto truckbed	20
Loading railroad cars from ground level, 7- to 10-man crew. Half of crew lift and half pull bales into car	20

Manual loading--Continued	Percent
Loading plant trailers:	
1 man steps upon trailer bed, grasps and pulls bale forward, steps off trailer bed and lowers bale onto trailer bed	10
2 or more men in crew, 1 or more men push bale and 1 man grasps, pulls, and lowers bale to trailer bed	5
Manual stacking	
2-high on-head stacking of flat bales, 6- to 8-man crew	20
Stacking flat or compressed bales in cordwood stacks, 10-to 12-man crew.	25
Manual breakout	
Lift bales out of solid blocks and roll to aisle, 6-man crew	15
Flat bales from 2-high on-head stacks in rows 2 bales wide; 3-man crew push and pull bales out of stacks into cross aisle	15
Bales broken out of cordwood stacks, 6 men move obstructing bales and lower bale to cross aisle	25
Manual pickup of bales from horizontal position to on-head position, 3-man crew	10
Manually setting bale down in horizontal position by lifting or pushing	10
Hand-truck operations	
Hand-truck transport	10
Hand-truck pickup:	
1 hand trucker, no pulldown man	10
1 hand trucker, 1 or more pulldown man	5
Hand-truck setdown:	
1 hand trucker, no setdown man	10
1 hand trucker, 1 or more setdown men	5
Hand trucker feeding bales to dinky press	10
Hand trucker setting bales down on forks of fork truck or on platform of portable electric elevator:	
1 hand trucker, no setdown man	10
1 hand trucker, 1 or more setdown men	5
Hand-truck unloading of railroad cars at car-floor level	10
Hand-truck unloading of road trucks at truckbed level	10
Hand-truck loading of cars at car-floor level	10
Hand-truck loading of road trucks at truckbed level	10
Hand-truck and manual prying of bale out of on-head stacks, 4-man crew..	10
Weighing operations	
Stationary beam scale, 4-, 5-, or 6-man crew	10

Weighing operations--Continued	Percent
Mobile beam scale, 4- or 5-man crew, manually or pneumatically operated	10
Mobile beam scale on lift truck	5
Platform scales, installed or portable	5
Recording necessary data in weighing and attaching warehouse tag	5
Sampling bales	
Cut or pull samples when flat bales are stacked on-head in rows, blocks, or on hand trucks; 1 man cuts sample and 1 man pulls sample	10
Cut and pull samples when flat bales are stacked in row blocks or on hand trucks; 1 man cuts and pulls sample	10
Cut or pull samples from compressed bales when bales are in blocks or on hand trucks	10
Cut and pull samples from compressed bales in block; manually turn bales 180 degrees after sampling	20
Trim loose samples from sample cut	5
Wrap samples individually in paper	5
Roll sample and place in container	5
Clamp trucks; 2-, 3-, 4-, and 6-bale capacities; pick up, set down, transport, etc	5
Breakout device on lift trucks	5
Boom-truck operations	5
Tractor-trailer train transport	5
Fork-truck operations:	
Pick up and set down, no manual help	5
Pick up and set down, manual help	10
Portable electric elevator operations	10
Hoist operations	10

Table 2. --Productive time required to handle 100 bales of cotton with clamp trucks

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Clamp-truck elements						
Flat bales						
Pick up bales in open area or in relatively crowded area when bales are in on-head position	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Hours*
2-bale clamp truck	.05	.0025	.0025	.06	1	.06
3-bale clamp truck	.06	.0030	.0030	.07	1	.07
4-bale clamp truck	.08	.0040	.0040	.09	1	.09
6-bale clamp truck	.09	.0045	.0045	.10	1	.10
Pick up bales positioned on flat side						
2-bale clamp truck grabs bale on ends, 1 bale only	.12	.0060	.0060	.13	1	.13
2-bale clamp truck grabs bale on ball sides, 1 bale only	.12	.0060	.0060	.13	1	.13
Pick up bales positioned on ball side						
2-bale clamp truck grabs bale on ends, 1 bale only	.12	.0060	.0060	.13	1	.13
Pick up bales positioned on-head from 2nd tier						
2-bale clamp truck	.06	.0030	.0030	.07	1	.07
3-bale clamp truck	.07	.0035	.0035	.08	1	.08
Set bales down in on-head position in open area or in relatively crowded area						
In block or in 1st-tier storage blocks						
2-bale clamp truck	.04	.0020	.0020	.05	1	.05
3-bale clamp truck	.04	.0020	.0020	.05	1	.05
4-bale clamp truck	.05	.0025	.0025	.06	1	.06
6-bale clamp truck	.05	.0025	.0025	.06	1	.06
2nd tier in storage blocks						
2-bale clamp truck	.16	.0080	.0080	.18	1	.18
3-bale clamp truck	.16	.0080	.0080	.18	1	.18
4-bale clamp truck	.17	.0085	.0085	.19	1	.19
3rd tier in storage block						
2-bale clamp truck	.26	.0130	.0130	.29	1	.29
3-bale clamp truck	.26	.0130	.0130	.29	1	.29
4-bale clamp truck	.28	.140	.0140	.31	1	.31
Set bales down in a cordwood stack on flat side by 2- or 3- bale clamp truck; 1 bale per setdown						
1st tier only	.29	.0145	.0145	.32	1	.32
2nd tier only	.33	.0165	.0165	.36	1	.36
3rd tier only	.39	.0195	.0195	.43	1	.43
4th tier only	.46	.0230	.0230	.50	1	.50
5th tier only	.52	.0260	.0260	.57	1	.57
6th tier only	.62	.0310	.0310	.68	1	.68
Compressed bales						
Pick up bales in open area or in relatively crowded area, when bales are in on-head position						
2-bale clamp truck	.07	.0035	.0035	.08	1	.08
3-bale clamp truck	.08	.0040	.0040	.09	1	.09
4-bale clamp truck	.09	.0045	.0045	.10	1	.10
6-bale clamp truck	.08	.0040	.0040	.09	1	.09

Table 2. --Productive time required to handle 100 bales of cotton with clamp trucks--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Clamp-truck elements--Continued						
Compressed bales--Continued						
Pick up bale from horizontal position; clamp grabs ends of bale (1 bale per trip)	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Hours*
2- or 3-bale clamp truck	.15	.0075	.0075	.17	1	.17
Pick up bales from horizontal position, clamps grab bales on sides						
2-bale clamp truck--2 bales	.22	.0110	.0110	.24	1	.24
3-bale clamp truck--3 bales	.20	.0100	.0100	.22	1	.22
2- or 3-bale clamp truck picking up 1 bale	.28	.0140	.0140	.31	1	.31
Set bales down in on-hand position in open area or relatively crowded area						
2-bale clamp truck--2 bales	.05	.0025	.0025	.06	1	.06
3-bale clamp truck--3 bales	.05	.0025	.0025	.06	1	.06
4-bale clamp truck--4 bales	.06	.0030	.0030	.07	1	.07
6-bale clamp truck--6 bales	.06	.0035	.0030	.07	1	.07
Set bales down in horizontal position in cordwood stacks						
2-bale clamp truck						
1st tier only	.20	.0100	.0100	.22	1	.22
2nd tier only	.21	.0105	.0105	.23	1	.23
3rd tier only	.25	.0125	.0125	.28	1	.28
4th tier only	.29	.0145	.0145	.32	1	.32
5th tier only	.34	.0170	.0170	.38	1	.38
3-bale clamp truck						
1st tier only	.17	.0085	.0085	.18	1	.18
2nd tier only	.17	.0085	.0085	.18	1	.18
3rd tier only	.21	.0105	.0105	.23	1	.23
4th tier only	.25	.0125	.0125	.28	1	.28
5th tier only	.28	.0140	.0140	.30	1	.30

Table 3. --Productive time required to transport 100 bales of cotton different distances with one 2-bale clamp truck (round trip)

1 bale per trip			2 bales per trip		
Distance	Productive time		Distance	Productive time	
Feet	*Man-minutes*	*Man-hours*	*Feet*	*Man-minutes*	*Man-hours*
10	14.00	.233	10	7.00	.117
20	24.00	.400	20	12.00	.200
30	31.40	.523	30	15.70	.261
40	37.00	.617	40	18.50	.308
50	41.00	.683	50	20.50	.341
60	45.00	.750	60	22.50	.375
70	48.50	.808	70	24.25	.404
80	51.00	.850	80	25.50	.425
90	53.50	.891	90	26.75	.446
100	56.00	.933	100	28.00	.467
120	61.00	1.017	120	30.50	.508
140	66.00	1.100	140	33.00	.550
160	71.00	1.183	160	35.50	.591
180	76.00	1.267	180	38.00	.633
200	81.00	1.350	200	40.50	.675
220	86.00	1.433	220	43.00	.717
240	91.00	1.517	240	45.50	.758
260	96.00	1.600	260	48.00	.800
280	101.00	1.683	280	50.50	.841
300	106.00	1.767	300	53.00	.883
320	111.00	1.850	320	55.50	.925
340	116.00	1.933	340	58.00	.967
360	121.00	2.017	360	60.50	1.008
380	126.00	2.100	380	63.00	1.050
400	131.00	2.183	400	65.50	1.091
420	136.00	2.267	420	68.00	1.133
440	141.00	2.350	440	70.50	1.175
460	146.00	2.433	460	73.00	1.217
480	151.00	2.517	480	75.50	1.258
500	156.00	2.600	500	78.00	1.300
520	161.00	2.683	520	80.50	1.341
540	166.00	2.767	540	83.00	1.383
560	171.00	2.850	560	85.50	1.425
580	176.00	2.933	580	88.00	1.467
600	181.00	3.017	600	90.50	1.508
620	186.00	3.100	620	93.00	1.550
640	191.00	3.183	640	95.50	1.591
660	196.00	3.267	660	98.00	1.633
680	201.00	3.350	680	100.50	1.675
700	206.00	3.433	700	103.00	1.717

Table 4. --Productive time required to transport 100 bales of cotton different distances with one 3-bale and one 4-bale clamp truck (round trip)

3-bale clamp truck			4-bale clamp truck		
Distance	Productive time		Distance	Productive time	
Feet	*Man-minutes*	*Man-hours*	*Feet*	*Man-minutes*	*Man-hours*
10	4.66	.078	20	3.50	.058
20	8.00	.133	30	4.75	.079
30	10.47	.174	40	5.60	.093
40	12.33	.205	50	6.00	.100
50	13.67	.228	60	6.45	.108
60	15.00	.250	70	6.90	.115
70	16.17	.269	80	7.25	.121
80	17.00	.283	90	7.60	.127
90	17.83	.297	100	7.95	.132
100	18.67	.311	120	8.65	.144
120	20.33	.339	140	9.35	.156
140	22.00	.367	160	10.05	.168
160	23.67	.394	180	10.70	.178
180	25.33	.422	200	11.40	.190
200	27.00	.450	220	12.10	.201
220	28.67	.478	240	12.80	.213
240	30.33	.505	260	13.50	.225
260	32.00	.533	280	14.20	.237
280	33.67	.561	300	14.90	.248
300	35.33	.589	320	15.60	.260
320	37.00	.637	340	16.30	.271
340	38.67	.644	360	17.00	.283
360	40.33	.672	380	17.70	.295
380	42.00	.700	400	18.40	.307
400	43.67	.728	420	19.10	.318
420	45.33	.756	440	19.80	.330
440	47.00	.784	460	20.50	.341
460	48.67	.811	480	21.20	.353
480	50.33	.839	500	21.90	.365
500	52.00	.867	520	22.60	.377
520	53.67	.894	540	23.30	.388
540	55.33	.922	560	24.00	.400
560	57.00	.950	580	24.70	.411
580	58.67	.978	600	25.40	.423
600	60.33	1.005	620	26.10	.435
620	62.00	1.033	640	26.80	.447
640	63.67	1.061	660	27.50	.458
660	65.33	1.089	680	28.20	.470
680	67.00	1.117	700	28.90	.481
700	68.67	1.145			

Table 5. --Productive time required to transport 100 bales of cotton different distances with one 6-bale clamp truck and with 1 tractor-trailer train (round trip)

6-bale clamp truck			Tractor-trailer train (tractor and 4 trailers, 16 bales per trip)		
Distance	Productive time		Distance	Productive time	
Feet	*Man-minutes*	*Man-hours*	*Feet*	*Man-minutes*	*Man-hours*
40	2.0	.033	100	4.80	.080
50	2.3	.038	200	7.80	.130
60	2.5	.041	300	10.50	.175
70	2.6	.043	400	13.00	.217
80	2.8	.047	500	15.50	.258
90	3.0	.05			
100	3.2	.053	600	18.00	.300
			700	20.50	.341
120	3.7	.061	800	23.00	.383
140	4.1	.068	900	25.50	.425
160	4.5	.075			
180	4.9	.081	1,000	28.00	.467
200	5.4	.090	1,100	30.50	.508
			1,200	33.00	.550
220	5.9	.098	1,300	35.50	.591
240	6.4	.107	1,400	38.00	.633
260	6.9	.115	1,500	40.50	.675
280	7.4	.123			
300	7.9	.131	1,600	43.00	.717
			1,700	45.50	.758
320	8.4	.140	1,800	48.00	.800
340	8.9	.148	1,900	50.50	.841
360	9.4	.157	2,000	53.00	.883
380	9.9	.165			
400	10.4	.173	2,100	55.50	.925
			2,200	58.00	.967
420	10.9	.181	2,300	60.50	1.008
440	11.4	.190	2,400	63.00	1.050
460	11.9	.198	2,500	65.50	1.091
480	12.4	.207			
500	12.9	.215	2,600	68.00	1.133
			2,700	70.50	1.175
520	13.4	.223	2,800	73.00	1.217
540	13.9	.231	2,900	75.50	1.258
560	14.4	.240	3,000	78.00	1.300
580	14.9	.248			
600	15.4	.257	3,100	80.50	1.341
			3,200	83.00	1.383
620	15.9	.265	3,300	85.50	1.425
640	16.4	.273	3,400	88.00	1.467
660	16.9	.281	3,500	90.50	1.508
680	17.4	.290			
700	17.9	.298	3,600	93.00	1.550
			3,700	95.50	1.591
750	19.2	.320	3,800	98.00	1.633
800	20.4	.340	3,900	100.50	1.675
850	21.6	.360	4,000	103.00	1.717
900	22.9	.381			
950	24.2	.403	4,100	105.50	1.758
1,000	25.4	.423	4,200	108.00	1.800
			4,300	110.50	1.841
			4,400	113.00	1.883
			4,500	115.50	1.925

