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PROGRESS REPORT ON WOOL BALING

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Introduction

The acute shortage of package material has provided the incentive for investigations into the possibilities of baling commercial wool in the West. The Colorado Agricultural Experiment Station in conjunction with the Agricultural Marketing Administration, United States Department of Agriculture, and Merrion and Wilkins, Denver, Colo., has conducted preliminary baling trials. These trials were conducted during May, June, and July of 1942. A total of 10,283 pounds of grease wool was compressed into 22 bales with a cotton press at the Merrion and Wilkins warehouse in Denver, Colo. With a hay baler, 1,437 pounds of wool was baled at the Experiment Station at Fort Collins.

THE PROBLEM

The packaging of Australian, New Zealand, and English wools is described by Walker (1).

The fleece in Australia is first skirted; that is the removing from the body of the fleece all objectional sorts. These sorts consist of burs, green tags, and any stained or undesirable portions of the fleece. The sorted wools are thrown into bins allotted to the various sorts. The body of the fleece is rolled but not tied prior to baling.

Each of the various sorts is placed in the baler and compressed under high pressure. The bales of wool are 4 feet long and 3 feet square and average about 330 pounds in weight. The owner's name and the kind of wool is branded on the bale. When the clip is sold, two bales of wool are compressed to the size of one under a powerful hydraulic press. This process is called dumping.

The wool bales (the burlap used) weigh 11½ pounds and cost from $1.20 to $1.65 in 1927.

Wool baling in New Zealand is similar to that in Australia. The bales average about 400 pounds. The growers furnish the sacks or bales which weigh 11 pounds and cost $1.20 to $1.65 based on 1927 prices.

Wool baling in England differs from the baling in Australia and New Zealand in that the wool is not classed prior to baling and the fleece is tied prior to baling.

Coon and Crandell (2) review the possibilities of wool baling in the United States and report the results of baling 25,000 pounds of Texas grease wool into 46 bales.

The wool-baling tests were conducted at Stoneville, Miss., in the United States Ginning Laboratory. The bales were pressed on a Murray type low-density, single-ram, double-box cotton press. The Murray type machine may be described as follows: "It consists of two boxes mounted opposite each other on a round revolving turntable. A hydraulic ram compresses the wool into one box while the other is being filled. The ram presses vertically from under the box and gets its power from an oil pump below the press; the press may be operated by an electric or gasoline motor. When the bale is compressed to the desired density, the sides of the box are opened and the bale patterns, which have already been put in place to cover the sides and

ends of the bales, are adjusted and the bale ties are then put on. After the tying operation is completed, the ram is released, and the bale rolls out of the press. Engineers who worked on these tests observed that the ordinary cotton gin baling equipment was just as well or even better suited for baling wool than it was for cotton."

The conclusion reached is that the cotton gin presses are satisfactory for baling wool. A recent survey shows that there are more than 1,400 idle cotton gin presses in the South. The engineers at the United States Ginning Laboratory at Stoneville, Miss., estimate that 80 percent of these presses are suitable for wool baling. Coon (4) estimates that it costs approximately $1,600 to set up a cotton press in Colorado. This cost would probably be broken down into approximately $1,000 for the cost of a secondhand press, approximately $200 for freight costs and approximately $400 for installation costs. In many cases the cost of purchasing a secondhand press may be as low as $500. Several new types of presses are available at various manufacturing plants. The cost of the new presses installed is estimated at approximately $2,500.

Coon (4) recommends that the presses should be located in warehouses at concentration points where at least 300 or 400 thousand pounds of wool can be assembled, graded, and tagged. These concentration areas should be close to the production area and at points where good railroad facilities are available. It is not advisable to install presses at the shearing corral since wool pressed into bales of 19 pounds density should be graded and tagged prior to baling. The shortage of trained wool-graders prevents the grading of wool at the shearing corral.

Coon (4) suggests that wool be transported in canvas sheets from the shearing corral to the central press. Canvas, burlap, osnaburg, or other material about 7 feet square can be used to tie the wool into bundles. These bundles can be handled on wagons, trucks, or even railroad cars in transporting to the central press. The sheets can be used over and over again. This method is used in some South American countries.

Bales of wool weighing from 500 to 600 pounds and measuring 22 inches by 32 inches by 56 inches, with a density of 19 pounds per cubic foot were found to be most satisfactory.

Six different bale covers were used: Cotton cloth patterns; heavy paper; 12-ounce burlap; 14-ounce burlap; and heavy brown wrapping paper. The burlap covering was the most suitable. It was found that 40 to 50 percent less burlap was needed in baling than would have been required if the wool had been bagged. Very light weight burlap on the top and bottom of the bale and a heavy wrapping paper on the sides proved the most satisfactory bale pattern. The cotton coverings were not satisfactory because they frayed, allowing the cotton fibers to intermingle with the wool fibers. The paper coverings alone were not satisfactory because they burst when the bales were released from the baler.