Table 6.--Productive time required to handle 100 bales of cotton by tractor-trailer trains

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
	Hours	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Tractor coupling and uncoupling and movement of tractor between trailer trains						
Couple tractor to trailer-train (1 man)	.018	.0009	.0009	.02	1	.02
Uncouple tractor from trailer-train (1 man)	.0125	.0006	.0006	.01	1	.01
Tractor movement from uncoupled trailer-train to next trailer-train to be moved; travel distance 20 feet						
1 man moves tractor 20 feet after uncoupling from trailer-train to couple up with next trailer-train	.021	.00105	.00105	.02	1	.02
Loading bales on trailers						
Flat bales						
Manual loading method						
1-man crew: 1 man steps upon edge of trailer, reaches and grasps bale, pulls bale forward and steps down to floor level as bale falls and guides it into position on trailer bed; bales are pre-positioned in loading blocks for loading on trailers	.26	.0260	.0130	.30	1	.30
2-man crew: 2 men step up on edge of trailer, reach and grasp bale, pull bale forward and step down to floor level as bale falls and guide it into position on trailer bed. The 2 men work on same bale. Bales are pre-positioned in loading blocks for loading on trailers	.18	.018	.0090	.21	2	.42
Clamp trucks load bales on-head on trailers						
2-bale clamp truck	.04	.0020	.0020	.05	1	.05
Compressed bales						
Manual loading method						
2-man crew: 2 men step up on edge of trailer, reach and grasp bale, pull bale forward and step down to floor level as bale falls into position on trailer bed. The 2 men work on same bale. Bales are pre-positioned in loading blocks for loading on trailers	.23	.0230	.0115	.26	2	.52
3-man crew: 2 men grasp bale and pull over onto trailer bed. 1 man on opposite side of trailer guides bale into position on trailer bed. Bales are pre-positioned in loading blocks for loading on trailers	.18	.0180	.0090	.21	3	.63
Clamp-truck loading of bales on trailers;						
2-bale clamp truck, bales on-side on trailer	.04	.0020	.0020	.05	1	.05
Hoist loading of bales on trailers						
2-man crew: 1 man operates hoist and lowers bale to trailer bed; 1 man on opposite side of trailer helps guide bale into place; bales positioned on side on trailer	.33	.0330	.0165	.38	2	.76
Unloading bales from trailers						
Flat bales						
Manual unloading method						
1-man crew: 1 man grabs lower edge of bale with both hands, places shoulder against bale and lifts and shoves bale at same time; bales positioned on side on trailer	.09	.0090	.0045	.10	1	.10

Table 6.--Productive time required to handle 100 bales of cotton by tractor-trailer trains--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
	Hours	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Unloading bales from trailers--Continued						
Flat bales--Continued						
Manual unloading method--Continued						
2-man crew: 1 man on 1 side of trailer grasps edge of bale and lifts, and 1 man on opposite side of trailer reaches across bale and uses bale hook to grab hold of head of bale and pulls; bales positioned on side on trailer	.12	.0060	.0060	.13	2	.26
3-man crew: 2 men on 1 side of trailer grasp edge of bale and lift; 1 man on opposite side of trailer reaches across and uses bale hook to grab hold of head of bale and pulls; bales positioned on-side on trailer	.12	.0060	.0060	.13	3	.39
Clamp-truck unloading of trailers						
2-bale clamp truck; bales positioned on-head on trailer	.05	.0025	.0025	.06	1	.06
Boom truck unloading of trailers						
2-man crew: 1 boom truck operator, 1 man attaches hooks; bales positioned on-side on trailer	.11	.0055	.0055	.12	2	.24
3-man crew: 1 boom truck operator, 2 men attach hooks; bales positioned on-side on trailer	.10	.0050	.0050	.11	3	.33
Compressed bales						
Manual unloading method						
2-man crew: 1 man on 1 side of trailer grasps head of bale, lifts and pushes; 1 man on opposite side of trailer reaches across and uses bale hook to grab hold of bale and pulls; bales positioned on-side on trailer	.20	.0100	.0100	.22	2	.44
3-man crew: 2 men on 1 side of trailer grasp head of bale, lift and push; 1 man on opposite side of trailer reaches across and uses bale hook to grab hold of bale and pulls; bales positioned on-side on trailer	.20	.0100	.0100	.22	3	.66
Clamp-truck unloading of trailers						
2-bale clamp truck; bales positioned on-side on trailer	.12	.0060	.0060	.13	1	.13
Boom-truck unloading of trailers						
2-man crew: 1 boom truck operator, 1 man attaches hooks to sides of bale; bales positioned on-side on trailers	.11	.0055	.0055	.12	2	.24

Table 7. --Productive time required to handle 100 bales of cotton by manual and hand-truck methods

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Hand-truck elements						
Flat bales						
Pick up bales in open area, from a block, on a road truckbed or in a car, when bale is in on-head position	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
No pulldown man	.28	.0280	.0140	.32	1	.32
With help of pulldown man	.26	.0130	.0130	.29	2	.58
With help of 2 pulldown men	.25	.0125	.0125	.27	3	.81
Pick up bales in narrow aisles or in crowded area, bale in on-head position						
No pulldown man	.34	.0340	.0170	.39	1	.39
With help of pulldown man	.30	.0150	.0150	.33	2	.66
Pick up bale on ball side						
With help of pulldown man	.29	.0145	.0145	.32	2	.64
Set bales down in on-head position in open area, block, in car, or on road truckbed						
No setdown man	.28	.0280	.0140	.32	1	.32
With help of setdown man	.24	.0120	.0120	.26	2	.52
With help of 2 setdown men	.24	.0120	.0120	.26	3	.78
Set bales down in on-head position in crowded area						
No setdown man	.31	.0310	.0155	.36	1	.36
With help of setdown man	.27	.0135	.0135	.30	2	.60
Set bale down on flat side by hand truck						
1 man	.18	.0180	.0090	.21	1	.21
Set bale down on ball side from on-head position						
1 man	.18	.0180	.0090	.21	1	.21
Set bales down on forks of fork truck						
1 hand trucker, no setdown man	.36	.0360	.0180	.41	1	.41
1 hand trucker, 1 setdown man	.32	.0160	.0160	.35	2	.70
Set bales down on portable electric elevator platform						
1 hand trucker, no setdown man	.32	.0320	.0160	.37	1	.37
1 hand trucker, 1 setdown man guides bales onto platform	.28	.0280	.0140	.32	2	.64
Compressed bales						
Pick up bales in open area, from block, from truckbed, or in car when bales are in on-head position						
No pickup man	.29	.0290	.0145	.33	1	.33
With help of 1 pickup man	.27	.0135	.0135	.30	2	.60
With help of 2 pickup men	.25	.0125	.0125	.28	3	.84
Pick up bales in narrow aisles or in crowded area, when bales are in on-head position						
No pickup man	.34	.0340	.0170	.39	1	.39
With help of 1 pickup man	.30	.0150	.0150	.33	2	.66
Set bales down in on-head position in open area, in block, on road truckbed, or in car						
No setdown man	.30	.0300	.0150	.35	1	.35
With help of 1 setdown man	.26	.0130	.0130	.29	2	.58
With help of 2 setdown men	.26	.0130	.0130	.29	3	.87

Table 7.--Productive time required to handle 100 bales of cotton by manual and hand-truck methods--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Hand-truck elements--Continued						
Compressed bales--Continued						
Set bales down in on-head position in crowded area	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
No setdown man	.31	.0310	.0155	.36	1	.36
With help of 1 setdown man	.27	.0135	.0135	.30	2	.60
Set bales down on flat side in open area, no setdown man	.16	.0160	.0080	.18	1	.18
Manual elements						
Pick up bale from horizontal position on floor and set on-head						
3 men lifting 1 bale and positioning on-head	.36	.0360	.0180	.41	3	1.23
4 men lifting 1 bale and positioning on-head	.28	.0280	.0140	.32	4	1.28
Pick up flat bales positioned on-head and lift from ground or floor level to on-head position on top of another bale, or on road truckbed, or into 2nd tier.						
5 men on ground lift and 2 men on 2nd tier pull bale	1.10	.2200	.0550	1.38	7	9.66
Pick up flat bales from on-head position and place in horizontal position; 6 men lift from floor level and 3 men on tiers pull bales into place.						
Place in 1st tier	.33	.0825	.0165	.43	9	3.87
Place in 2nd tier	.40	.1000	.0200	.52	9	4.68
Place in 3rd tier	.53	.1325	.0265	.69	9	6.21
Place in 4th tier	1.21	.3025	.0605	1.59	9	14.31
Place in 5th tier	1.54	.3850	.0770	2.00	9	18.00
Set bale down in aisle from 2nd-tier height to on-head position						
3-man crew: 2 men on top of bales and 1 man guides bales to on-head position in aisle	.20	.0200	.0100	.23	3	.69
Set bale down from on-head to horizontal position on flat side						
1 man pushes bale over on flat side	.11	.0100	.0050	.13	1	.13
Set flat bale down from on-head position to horizontal position on ball side						
1 man pushes bale over on ball side	.12	.0120	.0060	.14	1	.14
2 men push bale over on ball side	.10	.0050	.0050	.11	2	.22

Table 8. --Productive time required to transport 100 bales of cotton different distances in open areas, and in narrow aisles, with 1 hand truck (round trip)

One hand truck, open area		
Distance	Productive time	
Feet	*Man-minutes*	*Man-hours*
10	22.00	.367
20	30.00	.500
30	34.00	.567
40	38.00	.633
50	43.00	.717
60	48.40	.807
70	54.20	.903
80	60.40	1.007
90	67.60	1.127
100	74.00	1.233
110	80.70	1.345
120	87.60	1.460
130	94.70	1.568
140	102.20	1.703
150	110.00	1.833
160	118.00	1.967
170	126.50	2.108
180	135.00	2.250
190	144.20	2.403
200	153.40	2.557
210	164.00	2.733
220	174.60	2.910
230	185.50	3.091
240	196.20	3.270
250	209.70	3.495
260	224.00	3.733
270	237.20	3.953
280	252.00	4.200
290	265.70	4.428
300	281.40	4.690
310	297.50	4.958
320	313.00	5.217
330	331.70	5.528
340	352.60	5.877
350	369.70	6.161

One hand truck, open area		
Distance	Productive time	
Feet	*Man-minutes*	*Man-hours*
360	388.40	6.473
370	409.00	6.817
380	432.60	7.210
390	454.00	7.567
400	478.00	7.967
410	504.00	8.400
420	530.80	8.847
430	558.00	9.300
440	592.00	9.867
450	628.00	10.467
460	671.40	11.190
One hand truck, narrow aisle		
5	16.00	.267
10	27.00	.450
15	35.40	.590
20	43.00	.717
25	49.00	.817
30	54.00	.900
35	60.00	1.000
40	65.00	1.083
45	70.00	1.167
50	76.00	1.267
55	81.00	1.350
60	87.00	1.450

Table 9. --Productive time required to transport 1 bale of cotton different distances, 1 bale per trip, by 2 men rolling bale over top of other bales to main aisle (round trip)

Distance	Elapsed time		Productive time
Feet	*Minutes*	*Hours*	*Man-hours*
5	17.50	.290	.58
10	34.80	.580	1.16
15	51.30	.855	1.71
20	67.80	1.130	2.26
25	82.20	1.370	2.74
30	96.70	1.610	3.22
35	111.30	1.855	3.71
40	124.90	2.065	4.13
45	138.40	2.305	4.61
50	152.10	2.535	5.07
55	165.90	2.765	5.53
60	178.20	2.970	5.94

Table 10. --Productive time required to unload 100 bales of cotton from road trucks and railroad cars

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Setup and cleanup for unloading bales from road trucks						
Bridgeplates						
Manually (2 men)	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Set up bridgeplate	.03					
Remove bridgeplate	.03					
Total	.06			.06	2	.12
Industrial lift truck						
Set up bridge plate	.02					
Remove bridge plate	.02					
Total	.04			.04	1	.04
Lift hand truck onto and off road truck from ground level (2 men)						
Lift hand truck onto truckbed	.01					
Remove hand truck from truckbed	.01					
Total	.02			.02	2	.04
Setup and cleanup for unloading bales from cars						
Open car door						
Manually (2 men)						
Ground level	.05			.05	2	.10
Car-floor-level platform	.03			.03	2	.06
Industrial lift truck						
Ground level	.03			.03	1	.03
Car-floor-level platform	.03			.03	1	.03
Bridgeplates						
Manually (2 men)						
Set up bridgeplate	.03					
Remove bridgeplate	.03					
Total	.06			.06	2	.12
Industrial lift truck						
Set up bridgeplate	.02					
Remove bridgeplate	.02					
Total	.04			.04	1	.04
Lift hand truck into and out of railroad car from ground level (2 men)						
Lift hand truck into car	.01					
Remove hand truck from car	.01					
Total	.02			.02	2	.04
Ramps (1 man)						
Set up ramp	.06					
Remove ramp	.05					
Hook ramp to clamp truck	.01					
Unhook ramp from clamp truck	.01					
Total	.13			.13	1	.13

Table 10. --Productive time required to unload 100 bales of cotton from road trucks and railroad cars--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
	Hours	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Unload bales from road trucks						
Flat bales						
Unload flat bales from road trucks by manual push-off method. Ground level unloading						
2-man crew: 1 man on truck pushes bales and 1 man on ground sets bales on-head	.63	.0630	.0315	.72	2	1.44
3-man crew: 2 men on truck push bales, 1 man on ground sets bales on-head	.47	.0470	.0235	.54	3	1.62
4-man crew: 2 men on truck push bales, 2 men on ground set bales on-head	.41	.0410	.0205	.47	4	1.88
Unload flat bales from road trucks by hand truck, truckbed level platform						
1 pulldown man on truckbed	1.07	.1070	.0535	1.23	1	1.23
2 pulldown men on truckbed	.73	.0730	.0365	.84	2	1.68
3 pulldown men on truckbed	.73	.0730	.0365	.84	3	2.52
Unload flat bales from road trucks by clamp truck, ground level						
2-bale clamp truck	.34	.0170	.0170	.38	1	.38
3-bale clamp truck	.30	.0150	.0150	.33	1	.33
4-bale clamp truck	.28	.0140	.0140	.31	1	.31
Unload flat bales from road trucks by clamp truck, truckbed-level platform						
1 pulldown man moves bale to edge of truck for clamp truck pickup	.40	.0200	.0200	.44	1	.44
2-bale clamp truck unloads bales from road truck	.34	.0170	.0170	.38	1	.38
3-bale clamp truck unloads bales from road truck	.29	.0145	.0145	.32	1	.32
Compressed bales						
Unload compressed bales from road truck with hand trucks, truckbed-level platform						
1 pulldown man on truckbed	1.07	.1070	.0535	1.23	1	1.23
2 pulldown men on truckbed	.73	.0730	.0365	.84	2	1.68
Unload compressed bales from road truck by clamp truck, ground level						
2-bale clamp truck	.31	.0155	.0155	.34	1	.34
3-bale clamp truck	.28	.0140	.0140	.32	1	.32
4-bale clamp truck	.25	.0125	.0125	.29	1	.29
Load bales from railroad cars						
Flat bales						
Unload cars by hand trucks, ground level						
3-man crew: 1 breakout man in car positions bales for hand truckers, 1 hand trucker moves bales to car door and slides them off hand truck to ground, 1 setup man on ground guides bales to on-head position	.80	.0800	.0400	.92	3	2.76
4-man crew: 2 breakout men in car position bales for hand truckers, 1 hand trucker moves bales to car door and slides them off hand truck to ground, 1 setup man on ground guides bales to on-head position	.73	.0730	.0365	.84	4	3.36

Table 10. --Productive time required to unload 100 bales of cotton from road trucks and railroad cars--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Load bales from railroad cars--Continued						
Flat bales--Continued						
Unload railroad cars by hand truck, car-floor-level platform						
2 men break out and position each bale for hand truck pickup	*Hours* .73	*Hours* .0730	*Hours* .0365	*Hours* .84	*Number* 2	*Man-hours* 1.68
3 men break out and position each bale for hand-truck pickup	.62	.0620	.0310	.71	3	2.13
4 men break out and position each bale for hand-truck pickup	.62	.0620	.0310	.71	4	2.84
Unload railroad car by clamp truck, car-floor level platform						
2-bale clamp truck	.36	.0180	.0180	.40	1	.40
Unload bales from railroad car by clamp truck, using a magnesium ramp, from ground level						
2-bale clamp truck	.36	.0180	.0180	.40	1	.40
Compressed bales.						
Unload railroad cars by hand truck, ground level						
3-man crew: 1 breakout man in car positions bales for hand trucker, 1 hand trucker moves bales to car door and slides them to ground, 1 setup man on ground guides bales to on-head position	.81	.0810	.0405	.93	3	2.79
4-man crew: 2 breakout men in car position bales for hand trucker, 1 hand trucker moves bales to car door and slides them to ground, 1 setup man on ground guides bales to on-head position	.72	.0720	.0360	.83	4	3.32
Unload railroad cars by hand truck, car-floor level platform						
2 breakout men position bales for hand-truck pickup	.74	.0740	.0370	.85	2	1.70
3 breakout men position bales for hand-truck pickup	.65	.0650	.0325	.75	3	2.25
4 breakout men position bales for hand-truck pickup	.65	.0650	.0325	.75	4	3.00
Unload railroad cars by clamp truck, car-floor-level platform						
2-bale clamp truck	.37	.0185	.0185	.41	1	.41
3-bale clamp truck	.36	.0180	.0180	.40	1	.40
Unload railroad cars by clamp truck, using a magnesium ramp, from ground level						
2-bale clamp truck	.37	.0185	.0185	.41	1	.41

Table 11. --Productive time required to weigh 100 bales of cotton on beam and dial platform scales

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Setup and cleanup for weighing	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Stationary beam scale						
Set up scale, 2 men	.04					
Remove scale, 2 men	.03					
Total	.07			.07	2	.14
Mobile beam scale						
Manually operated scale						
Set up scale, 2 men	.02					
Remove scale, 2 men	.02					
Total	.04			.04	2	.08
Pneumatically operated scale						
Set up scale, 2 men	.02					
Remove scale, 2 men	.02					
Total	.04			.04	2	.08
Portable platform scale						
Set up scale, 2 men	.03					
Remove scale, 2 men	.03					
Total	.06			.06	2	.12
Weighing flat or compressed bales on stationary beam scale						
4-man crew: 1 man weighs bales; 1 man records weights and other information and drops warehouse tags on bales, 1 man attaches hooks on one side of bales, 1 man attaches hooks on other side and pulls rope to lift bales	.59	.0590	.0295	.68	4	2.72
5-man crew: 1 man weighs bales, 1 man records weights and other information and drops warehouse tags on bales, 2 men attach hooks to sides of bales, 1 man pulls rope to lift bales	.54	.0540	.0270	.62	5	3.10
6-man crew: 1 man weighs bales, 1 man records weights and other information, 1 man calls out previous tag number and drops warehouse tags on bales, 1 man pulls rope to lift bales, 2 men attach hooks to sides of bales	.54	.0540	.0270	.62	6	3.72
Weighing bales with mobile beam scale						
Manually operated scale:						
4-man crew: 1 man weighs bales, 1 man records weights and other information, 1 man attaches hooks on side of bales and helps move scale, 1 man attaches hooks on 1 side, pulls rope to lift bales, and helps move scale	.51	.0510	.0255	.59	4	2.36
5-man crew: 1 man weighs bales, 1 man records weights and other information, 2 men attach hooks to sides of bales and move scale, 1 man pulls rope to lift bales	.42	.0420	.0210	.48	5	2.40
6-man crew: 1 man weighs bales, 1 man calls out tag numbers, 1 man records weights and other information, 2 men attach hooks to sides of bales, 1 man pulls rope to lift bales	.42	.0420	.0210	.48	6	2.88

Table 11.--Productive time required to weigh 100 bales of cotton on beam and dial platform scales--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Weighing bales with mobile beam scale--Continued						
Pneumatically operated scale:						
4-man crew; 1 man weighs bales, 1 man records weights and other information, 1 man attaches hooks, operates air lever to lift bales, and moves scale, 1 man attaches hooks and moves scale	*Hours* .36	*Hours* .0360	*Hours* .0180	*Hours* .41	*Number* 4	*Man-hours* 1.64
5-man crew: 1 man weighs bales, 1 man calls out tag numbers, 1 man records weights and other information, 1 man attaches hooks, operates air lever to lift bales, and moves scale, 1 man attaches hooks and moves scale	.36	.0360	.0180	.41	5	2.05
Beam scale on an industrial lift truck:						
3-man crew: 1 man drives lift truck, 1 man attaches hooks on 1 side and weighs bales, 1 man attaches hooks on 1 side of bales and records weights	.32	.0160	.0160	.35	3	1.05
Weighing flat or compressed bales on platform dial scales						
Installed platform scale:						
1-man crew: 1 man drops tags on bales, weighs bales, and records weights and other information	.58	.0290	.0290	.64	1	.64
2-man crew: 1 man weighs bales and records weights and other information, 1 man drops tags on bales and calls out information such as tag numbers, numbers of bands, etc	.42	.0210	.0210	.46	2	.92
Portable platform scale						
1-man crew: 1 man drops tags on bales, weighs bales and records weights and other information	.58	.0190	.0190	.64	1	.64
2-man crew: 1 man weighs bales and records weights and other information, 1 man drops tags on bales and calls out information such as tag number, number of bands, etc	.42	.0210	.0210	.46	2	.92
Recording weights and other information						
1 man	.17	.0085	.0085	.19	1	.19
Tying warehouse tags on bales						
1 man	.18	.0090	.0090	.20	1	.20

Table 12. --Productive time required to sample 100 bales of cotton in blocks and on hand trucks

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Sample flat bales:						
Bales positioned on-head in rows:						
Cut samples: 1 man cuts sample on 1 side of bale	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
1 sample cut	.12	.0120	.0060	.14	1	.14
2 sample cuts	.19	.0190	.0095	.22	1	.22
3 sample cuts	.27	.0270	.0135	.31	1	.31
Pull cut samples from bale: 1 man pulls cut sample from 1 side of bale and places it on top of bale						
Pull 1 cut sample	.23	.0230	.0115	.26	1	.26
Pull 2 cut samples	.47	.0470	.0235	.54	1	.54
Pull 3 cut samples	.68	.0680	.0340	.78	1	.78
Cut and pull sample: 1 man cuts and pulls sample from 1 side of bale, and places it on top of bale						
Cut and pull 1 sample	.39	.0390	.0195	.45	1	.45
Cut and pull 2 samples	.68	.0680	.0340	.78	1	.78
Cut and pull 3 samples	.97	.0970	.0485	1.11	1	1.11
Bales positioned on hand truck:						
Cut samples: 1 man cuts sample on 1 side of bale						
1 sample cut	.14	.0140	.0070	.16	1	.16
2 sample cuts	.24	.0240	.0120	.28	1	.28
3 sample cuts	.36	.0360	.0180	.41	1	.41
Pull samples: 1 man pulls cut sample on 1 side and places it on top of bale						
Pull 1 cut sample	.20	.0200	.0100	.23	1	.23
Pull 2 cut samples	.44	.0440	.0220	.51	1	.51
Pull 3 cut samples	.68	.0680	.0340	.78	1	.78
Cut and pull samples: 1 man cuts and pulls samples on 1 side of bale and places them on top of bale						
Cut and pull 1 sample	.39	.0390	.0195	.45	1	.45
Cut and pull 2 samples	.71	.0710	.0355	.82	1	.82
Cut and pull 3 samples	1.00	.1000	.0500	1.15	1	1.15
Sample compressed bales:						
Cut and pull sample from 1 side of flat bale when it is positioned on hand truck: 1 man cuts and pulls sample on 1 side and places sample on top of bale	.32	.0320	.0160	.37	1	.37
Cut and pull sample from 1 side of bale when it is positioned on-head in a temporary block: 1 man cuts and pulls sample on 1 side, and places sample on top of bale	.32	.0320	.0160	.37	1	.37
Cut and pull samples from bale in temporary blocks:						
1 man cuts and pulls sample on exposed side of bale in 1st temporary block, then turns bale 180°	.38	.0760	.0190	.48	1	.48
1 man cuts and pulls sample on 1 side of bale in 2nd temporary block	.32	.0320	.0160	.37	1	.37

Table 12. --Productive time required to sample 100 bales of cotton in blocks and hand trucks--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Wrap samples:						
Samples wrapped in individual paper wrappers:						
1 man wraps sample, staples warehouse tag to paper wrapper, and places it in a container....	*Hours* .56	*Hours* .0280	*Hours* .0280	*Hours* .62	*Number* 1	*Man-hours* .62
Samples, 50 to 100, wrapped in 1 paper bundle:						
2 men place samples on paper strips and wrap in large bundle.....	.38	.0190	.0190	.42	2	.84
Roll samples and place in container:						
1 man places warehouse stub in sample, rolls sample, and places it in container.....	.32	.0160	.0160	.35	1	.35
Trim loose cotton:						
Flat bales positioned on-head in row blocks:						
1 man removes loose cotton from sample hole cut in bale, 1 side only, and places it in bag	.19	.0095	.0095	.21	1	.21
Flat bales positioned on hand truck:						
1 man removes loose cotton from sample hole cut in bale, 1 side only, and places it in bag.....	.19	.0095	.0095	.21	1	.21
Compressed bales positioned in blocks:						
1 man removes loose cotton from sample hole cut in bale, 1 side only, and places it in bag.....	.19	.0095	.0095	.21	1	.21
Compressed bales positioned on a hand truck:						
1 man removes loose cotton from sample hole cut in bale, 1 side only, and places it in bag.....	.19	.0095	.0095	.21	1	.21

Table 13. --Productive time required to stack 100 bales of cotton in on-head and cordwood storage stacks

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
	Hours	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Setup and cleanup						
For stacking bales on dunnage						
Flat bales						
Stack bales on-head; 2 men place dunnage						
1-high stack	.18			.18	2	.36
2-high stack	.10			.10	2	.20
3-high stack	.07			.07	2	.14
Cordwood stacks; 2 men place dunnage						
4-high stack	.08			.08	2	.16
5-high stack	.06			.06	2	.12
Compressed bales						
Cordwood stacks; 2 men place dunnage						
4-high stacks	.06			.06	2	.12
5-high stacks	.05			.05	2	.10
6-high stacks	.04			.04	2	.08
Set up and remove portable electric elevator						
Position elevator, plug in electric cord, and raise wheels	.08			.08	1	.08
Disconnect electric cord and lower wheels for moving	.06			.06	1	.06
Stacking flat bales						
Stacking bales on-head						
Manual and hand-truck methods						
1-high stack in solid block						
1-hand trucker, no setdown man	.28	.0280	.0140	.32	1	.32
1-hand trucker, 1 setdown man	.24	.0120	.0120	.26	2	.52
1-hand trucker, 2 setdown men	.24	.0120	.0120	.26	3	.78
2-high stack: 1st tier bales positioned in stack by hand trucker; 2nd tier bales by manual lifting; bales placed in 1st tier and then in 2nd tier as rows are built; 6-man crew: 1 hand trucker set bales down in 1st tier, 5 lift bales to 2nd tier	1.13	.1695	.0565	1.36	6	8.16
2-high stack: 1st-tier bales are set down in blocks from wall to aisle; 2nd-tier bales are lifted, rolled to bale nearest wall and then positioned on-head; 6-man crew: 6 hand truckers set bales down in 1st tier; then 5 of the hand truckers form a stacking crew; 1-hand trucker and 3 stackers working at floor level and 2 stackers working on 2nd tier lift and pull bales to 2nd tier; then the 2 stackers roll bales 30 ft. to storage position in stacks	1.36	.2040	.0680	1.63	6	9.78
Portable electric elevator						
2-high stack: 1st-tier bales are set down by hand truckers; 2nd-tier bales lifted by portable electric elevator and bales are pulled and pushed into place by unloaders; 6-man crew: 5 hand truckers set bales down in 1st tier, then 1 hand trucker and 1 setdown man place bales on elevator platform; 1 man operates elevator and 3 men unload and position bales in 2nd tier	.72	.0720	.0360	.83	6	4.98

Table 13. --Productive time required to stack 100 bales of cotton in on-head and cordwood storage stacks--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Stacking flat bales--Continued						
Stacking bales on-head--Continued						
Fork truck, 2-high stacks (1 bale per trip)	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
1 fork truck, no setdown man	.52	.0260	.0260	.57	1	.57
1 fork truck, 1 setdown man loads bales on forks	.47	.0235	.0235	.52	2	1.04
1 fork truck, 2 setdown men load bales on forks	.45	.0225	.0225	.50	3	1.50
Boom truck, 2-high stacks, in rows 2 bales wide						
3-man crew: 1 man operates boom truck; 2 men attach and release hooks on bale						
Bales picked up from on-head position at storage stack	.62	.0310	.0310	.68	3	2.04
Bales picked up from trailers	.70	.0350	.0350	.77	3	2.31
Clamp truck						
1-high stack: Bales stacked in solid blocks or in rows						
2-bale clamp truck	.04	.0020	.0020	.05	1	.05
3-bale clamp truck	.04	.0020	.0020	.05	1	.05
4-bale clamp truck	.05	.0025	.0025	.06	1	.06
6-bale clamp truck	.05	.0025	.0025	.06	1	.06
2-high stack: Bales stacked in rows						
2-bale clamp truck	.10	.0050	.0050	.11	1	.11
3-bale clamp truck	.10	.0050	.0050	.11	1	.11
4-bale clamp truck	.11	.0055	.0055	.12	1	.12
3-high stack: Bales stacked in rows:						
2-bale clamp truck	.15	.0075	.0075	.17	1	.17
3-bale clamp truck	.15	.0075	.0075	.17	1	.17
4-bale clamp truck	.17	.0085	.0085	.19	1	.19
Stacking bales in 5-high cordwood stack						
Manual method						
9-man crew: 3 men at floor level lift and push bales to 2nd or 3rd tier, where 3 men pull bales into place; 3 men work at 4th-tier level and pull bales from 3rd tier to 4th and 5th tier	4.01	1.0025	.2005	5.21	9	46.89
Boom-truck method:						
3-man crew: 1 truck operator; 2 men attach hooks to bales on hand trucks or on trailers, place bales in stacks and release hooks	.58	.0290	.0290	.64	3	1.92
4-man crew: 1 truck operator; 2 men attach hooks to bales on hand trucks or on trailers, place bales in 1st, 2nd, and 3rd tiers, and release hooks; 1 man works on top of stack and places bales in 4th and 5th tiers and releases hooks	.57	.0285	.0285	.63	4	2.52
Clamp-truck methods:						
2-bale clamp truck: Includes positioning bales on flat side and in 2-high stacks, and pick up stacks	1.01	.0505	.0505	1.11	1	1.11
3-bale clamp truck, includes positioning bales on flat side and in 2- and 3-high stacks, and pick up stacks	.60	.0300	.0300	.66	1	.66

Table 13. --Productive time required to stack 100 bales of cotton in on-head and cordwood storage stacks--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Stacking compressed bales						
Stacking 1-high on-head in solid blocks or in rows						
Manual and hand-truck method	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
1 hand trucker, no setdown man	.30	.0300	.0150	.35	1	.35
1 hand trucker, 1 setdown man	.26	.0130	.0130	.29	1	.58
1 hand trucker, 2 setdown men	.26	.0130	.0130	.29	1	.87
Clamp truck						
2-bale clamp truck	.05	.0025	.0025	.06	1	.06
3-bale clamp truck	.05	.0025	.0025	.06	1	.06
4-bale clamp truck	.06	.0030	.0030	.07	1	.07
6-bale clamp truck	.06	.0030	.0030	.07	1	.07
Stacking bales in 5-high cordwood stacks						
Boom-truck method						
3-man crew: 1 truck operator, 2 men place bales in 1st, 2nd and 3rd tiers and release hooks, stacking full length of row; then 1 stacker works at floor level and 1 stacker, working on top of row, places bales in 4th and 5th tiers, and releases hooks	.60	.0300	.0300	.66	3	1.98
4-man crew: 1 truck operator, 2 men place bales in 1st, 2nd, 3rd tiers, and release hooks; 1 man working on top of stack places bales in 4th and 5th tiers and releases hooks	.62	.0310	.0310	.68	4	2.72
5-man crew: 1 truck operator; 2 men place bales in 1st, 2nd, and 3rd tiers; 2 men on top of stack place and release bales in 4th and 5th tiers	.62	.0310	.0310	.68	5	3.40
Clamp-truck method						
2-bale clamp truck: Bales picked up from horizontal position on floor and placed in cordwood stack	.26	.0130	.0130	.29	1	.29
3-bale clamp truck: Bales picked up from horizontal position on floor and placed in cordwood stack	.22	.0110	.0110	.24	1	.24
Miscellaneous boom-truck operation						
Attach hooks to flat or compressed bales on hand trucks or on trailers, 2 men	.095	.0047	.0047	.104	2	.21

Table 14. --Productive time for breaking 100 bales of cotton out of storage stacks by manual and machine methods.

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Break out bales from on-head storage stacks						
Flat bales						
Manual and hand-truck methods						
Break out from solid blocks: Bales are stacked on-head, 1-high, and are lifted from storage space, rolled over top of other bales to main aisle, and lowered to floor in on-head position						
6-man crew: 5 men grasp head of bale, lift upwards until bale is clear of other bales, and position bale on ball side; 2 men roll bale over top of other bales to main aisle and lower bale to floor; 1 man on floor guides bale to on-head position	*Hours* 2.92	*Hours* .4380	*Hours* .1460	*Hours* 3.50	*Number* 6	*Man-hours* 21.00
Break out from solid blocks: Bales are stacked on-head. 1 row of bales is 1 bale high, next 2 rows 2 bales high. Bales are lifted and moved if necessary, and rolled over top of other bales to main aisle and lowered to floor in on-head position						
6-man crew: 5 men move and lift bale on top of 1-high stack. Then 2 men roll bale 30 feet over top of other bales to main aisle and lower to floor. 1 man on floor guides bale to on-head position	4.29	.6435	.2145	5.14	6	30.84
Break out from 2-high on-head stacks in rows 2 bales wide						
3-man crew: 1 man works on top of stack and pushes bale, 2 men work at floor level and pull bale to on-head position in cross aisle	3.54	.5314	.1770	4.25	3	12.75
Break out from solid block 15 bales in depth; 7 obstructing bales moved to obtain 1 desired bale; each hand trucker works independently						
1 hand trucker, no pulldown man	20.12	2.0120	1.0060	23.14	1	23.14
2 hand truckers no pulldown man	10.06	1.0060	.5030	11.57	2	23.14
3 hand truckers no pulldown man	6.70	.6710	.3355	7.71	3	23.13
4 hand truckers no pulldown man	5.03	.5030	.2515	5.78	4	23.12
Boom-truck method						
Break out from 2-high on-head stacks in rows 2 bales wide: Move obstructing bales, break-out desired bales from stack and place bales on-head in cross aisle						
2-man crew: 1 truck operator; 1 hookman, working off of platform attached to boom, attaches and releases hooks and positions bales	1.48	.0740	.0740	1.63	2	3.26
Breakout device on 2,000 - 3,000-lb. lift truck						
Break out bales from on-head stacks 2-bales wide						
2-high stacks	.55	.0275	.0275	.60	1	.60
3-high stacks	.67	.0335	.0335	.74	1	.74

Table 14. --Productive time for breaking 100 bales of cotton out of storage stacks by manual and machine methods--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Break out bales from on-head storage stacks--Continued						
Compressed bales						
Manual and hand-truck method						
Break out from solid block 5 bales in depth; 2 obstructing bales moved to obtain 1 desired bale; each hand trucker works independently	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
1-hand trucker, no setdown man	7.68	.7680	.3840	8.83	1	8.83
2-hand truckers, no setdown man	3.84	.3840	.1920	4.416	2	8.83
3-hand truckers, no setdown man	2.56	.2560	.1280	2.944	3	8.83
Breakout device on 2,000 - 3,000-lb. lift truck						
Break out from solid block 5 bales in depth; 2 obstructing bales moved to obtain 1 desired bale	.49	.0245	.0245	.54	1	.54
Break out bales from cordwood stacks						
Flat bales						
Manual and hand-truck method						
Break out from 5-high cordwood stacks 6-man crew: 4 men work on top of bales, roll obstructing bales aside, and lower desired bale to floor; 1 man works at floor level and positions desired bale on head; 1 hand trucker moves bale 40 feet to temporary block in main aisle	5.52	1.3800	.2760	7.18	6	43.08
Boom-truck method						
Break out from 5-high cordwood stacks 2 man crew: 1 truck operator; 1 hookman working from platform on mast attaches and releases hooks, and guides bale into storage position. Desired bales lowered to floor in a horizontal position	4.05	.2025	.2025	4.46	2	8.92
3 man crew: 1 truck operator: 1 hook man working on top of stack attaches and releases hooks on one end of bale and 1 hook man working from platform on mast attaches and releases hooks on one end of bale, and guides bale into storage position in stack; desired bales lowered to floor in horizontal position	4.08	.2040	.2040	4.49	3	13.47
Compressed bales						
Manual and hand-truck method						
Break out from 5-high cordwood stacks 6-man crew: 4 men work on top of bales, roll obstructing bales aside, and lower desired bale to floor; 1 man works at floor level and positions desired bale on-head in cross aisle; 1 hand trucker moves bale 40 feet to temporary block in main aisle	5.28	1.3200	.2640	6.86	6	41.16
Boom-truck method						
Break out from 5-high cordwood stacks 2-man crew: 1 truck operator; 1 man rides platform on boom truck mast and attaches hooks, releases hooks, positions bales in stacks, and lowers desired bales to floor in horizontal position	3.57	.1785	.1785	3.93	2	7.86

Table 14. --Productive time for breaking 100 bales of cotton out of storage stacks by manual and machine methods--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Break out bales from cordwood stacks--Continued						
Compressed bales--Continued						
Boom-truck method--Continued						
Break out from 5-high cordwood stack--Continued						
3-man crew: 1 truck operator; 1 man, working on top of stacks, attaches hooks and releases hooks on 1 end of bale and helps guide bale to position in stack, 1 man rides platform and attaches and releases hooks on opposite side, helps guide bale into position in stack; desired bale lowered to floor in a horizontal position	*Hours* 3.63	*Hours* .1815	*Hours* .1815	*Hours* 3.99	*Number* 3	*Man-hours* 11.97
4-man crew: 1 truck driver; 2 men work on top of stack, attach and release hooks on bale and guide bale to position in stack; 1 man works at floor level and releases hooks on desired bale when it is lowered to floor in horizontal position	4.04	.2020	.2020	4.44	4	17.76
Break out from 6-high cordwood stack						
3-man crew: 1 truck operator; 1 man working on top of stacks attaches hooks and releases hooks on 1 end of bale and helps to guide bale to position in stack; 1 man works on top of stacks, attaches hooks and releases hooks on opposite end of bale, helps guide bale to position in stack and rides platform on boom to floor level where desired bale is lowered in a horizontal position	4.66	.2330	.2330	5.13	3	15.39
4-man crew: 1 truck operator; 2 men work on top of stack, attach and release hooks on bale, and guide bale to position in stack; 1 man works at floor level and releases hooks when desired bale is lowered to cross aisle, in a horizontal position	4.56	.2280	.2280	5.02	4	20.08
Miscellaneous elements						
Set bales on-head in cross aisle, using boom truck; 2-man crew: 1 truck operator; 1 man attaches hooks to head of bale, positions bale on-head in aisle, and releases hooks						
Flat bales	.31	.0155	.0155	.34	2	.68
Compressed bales	.31	.0155	.0155	.34	2	.68
Locate next bale to be broken out when bales are not stacked in numerical order by warehouse tag number, 1 man	.83	.0415	.0415	.91	1	0.91
Spotting bales for breaking out						
1 man spots and attaches break out flag to bales without a definite locating system	2.13	.1065	.1065	2.34	1	2.34
1 man spots and attaches breakout flag when location sheet shows compartment, bay and aisle	1.08	.0540	.0540	1.19	1	1.19
1 man spots and attaches break out flag to bales stacked in numerical sequence	.74	.0370	.0370	.81	1	.81
Tie breakout flags on bales; 1 man	.15	.0075	.0075	.17	1	.17
Breakout device: Set bales down on head						
Set bales down in open area						
Flat bales	.14	.0070	.0070	.15	1	.15
Compressed bales	.14	.0070	.0070	.15	1	.15
Set bales down in congested area						
Flat bales	.20	.0100	.0100	.22	1	.22
Compressed bales	.20	.0100	.0100	.22	1	.22

Table 15. --Productive time required to load 100 bales of cotton on road trucks and into railroad cars.

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Setup and cleanup for loading bales on road truck						
Setup and removal of bridgeplate						
Manual method, 2 men	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Set up bridgeplate	.03			.03		
Remove bridgeplate	.03			.03		
Total	.06			.06	2	.12
Industrial lift truck						
Set up bridgeplate	.02			.02		
Remove bridgeplate	.02			.02		
Total	.04			.04	2	.08
Load bales onto road trucks						
Flat bales						
Ground-level loading, bales stacked on-head						
Manual and hand-truck method: 7-man crew loads bales onto road truck by manually lifting bales onto truckbed; 5 men working at ground level lift bale onto truckbed, 2 men pull bale and position it on truckbed	1.15	.1725	.0575	1.38	7	9.66
Portable electric elevator method: 4-man crew loads bales on road truck using portable electric elevator to lift bales from ground level to truckbed level; 1 man operates portable elevator; 1 man loads bales on elevator platform at ground level; 2 men on truckbed remove bales from elevator platform and position bales on truckbed	.90	.0900	.0450	1.04	4	4.16
Fork-truck method: 3-man crew loads bales on road truck, working at side of road truck and lifting bale to truckbed level; 1 fork truck operator working at side of road truck lifts bales to truckbed level for unloading, 2 men remove bales from forks, move and position bale on truckbed	.90	.0900	.0450	1.04	3	3.12
Clamp-truck method: Clamp truck working at side of road truck raises bales to truckbed level and positions bales on truckbed						
2-bale clamp truck	.57	.0285	.0285	.63	1	.63
3-bale clamp truck	.43	.0215	.0215	.47	1	.47
4-bale clamp truck	.41	.0205	.0205	.45	1	.45
Platform-level loading, bales stacked on-head						
Manual and hand-truck method: 6-man crew; 6 men on truckbed assist in offloading hand trucks, positioning bales on truckbed, and lift bales to 2nd tier	.69	.1033	.0345	.83	6	4.98
Clamp-truck method: Clamp trucks load bales on road truck by moving bales over truck tailgate; 2-bale clamp truck loads bales on road truck by operating clamp truck on truckbed	.65	.0325	.0325	.72	1	.72
2-man crew: 1 clamp truck operator releases bales on tailgate of road truck; 1 hand trucker moves bales from tailgate to stack on truckbed	.68	.0340	.0340	.75	2	1.50

Table 15. --Productive time required to load 100 bales of cotton on road trucks and into railroad cars--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
	Hours	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Load bales onto road trucks--Continued						
Compressed bales						
Ground-level loading, bales stacked on-head						
Manual and hand-truck method: 8-man crew: 5 men working at ground level lift bales to truckbed; 2 men working on truckbed pull and position bales on truckbed, 1 man holds bale in place	1.09	.2180	.0545	1.36	8	10.88
Portable electric elevator method: 5-man crew: 1 elevator operator; 1 man loads bales on elevator platform at ground level; 2 men on truckbed remove bale from elevator platform and position on truckbed; 1 man holds bale in place	.87	.0870	.0435	1.00	5	5.00
Clamp-truck method						
2-bale clamp truck: Clamp operator places bales on truckbed, positions bales in place on truckbed by pushing bales with next load	.71	.0355	.0355	.78	1	.78
3-bale clamp truck: Clamp truck operator places bales on truckbed, positions bales on truckbed by pushing bales with next load	.59	.0295	.0295	.65	1	.65
4-bale clamp truck: Clamp truck operator positions, places, and releases bales on truckbed; no pushing required by next load to position bales in place	.40	.0200	.0200	.44	1	.44
Platform-level loading, bales stacked on-head						
Manual and hand-truck method: 6-man crew: 5 hand truckers load bales on road truck; 1 man on road truck assists in offloading bales from hand trucks, positioning bales on truckbed, and holding bales in place	.87	.1305	.0435	1.04	6	6.24
Clamp-truck methods						
2-bale clamp truck loads bales on road truck, moving over tailgate to stack on truckbed	.74	.0370	.0370	.81	1	.81
2-bale clamp truck with 2-man crew: Clamp truck moves bales to stack on truckbed; 1 man positions and holds bales in place on truckbed	.71	.0355	.0355	.78	2	1.56
Setup and cleanup for loading bales in railroad cars						
Set up and remove bridgeplate						
Manual method, 2 men						
Set up bridgeplate	.03			.03		
Remove bridgeplate	.03			.03		
Total	.06			.06	2	.12
Industrial lift truck						
Set up bridgeplate	.02			.02		
Remove bridgeplate	.02			.02		
Total	.04			.04	2	.08

Table 15. --Productive time required to load 100 bales of cotton on road trucks and into railroad cars--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Setup and cleanup for loading bales in railroad cars--Continued						
Close car door						
Manual method, 2 men	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Ground level	.04			.04	2	.08
Car-floor-level platform	.04			.04	2	.08
Industrial lift truck						
Ground level	.03			.03	1	.03
Car-floor-level platform	.03			.03	1	.03
Set up and remove portable magnesium ramp, 1 man and industrial lift truck						
Set up ramp at car door	.06					
Remove ramp from car door	.05					
Hook ramp to lift truck	.01					
Unhook ramp from lift truck	.01					
Total	.13			.13	1	.13
Load bales into railroad cars						
Flat bales						
Ground-level loading						
Manual and hand-truck method: 10-man crew: 5 men on ground lift bales into car door; 1 hand trucker moves bales to stack in car for 1st tier; hand trucker and 4 men lift bale to 2nd tier and position it in stack	.95	.1900	.0475	1.15	10	11.50
Fork-truck method: 4-man crew: 1 fork-truck operator lifts bales from ground level to car door; 3 men unload bales from forks, move bales to stack by hand truck when loading 1st tier; the 3 men unload bales from forks and roll bales to place in stack and stand them on-head in 2nd tier	1.15	.1150	.0575	1.32	4	5.28
Clamp truck using portable magnesium ramp: 2-bale clamp truck moves bales over ramp through car door to stack in rail car	.32	.0160	.0160	.35	1	.35
Car-floor-level platform						
Manual and hand truck method: 6-man crew: Hand truckers remove bales from car door to stacks in car. 4 men working on car floor position bales in 1st tier, and then the 4 men on car floor and 2 men working on top of 1st tier lift and position bales in 2nd tier.	.97	.1455	.0485	1.16	6	6.96
Fork-truck method: 3-man crew: 1 man operates fork truck; 2 men assist in unloading bales from hand trucks in 1st tier, and unload and position bales from fork truck in 2nd tier	1.00	.1000	.0500	1.15	3	3.45
Clamp-truck method: 2-bale clamp truck moves bales from car door to stacks, and places and positions bales in stacks	.32	.0160	.0160	.35	1	.35
Compressed bales						
Ground-level loading						
Clamp trucks using magnesium ramps						
2-bale clamp truck	.32	.0160	.0160	.35	1	.35
3-bale clamp truck	.31	.0155	.0155	.34	1	.34

Table 15. --Productive time required to load 100 bales of cotton on road trucks and into railroad cars--Continued

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Load bales into railroad cars--Continued						
Compressed bales--Continued						
Car-floor-level platform						
Manual and hand-truck method:						
7-man crew: 5 men working on car floor unload hand trucks and position bales in 1st tier; the 5 men on car floor and 2 men working on top of 1st tier lift and position bales in 2nd tier	*Hours* .85	*Hours* .1275	*Hours* .0425	*Hours* 1.02	*Number* 7	*Man-hours* 7.14
Clamp-truck method						
2-bale clamp truck	.32	.0160	.0160	.35	1	.35
3-bale clamp truck	.31	.0155	.0155	.34	1	.34

Table 16--Productive time required to feed 100 bales of cotton to the dinky press

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Manual and hand-truck methods						
1-man crew: 1 man positions loaded hand truck beside dinky press platen; bale has been picked up from on-head position and moved 15 feet to dinky area; dinky press operator aids in placing bale in dinky press	*Hours* .20	*Hours* .0200	*Hours* .0100	*Hours* .23	*Number* 1	*Man-hours* .23
2-man crew: 1 man positions bale on ball side and assists in loading bale on hand truck; 1 hand trucker places bale in dinky press; bale is moved 15 feet to dinky press	.20	.0200	.0100	.23	2	.46
Clamp-truck method						
2-bale clamp truck positions bale in dinky press; bale has been positioned on ball side and clamps grab ends; 1 bale per trip; bale is moved 15 feet to dinky press	.31	.0155	.0155	.34	1	.34
Automatic dinky press feeder						
3-bale clamp truck with rotating clamp positions 3 bales in feeder chute; bales are moved 160 feet to dinky press feeder	.28	.0140	.0140	.31	1	.31

Table 17.--Productive time required to handle 100 bales of cotton from the compress with a hoist

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Hoist operation at compress						
Pick up compressed bales after compressing; 1 man attaches hooks to bale, operates lever on jib crane, and lifts bales	*Hours* .16	*Hours* .0160	*Hours* .0080	*Hours* .18	*Number* 1	*Man-hours* .18
Move bales manually with jib crane and set bales down						
Set bale down on hand truck; 1 man moves bale 10 feet by jib crane to hand truck, lowers bale onto hand truck, and removes hooks	.39	.0390	.0195	.45	1	.45
Set bale down on trailer; 1 man moves bale 15 feet by jib crane to trailer and releases bale onto trailer bed; 1 man assists in positioning bale onto trailer bed	.33	.0330	.0165	.38	2	.76
Set bale down at buck bar; 1 man moves bale 15 feet by jib crane to buck bar, lowers bale against buck bar, and removes hooks	.28	.0280	.0140	.32	1	.32

Table 18.--Productive time required for handling 100 bales with a fork truck

Element description	Time per 100 bales				Workers	Productive time per 100 bales
	Elapsed base time	Fatigue allowance	Personal allowance	Total elapsed time		
Fork-truck pickup						
Pick up bales on-head	*Hours*	*Hours*	*Hours*	*Hours*	*Number*	*Man-hours*
Fork-truck pickup, no help	.21	.0105	.0105	.23	1	.23
Fork-truck pickup, 1 loader positions bale on forks	.20	.0300	.0100	.24	2	.48
Fork-truck pickup, 2 loaders position bale on forks	.20	.0300	.0100	.24	3	.72
Pick up bales on flat side						
Fork-truck pickup, 1 loader pulls bale down on forks	.15	.0075	.0075	.16	2	.32
Fork-truck pickup, 2 loaders pull bale down on forks	.12	.0060	.0060	.13	3	.39
Pick up bales on ball side;						
Fork-truck pickup, 1 loader positions bale on forks	.15	.0075	.0075	.16	2	.32
Fork-truck setdown, including positioning bale						
1st tier, block or row						
Fork-truck setdown, no help	.31	.0155	.0155	.34	1	.34
Fork-truck setdown, 1 unloader	.26	.0130	.0130	.29	2	.58
Fork-truck setdown, 2 unloaders	.26	.0130	.0130	.29	3	.87
2nd tier in storage stack, road truck, or railroad car						
Fork-truck setdown, no help	.74	.0370	.0370	.81	1	.81
Fork-truck setdown, 1 unloader	.69	.0345	.0345	.76	2	1.52
Fork-truck setdown, 2 unloaders	.69	.0345	.0345	.76	3	2.28

Table 19.--Comparative labor and equipment costs for unloading 100 flat bales of cotton from railroad cars to a temporary block, car-floor-level platform, by 2 specified methods

Method	Workers	Elapsed time	Labor and equipment costs		
			Equipment	Labor	Total cost
Manual unloading:					
2 men break out bales in boxcar, 2 men transport bales 50 feet and store them in temporary block by hand truck	*Number* 4	*Man-hours* .84	*Dollars* .02	*Dollars* 3.36	*Dollars* 3.38
2-bale clamp truck:					
Unload boxcar, transport bales 50 feet, and store them in temporary block	1	.79	.95	.99	1.94

Table 20. --Labor required for a 4-man crew using hand trucks to unload and move 100 flat bales of cotton from railroad car to temporary block, car-floor-level platform[1]

Time item	Labor required	
Productive labor		
	Man-hours	*Man-hours*
Remove bales from car		1.68
Transport:		
Move bales 50 feet	.72	
Set bales down	.32	
Total transport		1.04
Total productive labor		2.72
Unproductive labor		
2 hand truckers wait on breakout men		.64
Total unproductive labor		.64
Total labor		3.36
Elapsed hours..... 0.84		

1/ Crew organization: 2 men break out bales of cotton stacked in car and place them in on-head position; 2 hand truckers move bales 50 feet to temporary storage block.

Table 21. --Labor required for 1 worker using 2-bale clamp truck to unload and move 100 flat bales of cotton from railroad car to temporary block, car-floor-level platform

Time item	Productive labor required
Productive labor	
	Man-hours
Remove bales from boxcar	.40
Move bales 50 feet	.34
Set bales down in temporary block	.05
Total labor	.79
Elapsed hours..... 0.79	

Table 22. --Comparative labor and equipment cost for unloading 100 compressed bales of cotton from railroad car to a temporary block, car-floor-level platform, by 2 specified methods

Method	Workers	Elapsed time	Equipment and labor cost		
			Equipment	Labor	Total cost
2-bale clamp truck:	*Number*	*Hours*	*Dollars*	*Dollars*	*Dollars*
Unload car, transport bales 50 feet and store them in temporary block	1	.81	.97	1.01	1.98
3-bale clamp truck:					
Unload car, transport bales 50 feet and store them in temporary block	1	.69	.93	.86	1.79

Table 23. --Labor required for 1 worker with 2-or 3-bale clamp truck to unload and move 100 compressed bales of cotton to temporary block from railroad car, car-floor-level platform

Time item	Productive labor required	
	2-bale clamp truck	3-bale clamp truck
	Man-hour	*Man-hour*
Remove bales from car	.41	.40
Move bales 50 feet	.34	.23
Set bales down in temporary block	.06	.06
Total	.81	.69
Elapsed hours	.81	.69

Table 24. --Comparative labor and equipment costs for unloading 100 flat bales of cotton from railroad cars at ground level to temporary block, by 3 specified methods

Time item	Workers	Elapsed time	Equipment labor and costs		
			Equipment	Labor	Total costs
Manual unloading	*Number*	*Hours*	*Dollars*	*Dollars*	*Dollars*
8-man crew: 2 men break out bales, then 1 hand trucker moves bales to car door and slides them to ground level; 2 men on ground position bales on-head; 4 hand truckers move bales 50 feet to temporary block	8	.84	.04	6.72	6.76
5-man crew: 2 men break out bales in car and hand truck them to car door, slide them to ground level; man on ground positions bales on-head, 2 hand truckers transport bales 50 feet to temporary block	5	.92	.03	4.60	4.63
2-bale clamp truck and portable ramp					
Unload car over ramp, transport bales 50 feet and store in temporary block	1	.79	1.18	.99	2.17

Table 25. --Labor required for a 4-man breakout crew and 4 hand truckers to unload and move 100 flat bales of cotton from railroad car to temporary block, at ground level[1]

Time item	Labor required	
Productive labor:	*Man-hours*	*Man-hours*
Remove bales from car		3.36
Transport:		
Pick up bales	.32	
Move bales 50 feet	.72	
Set bales down	.32	
Total transport		1.36
Total productive labor		4.72
Unproductive labor:		
4 hand truckers wait on breakout crew		2.00
Total unproductive labor		2.00
Total labor		6.72
Elapsed hours 0.84		

[1] Crew organization: 2 men break out bales in car, 1 man moves bale to car door by hand truck and slides bale out of door, 1 man on ground guides and positions bale on-head. Then 4 hand truckers move bales 50 feet to temporary block.

Table 26. --Labor required for a 3-man breakout crew and 2 hand truckers to unload and move 100 flat bales of cotton to temporary block from railroad car, at ground-level[1]

Time item	Labor required	
Productive labor	*Man-hours*	*Man-hours*
Remove bales from car		2.76
Transport:		
Pick up bale	.32	
Move 50 feet	.72	
Set down in temporary block	.32	
Total transport		1.36
Total productive labor		4.12
Unproductive labor		
2 hand truckers wait on breakout crew		.48
Total unproductive labor		.48
Total man-hours		4.60
Elapsed hours 0.92		

[1] Crew organization: 2 men break out bales in car, 1 breakout man moves bales to car door by hand truck and slides bale to ground level, 1 man on ground guides bale from car and positions it on-head; 2 hand truckers move bales 50 feet to temporary block.

Table 27.--Labor required for 1 worker with portable ramp and 2-bale clamp truck to unload and move 100 flat bales of cotton to temporary block from railroad car, at ground level

Time item	Productive labor required
	Man-hours
Remove bales	.40
Move bales 50 feet	.34
Set bales down in temporary block	.05
Total labor	.79
Elapsed hours[1]	0.79

[1] Time required to set up and remove magnesium ramp is .13 hour. This time should be added to the unloading time of .79, (making a total elapsed time of .92 hour), if a warehouseman includes setup and cleanup time in his costs.

Table 28.--Comparative labor and equipment costs for unloading 100 flat bales of cotton from a road truck and moving them to temporary block, truckbed-level platform, by 2 specified methods

Method	Workers	Elapsed time	Equipment and labor costs		
			Equipment	Labor	Total cost
Manual and hand-truck method	*Number*	*Hours*	*Dollars*	*Dollars*	*Dollars*
Unload truck, 2 men break out bales on truckbed, 2 hand truckers transport bales 50 feet to temporary block; truckbed-level platform, unload bales over truck tailgate...	4	.84	.02	3.36	3.38
2-bale clamp truck					
Unload truck, 1 breakout man positions bales for clamp truck; clamp truck transports bales 50 feet to temporary block; truckbed-level platform, truck parked parallel to platform	2	.77	.92	1.74	2.66

Table 29.--Labor required for a 4-man crew with 2-wheel hand trucks to unload 100 flat bales of cotton over tailgate of road truck, move bales 50 feet to temporary block, truckbed-level platform[1]

Time item	Labor required	Time item	Labor required
Productive labor	*Man-hours*	Unproductive labor	*Man-hours*
Remove bales	1.68	2 hand truckers wait on 2 breakout men	.64
Transport bales 50 feet	.72	Total unproductive labor	.64
Set bales down	.32		
Total productive labor	2.72	Total labor	3.36
		Elapsed hours .84	

[1] Crew organization: 2 men break out and position bales on-head, 2 hand truckers move bales to temporary block.

Table 30.--Labor required for 2 men with 2-bale clamp truck to unload 100 flat bales of cotton from road truck and move bales to temporary block, road truck parked parallel to truckbed-level platform[1]

Time item	Labor required	
Productive labor	*Man-hours*	*Man-hours*
Move bales to edge of truck		.44
Transport:		
Pick up bales	.38	
Move 50 feet	.34	
Set bales down in block	.05	
Total transport		.77
Total productive labor		1.21
Unproductive labor:		
Unloader on truck waits on clamp truck		.33
Total unproductive labor		.33
Total labor		1.54
Elapsed hours..... 0.77		

[1] Crew organization: 1 unloader positions bales at platform edge of truck for clamp truck pickup, 1 2-bale clamp truck removes bales from edge of truck and moves them 50 feet to temporary block.

Table 31.--Comparative labor and equipment costs for unloading 100 flat bales of cotton from road truck, at ground level, and moving them to temporary storage block, by 4 specified methods

Method	Workers	Elapsed time	Equipment and labor costs		
			Equipment	Labor	Total costs
Manual and hand-truck	*Number*	*Hours*	*Dollars*	*Dollars*	*Dollars*
1 worker pushes bales off truck; 1 worker positions bales on-head on ground; 2 hand truckers transport bales 50 feet to temporary block	4	.72	.01	2.88	2.89
2-bale clamp truck					
Unload bales from truck and transport them 50 feet to temporary block	1	.77	.92	.97	1.89
3-bale clamp truck					
Unload bales from truck and transport them 50 feet to temporary block	1	.61	.82	.77	1.59
4-bale clamp truck					
Unload bales from truck and transport them 50 feet to temporary block	1	.46	.83	.50	1.40

Table 32. --Labor required for 4-man crew to unload 100 flat bales of cotton from road truck and move to temporary block, ground-level unloading by manual and hand-truck method[1]

Time item	Labor required	
Productive time	*Man-hours*	*Man-hours*
Remove bales from truck		1.44
Transport:		
Pick up bales	.32	
Transport bales 50 feet	.72	
Set down bales	.32	
Total transport		1.36
Total productive labor		2.80
Unproductive time		
2 hand truckers wait on 2 unloaders		.08
Total unproductive labor		.08
Total labor		2.88
Elapsed hours	.72	

[1] Crew organization: 1 man on top of bales on road truck pushes bales off truck, and 1 setup man on ground guides bales to on-head position, 2 hand truckers move bales 50 feet to temporary block.

Table 33. --Labor required for 1 worker with 2-, 3-, or 4-bale clamp truck to unload 100 flat bales of cotton from road truck and move them to temporary block, ground level

Time item	Productive labor required		
	2-bale Clamp truck	3-bale Clamp truck	4-bale Clamp truck
	Man-hour	*Man-hour*	*Man-hour*
Remove bales from road truck	.38	.33	.30
Move bales 50 feet to temporary block	.34	.23	.10
Set down bales	.05	.05	.06
Total labor	.77	.61	.46
Elapsed hours	.77	.61	.46

Table 34. --Comparative labor and equipment costs for weighing flat bales of cotton, by 6 specified methods

Method	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total cost
Fixed-position scales[1]	*Number*	*Hours*	*Dollars*	*Dollars*	*Dollars*
Conventional stationary beam scale (5-man scale crew; 4 hand truckers)	9	.62	6.51	.06	6.57
Stationary floor dial scale (2-man scale crew; 4 hand truckers)	6	.46	3.45	.12	3.56
Portable platform dial scale (2-man scale crew; 4 hand truckers)	6	.46	3.45	.20	3.65
Mobile scales					
Hand-propelled mobile beam scale	5	.48	3.12	.03	3.15
Hand-propelled mobile beam scale with pneumatic hoist	4	.41	2.26	.04	2.30
Motor-propelled mobile beam scale (lift-truck mounted)[2]	3	.35	1.67	.38	2.05

[1] Data for fixed-position scales are based on an operation in which bales are first hand trucked from a temporary block 50 feet to the scale and then, after weighing, are trucked from the scale 50 feet to a second temporary block, and then 50 feet empty to original block.

[2] Not included in this method is the labor of a fourth worker who, independently of and prior to weighing, ties warehouse tags onto all bales. The elapsed time for tagging is .20 hours and the cost is $.0.20.

Table 35. --Labor required for a 9-man crew to weigh 100 flat bales of cotton with conventional stationary beam scale, where bales are moved by hand truck 50 feet from temporary block to scale, and after weighing are moved 50 feet to second temporary block[1]

Time item	Labor required	
Productive labor:	*Man-hours*	*Man-hours*
Transport:		
Pick up bales by hand truck at first temporary block	.32	
Move bales:		
40 feet to point behind waiting trucker at scale	.31	
10 feet to scale (lag time)	.19	
50 feet to second temporary block	.36	
Set down bales in second temporary block	.32	
Hand truckers return empty 50 feet to first block	.36	
Total transport		1.86
Weigh bales		2.15
Total productive labor		4.01
Unproductive labor:		
5-man scale crew wait on hand truckers (lag time)		.95
4 hand truckers wait on scale crew		.62
Total unproductive labor		1.57
Total labor		5.58
Elapsed hours 0.62		

[1] Crew organization: 4 hand truckers move bales to scale for weighing and from scale to second temporary block; hand truckers tie tags on bales during weighing period; 1 man attaches and releases hooks on 1 side of bale and calls old tag number; 1 man attaches and releases hooks on opposite side of bale; 1 man handles rope and lever to raise and lower bale; 1 man (weigher) "drops" warehouse tag on bale, handles poise and weighbeam, reads and calls out weight; and 1 man records weight and other information.

Table 36. --Labor required for 6-man crew to weigh 100 flat bales of cotton on a stationary or a portable platform dial scale, where bales are moved by hand truck 50 feet from temporary block to scale, and after weighing are moved 50 feet to second temporary block[1]

Time item	Labor required	
Productive labor	*Man-hours*	*Man-hours*
Transport:		
Pick up bales with hand truck at first temporary block	.32	
Move bales:		
50 feet to scale	.36	
50 feet to second temporary block	.36	
Set down bales in second block	.32	
Hand truckers return empty 50 feet to first block	.36	
Total transport		1.72
Weigh bales		.92
Total productive labor		2.64
Unproductive labor		
4 hand truckers wait on scale crew		.12
Total unproductive labor		.12
Total labor		2.76
Elapsed hours	.46	

[1] Crew organization: 4 hand truckers move bales to scale and then to second temporary block; 1 man (weigher) reads and records weight, and records other information; 1 man "drops" warehouse tags on bales, calls bale tag numbers and other information.

Table 37. --Labor required for 3 different sizes of crews, using 3 different pieces of equipment, to weigh 100 bales of flat cotton positioned on-head in rows

Time item	Productive labor required		
	5-man crew, hand-propelled beam scale[1]	4-man crew, hand-propelled beam scale and air hoist[2]	3-man crew, motor-propelled beam scale[3]
	Man-hours	*Man-Hours*	*Man-hours*
Move scale and weigh bales	2.40	1.64	1.05
Elapsed hours	.48	.41	.35 .20[4]

[1] Crew organization: 2 men move scale, attach and release hooks, call out old tag numbers and tie on new tags; 1 man handles rope and lever to raise and lower bale; 1 man (weigher) handles poise and weighbeam, weighs bale and calls out weight; and 1 man records weight and other information.

[2] Crew organization: 2 men move scale, attach and release hooks, call out old tag numbers, and tie on new tags; 1 man (weigher) operates lever of pneumatic hoist to raise and lower bale, handles poise and weighbeam, weighs bale and calls out weight; and 1 man records weight and other information.

[3] Crew organization: 1 man operates lift truck; 1 man (weigher) attaches and releases hooks on 1 side of bale, weighs bale and calls out weights, and old tag number; 1 man attaches and releases hooks on opposite side of bale, and records weight and other information.

[4] One man works independently of and prior to weighing, ties warehouse tags on all bales. He may or may not be a member of the weighing crew, but his time (.20 hour) for tying on tags should be included as part of the time for weighing bales.

Table 38. --Comparative labor and equipment costs for stacking 100 flat bales of cotton in 5-high cordwood stacks by 4 specified methods, where bales are moved 50 feet from temporary block to stacking point

Method	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total cost
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
Manual and hand-truck					
1 hand trucker					
9 stackers	10	5.21	52.10	.05	52.15
Boom truck and hand truck					
1 boom-truck operator					
2 hand truckers					
2 stackers	5	.64	3.36	.91	4.27
2-bale clamp truck	1	1.65	2.06	1.98	4.04
3-bale clamp truck	1	1.08	1.35	1.46	2.81

Table 39. --Labor required for a 9-man stacking crew and 1 hand trucker to stack by hand 100 flat bales of cotton in 5-high cordwood stacks[1]

Time item	Labor required	
Productive labor:	*Man-hours*	*Man-hours*
Transport bales:		
Hand truck pickup at temporary block	.32	
Move bales 50 feet to storage stock	.72	
Set down bales	.32	
Total transport		1.36
9 stackers store bales in 5-high cordwood stacks		46.89
Total productive labor		48.25
Unproductive labor:		
1 hand trucker waits on 9 stackers		3.85
Total unproductive labor		3.85
Total labor		52.10
Elapsed hours 5.21		

[1] Crew organization: 1 hand trucker picks up bales from temporary block and moves them 50 feet to cordwood stack; then 9 stackers lift and place bales in 5-high cordwood stacks.

Table 40. --Labor required for 3-man stacking crew and 2 hand truckers to move and stack 100 flat bales of cotton in 5-high cordwood stack with hand truck and boom truck[1]

Time item	Labor required	
Productive labor		
Transport:	*Man-hours*	*Man-hours*
2 hand truckers pick up bales in temporary block	.32	
Move bales 50 feet to storage stacks	.72	
Set bales down on flat side	.21	
Total transport		1.25
3-man crew stores bales in 5-high cordwood stack with a boom truck		1.92
Total productive labor		3.17
Unproductive labor		
2 hand truckers wait on 3-man stacking crew		.03
Total unproductive labor		.03
Total labor		3.20
Elapsed hours	0.64	

[1] Crew organization: 2 hand truckers move bale 50 feet from temporary block to storage stack; 2 stackers and 1 operator, using boom truck, stack bales in 1st, 2nd, and 3rd tiers, then 1 stacker works on top of bales for stacking of 4th and 5th tiers.

Table 41. --Labor required for 1 man with 2-bale clamp truck to move and stack 100 flat bales of cotton in 5-high cordwood stack[1]

Time item	Productive labor required
	Man-hours
Position bales on floor on flat side in horizontal position, place in 2-high stacks pick up stacks	1.11
Move bales 50 feet	.27
Set bales down in 5-high cordwood stacks	.27
Total labor	1.65
Elapsed hours	1.65

[1] Crew organization: 1 worker using a 2-bale clamp truck positions bales on flat side on floor, stacks 80 bales on flat side in 40 temporary stacks 2-bales high, and 20 bales on flat sides, 1-high. Picks up the temporary stacks, moves them 50 feet, and sets bales down in 5-high cordwood stacks.

Table 42. --Labor required for 1 man with 3-bale clamp truck to move and store 100 flat bales of cotton in 5-high cordwood stack[1]

Time item	Productive labor required
Position bales on floor on flat side in horizontal position, place in 2- and 3-high stacks and pickup stacks	.66
Move bales 50 feet	.23
Set bales down in 5-high cordwood stacks	.19
Total labor	1.08
Elapsed hours	1.08

[1] Crew organization: 1 worker using a 3-bale clamp truck positions bales on flat side on floor, stacks 60 bales on flat side in 20 temporary stacks of 3 bales high, and 40 bales on flat side 2-high. Picks up the temporary stacks, moves them 50 feet, and sets bales down in 5-high cordwood stacks.

Table 43. --Comparative labor and equipment costs for stacking 100 compressed bales of cotton in 5-high cordwood stacks by 3 specified methods

Method	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total cost
Boom truck and hand truck					
Bales are moved 50 feet by hand truck from temporary block to boom truck beside stack; 1 boom-truck operator, 2 stackers, 2 hand truckers	*Number* 5	*Hours* .66	*Dollars* 3.47	*Dollars* .94	*Dollars* 4.41
2-bale clamp truck					
Clamp truck moves bales 50 feet from temporary block and places them in storage stacks.	1	.87	1.09	1.04	2.13
3-bale clamp truck					
Clamp truck moves bales 50 feet from temporary block and places them in storage stacks.	1	.69	.86	.93	1.79

Table 44. --Labor required for a 3-man stacking crew and 2 hand truckers to stack 100 compressed bales of cotton into 5-high cordwood stacks using 2 hand trucks and a boom truck[1]

Time item	Labor required	
Productive labor:		
Transport:	*Man-hours*	*Man-hours*
2 hand truckers pick up bales in temporary block	.33	
Move bales 50 feet to boom truck	.72	
Bales set down on flat sides by hand trucks and boom truck	.18	
Total transport		1.23
Stack bales in 5-high cordwood stack		1.98
Total productive labor		3.21
Unproductive labor:		
2 hand truckers wait on stacking crew		.09
Total unproductive labor		.09
Total labor		3.30
Elapsed hours	.66	

[1] Crew organization: 2 hand truckers move bales 50 feet from temporary block to boom truck, Bales are placed in 5-high cordwood stack by boom truck. The 2 hookmen work at floor level in stacking 1st, 2nd, and 3rd tiers; 1 hookman works on top of bales and 1 hookman works at floor level when stacking 4th and 5th tiers.

Table 45. --Labor required for 1 worker with 2-bale or 3-bale clamp truck to stack 100 compressed bales of cotton in 5-high cordwood stacks

Time item	Productive labor required	
	2-bale clamp truck	3-bale clamp truck
	Man-hours	*Man-hours*
Position and pick up bales in horizontal position	.24	.22
Move bales 50 feet	.34	.23
Stack bales in 5-high cordwood stack	.29	.24
Total	.87	.69
Elapsed hours	.87	.69

Table 46. --Comparative labor and equipment costs for storing 100 flat bales of cotton on-head 1 high by 5 specified methods, when bales are transported 400 feet to storage

Method	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total cost
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
Hand truck	1	8.60	8.60	.09	8.69
2-bale clamp truck	1	1.20	1.50	1.44	2.94
3-bale clamp truck	1	.85	1.06	1.15	2.21
4-bale clamp truck	1	.46	.57	.83	1.40
6-bale clamp truck	1	.33	.41	.74	1.15

Table 47.--Labor required for 1 worker with a hand truck or 2-, 3-, 4-, or 6-bale clamp truck to move and store 100 flat bales of cotton on-head 1-high, when bales are transported 400 feet to storage

Time item	Productive labor required				
	Hand truck	2-bale clamp truck	3-bale clamp truck	4-bale clamp truck	6-bale clamp truck
	Man-hours	*Man-hours*	*Man-hours*	*Man-hours*	*Man-hours*
Pick up bales	.32	.06	.07	.09	.10
Move bales 400 feet	7.96	1.09	.73	.31	.17
Set bales down in storage block	.32	.05	.05	.06	.06
Total	8.60	1.20	.85	.46	.33
Elapsed hours	8.60	1.20	.85	.46	.33

Table 48.--Comparative labor and equipment costs for stacking 100 flat bales of cotton on-head 2-high by 4 specified methods, when bales are transported 400 feet to storage

Method	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total cost
Manual and hand-truck	*Number*	*Hours*	*Dollars*	*Dollars*	*Dollars*
6 hand truckers, 6 stackers	12	1.43	17.18	.09	17.27
2-bale clamp truck	1	1.26	1.57	1.51	3.08
3-bale clamp truck	1	.93	1.16	1.25	2.41
4-bale clamp truck	1	.52	.65	.94	1.59

Table 49.--Labor required for a 12-man crew to hand truck 100 flat bales of cotton and manually stack them on-head 2-high, when bales are transported 400 feet to storage[1]

Time item	Labor required	
Productive labor		
Transport:	*Man-hours*	*Man-hours*
6 hand truckers pick up bales in temporary block	.32	
Move bales 400 feet to storage stack	7.96	
Set down bales	.32	
Total transport		8.60
6 workers stack bales on-head 2-high		8.16
Total productive labor		16.76
Unproductive labor		
6 stackers wait on 6 hand truckers		.42
Total unproductive labor		.42
Total labor		17.18
Elapsed hours	1.43	

[1] Crew organization: 6 hand truckers move bales 400 feet from temporary block to stack and set bales down in 1st tier; for 2nd tier stacking, 6 men (2 on top of stack, 4 on floor) lift bale manually to 2nd tier.

Table 50.--Labor required for 1 worker with a 2-, 3-, or 4-bale clamp truck to move and store 100 flat bales of cotton on-head 2-high, where bales are transported 400 feet to storage.

Time item	Productive labor required		
	2-bale clamp truck	3-bale clamp truck	4-bale clamp truck
	Man-hours	*Man-hours*	*Man-hours*
Pick up bales	.06	.07	.09
Move bales 400 feet	1.09	.75	.31
Set bales down in storage stacks	.11	.11	.12
Total	1.26	.93	.52
Elapsed hours	1.26	.93	.52

Table 51.--Comparative labor and equipment costs for stacking 100 flat bales of cotton on-head 3-high by 3 specified methods when bales are transported 400 feet to storage

Method	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total cost
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
2-bale clamp truck	1	1.32	1.65	1.58	3.23
3-bale clamp truck	1	.97	1.21	1.31	2.52
4-bale clamp truck	1	.59	.74	1.06	1.80

Table 52.--Labor required for 1 worker with 2-, 3-, or 4-bale clamp truck to move and stack 100 flat bales of cotton on-head 3-high, when bales are transported 400 feet to storage

Time item	Productive labor required		
	2-bale clamp truck	3-bale clamp truck	4-bale clamp truck
	Man-hours	*Man-hours*	*Man-hours*
Pick up bales	.06	.07	.09
Move bales 400 feet	1.09	.73	.31
Set bales down in storage stacks on-head 3-high	.17	.17	.19
Total	1.32	.97	.59
Elapsed hours	1.32	.97	.59

Table 53.--Comparative labor and equipment costs for breaking out by 2 specified methods 100 flat bales of cotton stacked in 5-high cordwood stacks

Method	Workers	Elapsed time	Equipment and labor costs		
			Equipment	Labor	Total cost
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
Manual and hand-truck breakout: 1 hand truck and 6-man breakout crew	7	7.18	.07	50.26	50.33
Boom-truck and hand-truck breakout: 1 boom-truck operator, 1 hookman, and 1 hand trucker	3	4.80	6.77	15.60	22.37

Table 54. --Labor required for a 7-man crew with hand trucks to break out 100 flat bales of cotton from 5-high cordwood stack manually, and move bales to temporary storage block in main aisle[1]

Time item	Labor required	
Productive labor:	*Man-hours*	*Man-hours*
6-man crew break out bales from 5-high cordwood stack		43.08
Transportation:		
Hand trucker picks up desired bales in cross aisle	0.32	
Moves bales 50 feet to temporary block in main aisle	.72	
Sets bales down in temporary block	.32	
Total transport		1.36
Total productive labor		44.44
Unproductive labor:		
1 hand trucker waits on 6-man breakout crew		5.82
Total unproductive labor		5.82
Total labor		50.26
Elapsed hours	7.18	

[1] Crew organization: 2 breakout men at floor level and 4 men working on top of stack move obstructing bales aside and break out desired bales, then 6 men lower and position desired bales on-head in cross aisle; 1 hand trucker moves bale to temporary block in main aisle and waits while 6 men break out the next desired bale.

Table 55. --Labor required for 3-man crew with 1 boom truck and 1 hand truck to break out 100 flat bales of cotton from 5-high cordwood stack[1]

Time item	Labor required	
Productive labor:	*Man-hours*	*Man-hours*
2 men on boom truck break out bales		8.92
Set bales on head in cross aisle		.68
Transportation:		
1 hand trucker picks up bales in cross aisle	0.32	
Moves bales 50 feet to temporary block in main aisle	.72	
Sets bales down in temporary block	.32	
Total transport		1.36
Total productive labor		10.96
Unproductive labor		
1 hand trucker waits on breakout crew		3.44
Total unproductive labor		3.44
Total labor		14.40
Elapsed hours	4.80	

[1] Crew organization: 1 hookman and 1 boom truck-operator move obstructing bales to break out desired bales in 5-high cordwood stack. Desired bales are lowered to floor and placed on-head in cross aisle; 1 hand trucker moves empty hand truck 50 feet from temporary block in main aisle to desired bale in cross aisle, loads bale on hand truck, returns 50 feet to temporary block, and sets bale down. Hand trucker waits in main aisle while breakout crew works.

Table 56. --Comparative labor and equipment costs for breaking out by 5 specified methods, 100 flat bales of cotton stacked on-head

Methods	Workers	Elapsed time	Labor and equipment costs		
			Labor	Equipment	Total costs
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
Manually break out flat bales from solid blocks by lifting and rolling over top of other bales to main aisle	7	5.64	39.48	---	39.48
Hand-truck breakout of flat bales in solid blocks	1	23.14	23.14	0.23	23.37
Hand-truck breakout of flat bales stacked 2-high on-head in rows 2 bales wide, 3 breakout men and 1 hand trucker	4	4.25	17.00	.04	17.04
Breakout device on lift truck when flat bales are stacked 2 high on-head in rows 2 bales wide	1	1.37	1.71	1.58	3.29
Breakout device on lift truck when flat bales are stacked 3 high on-head in rows 2 bales wide	1	1.51	1.89	1.73	3.62

Table 57. --Labor required for a 7-man crew to break out manually 100 flat bales of cotton from solid block stacked on-head 1 high; bales lifted and rolled over top of bales to main aisle, lowered to floor level, and set on-head[1]

Time item	Labor required
Productive labor	
	Man-hours
Remove bale from stack	22.80
Roll bale to aisle, 30 feet	3.22
Set bale on head	.69
Total productive labor	26.71
Unproductive labor	
4 men wait while 2 men roll bale to aisle and return to next bale	7.36
1 man waits for bale in main aisle while 6 breakout men work	5.41
Total unproductive labor	12.77
Total labor	39.48

Elapsed time..... 5.64 hours

[1] Crew organization: 6 men lift bale out of storage place and then 4 men move to next bale while 2 men roll bale over top of stacked bales to aisle, lower and position bale on-head; 1 setdown man at floor level assists in positioning bale on-head in aisle; 1 setdown man waits while breakout crew removes bales from stack and moves them to aisle.

Table 58. --Labor required for a 4-man crew to break out manually 100 flat bales of cotton (bales stacked on-head 2 high in rows 2 bales wide with a 5-foot cross aisle) and move them by hand truck 40 feet to temporary block in main aisle[1]

Time item	Labor required	
Productive labor:		
	Man-hours	*Man-hours*
Manually break out bales from stacks		12.75
Transportation:		
Pick up bales by hand truck	32	
Move bales 40 feet to main aisle	.63	
Set bales down in temporary block	.32	
Total transport		1.27
Total productive labor		14.02
Unproductive labor:		
1 hand trucker waits on break out crew		2.98
Total unproductive labor		2.98
Total labor		17.00
Elapsed hours	4.25	

[1] Crew organization: 1 man on top of bales and 2 men working at floor level break out and lower bales to cross aisle, then 1 hand trucker moves bales to temporary block in main aisle.

Table 59. --Labor required for 1 worker with an industrial lift truck equipped with a breakout device to break out 100 flat bales of cotton stacked 2 and 3 high on-head

Time item	Productive labor required	
	2-high stacks	3-high stacks
	Man-hours	*Man-hours*
Break out bales	.60	.74
Move bales 40 feet to main aisle	.62	.62
Set bales down in temporary block	.15	.15
Total labor	1.37	1.51
Elapsed hours	1.37	1.51

Table 60. --Comparative labor and equipment costs for breaking out by 2 specified methods, 100 compressed bales of cotton stored on-head in solid blocks

Method	Workers	Elapsed time	Equipment and labor costs		
			Equipment	Labor	Total costs
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
Hand truck breaks out bales	1	8.83	.09	8.83	8.92
Breakout device on lift truck breaks out bales.	1	1.37	1.58	1.71	3.29

Table 61. --Labor required for 1 worker with breakout attachment on industrial lift truck to break out and move 100 compressed bales of cotton 40 feet to main aisle from a 1-high on-head stack 5 bales deep.

Time item	Productive labor required
	Man-hours
Break out 100 desired bales	.54
Move bales 40 feet to temporary block in main aisle	.68
Set bale down in temporary block	.15
Total labor	1.37
Elapsed hours 1.37	

Table 62. --Comparative labor and equipment costs for loading 100 flat bales of cotton into railroad cars, car-floor-level platform, by 2 specified methods

Method	Workers	Elapsed time	Labor and equipment costs		
			Labor	Equipment	Total costs
Manual and hand-truck loading:					
Bales transported 50 feet from temporary block to car door by 2 hand truckers; 6 men stack bales in 2 tiers in car	*Number* 8	*Hours* 1.16	*Dollar* 9.28	*Dollar* .02	*Dollars* 9.30
2-bale clamp truck:					
Bales transported 50 feet from temporary block to car, and loaded in car	1	.75	.94	.90	1.84

Table 63.--Labor required for a 6-man loading crew and 2 hand truckers to load 100 flat bales of cotton into railroad car by hand truck, car-door-level platform[1]

Time item	Labor required	
Productive labor		
Transport:	*Man-hours*	*Man-hours*
Pick up bales in temporary block	.32	
Move bales 50 feet to car	.72	
Set bale down in car	.32	
Total transport		1.36
Load bales in car		6.96
Total productive labor		8.32
Unproductive labor		
2 hand truckers wait on 6 loaders in car		.96
Total unproductive labor		.96
Total labor		9.28
Elapsed hours	1.16	

[1] Crew organization: 2 hand truckers pick up and move bales 50 feet from temporary block into car and set bales down. Then 6 men position bales in 1st tier, also lift and place bales in 2nd tier.

Table 64.--Labor required for 1 worker with 2-bale clamp truck to load 100 flat bales of cotton into railroad car; car-floor-level platform

Time item	Productive labor required
	Man-hours
Pick up bales in a temporary block	.06
Move bales 50 feet	.34
Load bales into car	.35
Total labor	.75
Elapsed hours	0.75

Table 65. --Comparative labor and equipment costs for loading 100 compressed bales of cotton into railroad cars, by 4 specified methods

Methods	Workers	Elapsed time	Labor and equipment cost		
			Labor	Equipment	Total costs
Manual and hand-truck loading: 2 hand truckers transport bales 50 feet from temporary block to car; car-floor-level platform; 7 men load bales in car.....	*Number* 9	*Hours* 1.02	*Dollars* 9.18	*Dollars* .02	*Dollars* 9.20
2-bale clamp truck: Bales transported 50 feet from temporary block to car door; car-floor-level platform..	1	.77	.96	.93	1.89
3-bale clamp truck: Bales transported 50 feet from temporary block to car; car-floor-level platform.....	1	.66	.83	.89	1.72
2-bale clamp truck over magnesium ramp: Bales transported 50 feet from temporary block to car floor; ground-level platform....	1	.77	.96	1.16	2.12

Table 66. --Labor required for 9-man crew to load 100 compressed bales of cotton into railroad car using manual and hand-truck method, car-floor-level platform[1]

Time item	Labor required	
Productive labor	*Man-hours*	*Man-hours*
7 men load bales in car.....		7.14
Transport		
2 hand truckers pick up bales in temporary block.....	.33	
Move bales 50 feet to car.....	.72	
Set bales down in car.....	.35	
Total transport.....		1.40
Total productive labor.....		8.54
Unproductive labor		
2 hand truckers wait at car on 6 loaders.....		.64
Total unproductive labor.....		.64
Total labor.....		9.18
Elapsed hours..... 1.02		

[1] Crew organization: 2 hand truckers move bales 50 feet to car and position on-head in 1st tier; then hand truckers move bales to car and unload in on-head position, 7 men lift and position bales in 2nd tier.

Table 67. --Labor required for 1 worker with a 2-, 3-, or 4-bale clamp truck to load 100 compressed bales of cotton into railroad car, car-floor-level platform

Time item	Productive labor required		
	2-bale clamp truck	3-bale clamp truck	4-bale clamp truck
	Man-hours	*Man-hours*	*Man-hours*
Pick up bales at temporary block	.08	.09	.08
Move bales 50 feet to car	.34	.23	.34
Load bales in car	.35	.34	.35
Total labor	.77	.66	.77
Elapsed hours	.77	.66	.77 [1]

[1] Time required to set up and remove magnesium ramp is 0.13 hour. This time should be added to the unloading time of 0.77 hour for a total of 0.90 hour, if warehouseman includes setup and cleanup time in his costs.

Table 68. --Comparative labor and equipment costs for loading 100 flat bales of cotton into railroad cars from ground level, by 2 specified methods

Method	Workers	Elapsed time	Labor and equipment costs		
			Labor	Equipment	Total cost
Manual and hand-truck loading:					
Bales transported 50 feet to car by hand truckers, lifted into and positioned in car manually; 3 hand truckers, 10 men lift bales.	*Number* 13	*Hours* 1.18	*Dollars* 15.34	*Dollars* .03	*Dollars* 15.37
2-bale clamp over magnesium ramp:					
Clamp truck transports bales 50 feet to car and over ramp into car	1	.75	.94	1.12	2.06

Table 69. --Labor required for a 13-man crew to load 100 flat bales of cotton into railroad car from ground level, by manual lift-up method[1]

Time item	Labor required	
Productive labor		
Transport	*Man-hours*	*Man-hours*
Pick up bales by hand truck at temporary block	.32	
Move bales 50 feet to point below car door	.72	
Set bales down on ground	.32	
Total transport		1.36
Lift and load bales into car		12.98
Total productive labor		14.34
Unproductive labor		
2 hand truckers on ground wait on loaders		1.00
Total unproductive labor		1.00
Total labor		15.34
Elapsed hours	1.18	

[1] Crew organization: 7 men work on ground and 6 work inside car. On ground, 2 hand truckers move bales 50 feet from temporary block to point below car door; here 5 men, assisted by 2 men working inside car, lift bales into car. Inside car, 1 hand trucker sets bales in first tier; all 6 men in car lift bales to top tier, and all but the hand trucker work in positioning them.

Table 70.--Labor required for 1 man with 2-bale clamp truck to load 100 flat bales of cotton into railroad car from ground level, using portable magnesium ramp

Time item	Productive labor required
	Man-hours
Pick up bales in temporary block	.06
Move bales 50 feet on ground and over ramp into car	.34
Load bales in car	.35
Total hours	.75
Elapsed hours 0.75	

Table 71.--Comparative labor and equipment costs for loading 100 flat bales of cotton onto road trucks, truckbed-level platform, by 2 specified methods

Method	Workers	Elapsed time	Labor equipment and costs		
			Labor	Equipment	Total cost
Manual and hand-truck loading: Bales transported 50 feet from temporary block onto road truck; 2 hand truckers set bales down in 1st tier; 6 men lift bales to 2nd tier	*Number* 8	*Hours* 0.83	*Dollars* 6.64	*Dollars* .02	*Dollars* 6.66
2-bale clamp-truck and hand-truck loading: Bales transported by clamp truck 50 feet to tailgate of road truck from temporary block; 2 hand truckers position bales on road truckbed	3	.75	2.44	.91	3.35

Table 72.--Labor required for 8-man crew with 2 hand trucks to load road truck with 100 flat bales of cotton, truckbed-level platform; bales stacked on-head in 1st tier, on flat side in 2nd tier on road truck[1]

Time item	Labor required	
Productive labor	*Man-hours*	*Man-hours*
Load bales on road truck		4.98
Transport		
Pick up bales	0.32	
Move bales 50 feet	.72	
Set bales down	.32	
Total transport		1.36
Total productive labor		6.34
Unproductive labor		
2 hand truckers wait on loaders		.30
Total unproductive labor		.30
Total labor		6.64
Elapsed hours 0.83		

[1] Crew organization: 2 hand truckers move bales 50 feet from temporary storage block onto road truckbed, setting bales down in 1st tier; 4 men working on truckbed lift and 2 men on top of bales pull 2nd tier bales into place.

Table 73.--Labor required for 3-man crew with 2-bale clamp truck and hand truck to load 100 flat bales of cotton onto road truck, truckbed-level platform; bales stacked in on-head position, loading over tailgate of road truck[1]

Time item	Labor required	
Productive labor		
Transport	*Man-hours*	*Man-hours*
Pick up bales in temporary block	.06	
Move bales 50 feet to tailgate of truck	.34	
Set bales down on tailgate	.05	
Total transport		.45
Load bales on truck, 1 hand trucker and 1 pulldown man		1.50
Total productive labor		1.95
Unproductive labor		
1 man on clamp truck waits on loading crew		.30
Total unproductive labor		.30
Total labor		2.25
Elapsed hours 0.75		

[1] Crew organization: 2-bale clamp truck picks up and moves bales 50 feet from temporary block and sets bales down on road truck tailgate; 1 hand trucker moves bales into position on truckbed; 1 pulldown man on truckbed assists in loading bales on hand truck and in positioning bales on truck.

Table 74.--Comparative labor and equipment costs for loading 100 flat bales of cotton onto road trucks from ground level, by 5 specified methods

Method	Workers	Elapsed time	Labor and equipment costs		
			Labor	Equipment	Total cost
Manual and hand-truck loading: 1 hand trucker transports bales 50 feet from temporary block to side of road truck, 5 men on ground lift bales to truckbed; 2 men on truck position bales	*Number* 8	*Hours* 1.38	*Dollars* 11.04	*Dollars* 0.01	*Dollars* 11.05
2-bale clamp truck Transports bales 50 feet from temporary block and loads them onto truck	1	0.97	1.21	1.16	2.37
3-bale clamp truck Transports bales 50 feet from temporary block and loads them onto truck	1	.77	.96	1.04	2.00
4-bale clamp truck Transports bales 50 feet from temporary block and loads them onto truck	1	.65	.81	1.17	1.98

Table 75.--Labor required for an 8-man crew to load manually 100 flat bales of cotton onto road truck from ground level; bales stacked on-head[1]

Time item	Labor required	
Productive labor		
Transport	*Man-hours*	*Man-hours*
Pick up bale	.32	
Move bale 50 feet to road truck	.72	
Set bale down	.32	
Total transport		1.36
Load bales on road truck		9.66
Total productive labor		11.02
Unproductive labor		
1 hand trucker waits on 7 loaders		.02
Total unproductive labor		.02
Total labor		11.04
Elapsed hours 1.38		

[1] Crew organization: 1 hand trucker moves bales 50 feet and sets them down by road truck; then 5 men on ground lift bales onto truckbed and 2 men on truckbed position bales.

Table 76.-- labor required for 1 worker with 2-, 3-, or 4-bale clamp truck to load 100 flat bales of cotton onto road truck at ground level

Time item	Productive labor required		
	2-bale clamp truck	3-bale clamp truck	4-bale clamp truck
	Man-hours	*Man-hours*	*Man-hours*
Pick up bales at temporary block	.06	.07	.10
Move bales 50 feet to road truck	.34	.23	.10
Load bales onto truckbed	.57	.47	.45
Total	.97	.77	.65
Elapsed hours	.97	.77	.65

Table 77.--Comparative labor and equipment costs for loading 100 compressed bales of cotton on-head onto road trucks from ground level, by 3 specified methods

Methods	Workers	Elapsed time	Equipment and labor costs		
			Equipment	Labor	Total costs
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
2-bale clamp truck:					
Bales transported 50 feet from temporary block	1	1.26	1.51	1.57	3.08
3-bale clamp truck:					
Bales transported 50 feet from temporary block	1	0.97	1.31	1.21	2.52
4-bale clamp truck:					
Bales transported 50 feet from temporary block	1	.64	1.15	.80	1.95

Table 78.--Labor required for 1 worker with a 2-, 3-, or 4-bale clamp truck to load 100 compressed bales of cotton onto road truck from ground level; bales stacked on-head on road truck.

Time items	Productive labor required		
	2-bale clamp truck	3-bale clamp truck	4-bale clamp truck
	Man-hours	*Man-hours*	*Man-hours*
Pick up bales in temporary block	.08	.09	.10
Move bales 50 feet to road truck	.24	.23	.10
Load and position bales on truck	.84	.65	.44
Total	1.26	.97	.64
Elapsed hours	1.26	.97	.64

Table 79.--Comparative labor and equipment costs for feeding bales to dinky press, by 4 specified methods

Methods	Workers	Elapsed time	Equipment and labor costs		
			Equipment	Labor	Total costs
	Number	*Hours*	*Dollars*	*Dollars*	*Dollars*
Manual and hand truck					
Bales on-head loaded on hand truck from temporary blocks; transported 15 feet to dinky press and fed from hand truck into press with aid of press worker	1	.98	.01	.98	.99
Bales loaded on hand truck on ball side; 1 pulldown man assists hand trucker in loading; bale transported to dinky press and unloaded.	2	.98	.01	1.96	1.97
2-bale clamp truck					
Bales positioned on ball side, picked up and transported 15 feet to dinky press, 1 bale per trip	1	.78	1.94	.98	1.92
3-bale clamp truck					
Bales moved 160 feet and fed to automatic dinky feeder; revolving clamp attachment used on clamp machine	1	.77	1.81	.96	2.77
2-bale clamp truck					
Bales moved 160 feet from segregating block to temporary block about 15 feet in front of dinky press	1	.70	.84	.88	1.72

Table 80.--Labor required for a 2-man crew to feed 100 flat bales of cotton into dinky press by hand truck, when bales are picked up on ball side from temporary block 15 feet from dinky press[1]

Time item	Labor required
Productive labor	*Man-hours*
Pull bales down on ball side at temporary block	.14
Pick up bales	.64
Move bales 15 feet	.43
Set bales down in dinky press	.23
Total productive labor	1.44
Unproductive labor	
1 pulldown man waits on hand trucker	.52
Total unproductive labor	.52
Total labor	1.96
Elapsed hours	0.98

[1] Crew organization: 1 pulldown man positions bales on ball side and assists in loading bales on hand truck, then 1 hand trucker moves bales to dinky press and unloads bales in dinky press.

Table 81.--Labor required for 1 worker with hand truck or 2- or 3-bale clamp truck to feed 100 bales of cotton into dinky press

Time item	Productive labor required		
	Hand truck[1]	2-bale clamp truck[2]	3-bale clamp truck and automatic dinky press feeder[3]
	Man-hours	*Man-hours*	*Man-hours*
Pick up bales from temporary block	.32	.13	.07
Move bales to press	.43	.31	.39
Set bales down at press	.23	.34	.31
Total	.98	.78	.77
Elapsed hours	.98	.78	.77

[1] One hand trucker loads bales onto hand truck, moves bales 15 feet to dinky press, and offloads them into press. He is assisted in offloading by 1 of the workers at press; this latter worker is member of dinky press crew, and his labor is not included as part of dinky press operation.

[2] Two-bale clamp truck picks up 1 bale, moves it 15 feet to dinky press, and places it into dinky press. Bale is placed in press with ball side down; clamps grab bale on ends.

[3] Three-bale clamp with rotating clamp attachment picks up 3 bales in segregated block, moves them 160 feet and places them, flat side down, in chute of automatic dinky press feeder.

Table 82.--Labor required for 1 worker with 2-bale clamp truck to move 100 flat bales of cotton, 2 bales per load, 160 feet from segregated block to temporary block at dinky press

Time item	Productive labor required
	Man-hours
Pick up bales from segregated block	.06
Move bales 160 feet	.59
Set bales down in temporary block at press	.05
Total	.70
Elapsed hours	0.70

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