Different bale ties were used, namely: Regular 1-inch-wide steel band, half-inch steel band specially adapted for cinching up tight, and baling wire of 14- and 15-gauge sizes. Drop tests of 14 feet favored the 15-gauge baling wire for 500 to 600-pound bales with a density of 19 pounds per cubic foot. The heavy steel bands were not necessary for bales of 500 to 600 pounds with density of 19 pounds per cubic foot but would have been necessary for bales weighing 700 to 1,000 pounds with density of 19 pounds per cubic foot.

The 25,600 pounds of wool compressed into 46 bales were shipped to Boston in a 40-foot railroad car formerly used for shipping automobiles. It would have been possible to put 40,000 to 50,000 pounds of wool in this car.

Inspection of the wool in Boston showed that the wool fibers were not injured; however, the fleeces did not appear as attractive as bagged wool.

PRELIMINARY TRIALS

A. Cotton-Press Baling

The wool in this study was compressed in an ordinary cotton press. The amount of wool baled was 10,283 pounds compressed into 15 bales. The bales varied in weight from 808 pounds to 469 pounds with an average weight of 686 pounds. Nine of the bales were fine wool, two bales were half-blood wool, three bales were three-eighths-blood wool, and one bale was quarter-blood wool.

The bales varied in thickness from 22 inches to 32 inches while in the press. The tied-out dimensions varied in length from 58 inches to 62 inches, in thickness from 30 inches to 39 inches, and in width from 28 inches to 30 inches. The density of the bales varied from 14.7 pounds per cubic foot to 22.6 pounds per cubic foot.

The kinds of ties used were 15-gauge baling wire, one-half inch steel band specially adapted for cinching up tight, and a wide steel band.

The package material consisted of 7½-pound burlap on 8 of the bales and 7½-pound burlap and a heavy, tough, commercially manufactured paper on seven bales.

The number of fleeces in some of the bales was: 123 fleeces of fine wool in a 789-pound bale; 87 fleeces of half-blood wool in a 638-pound bale; 85 fleeces of three-eighths-blood wool in a 663-pound bale; and 85 fleeces of quarter-blood wool in a 619-pound bale.

The amount of wool baled was limited because of mechanical difficulties and a shortage of labor for wool grading.

Conclusions

Fine wool was considerably easier to compress than coarse wool.

Bales weighing from 500 to 600 pounds were easier to bale and to handle than heavier bales. A density of 19 pounds per cubic foot did not injure the wool fibers and was easy to obtain with the cotton press.

Burlap can be saved by using burlap on the top and bottom of the bales and heavy, tough paper on the two sides. Burlap requirements can be reduced approximately 40 to 50 percent over the bagging method of packaging wool.

Shipping space may be reduced about 50 percent when the wool clip is baled as compared to the conventional method of bagging wool.

Special steel bands one-half inch wide proved to be the most desirable because they could be drawn up tight and would allow only a slight expansion when the bales were released from the press.

This method of baling wool offers definite possibilities.

B. Baling with Hay Baler

The wool in this study was compressed in an ordinary hay baler. The amount of wool baled was 171 pounds of half-blood wool and 835 pounds of fine wool compressed into seven bales.

The tied fleeces were fed into the baling chamber from the platform, one at a time. Enough fleeces were put through without tying to build up the proper pressure before a block was inserted. The number of fleeces per bale was varied from 12 to 17 in an attempt to establish the proper density.

The wire used for tying was 15-gauge baling wire 9 feet long. When too great a pressure or too many fleeces were put into the bale, the ties burst as the bale left the machine. The first bales that came out of the machine had a tendency to curl upward so much that they came out of the ties. After some investigation it was concluded that too much wool was forced into the bottom half of the bale by the foot feed. Removal of the foot feed solved this problem, and more uniformly packed and straighter bales were obtained.

The bales varied in weight from 121 pounds to 205 pounds with an average of 143.7 pounds per bale. The bales had a uniform width and depth, each bale measuring 14 inches in depth and 18 inches in width. The bales varied in length from 38 inches to 46 inches. The density ranged from 31.9 pounds per cubic foot to 18.7 pounds per cubic foot with an average of 23.8 pounds per cubic foot.

Three bales were packaged with burlap, two bales with heavy, tough paper, and one bale was not packaged. The bale which had no covering appeared very shabby upon its arrival in Boston and had picked up considerable dirt. (3) The two bales covered with burlap and paper arrived in a satisfactory condition but were awkward to handle with the whip-hoist. The bales covered with burlap arrived in the best condition.

The reaction of two large manufacturers was to favor bags over bales from a hay baler for packaging domestic wool. Fleeces packaged in bags were much easier to sort than fleeces packaged in these bales.

The preliminary trials with baling wool in a hay baler were not satisfactory; however, further trials should be made to give this method a fair trial.

CONCLUSIONS

Preliminary wool-baling trials indicate that wool can be baled satisfactorily with the cotton press, and with the use of burlap and paper, considerably less burlap will be needed to market the wool clip. The first trials with the hay baler were not very encouraging; however, further trials should be made with the hay baler before this possibility is discarded.

The perfection of the baler and the distribution of balers so that the wool grower has access to a baler present the major problems which have to be solved before wool baling can be practiced generally.

Discussions of packaging wool contribute to more care in preparing wool for market. The immediate problem is to begin wool baling as soon as possible so as to save packaging material and to conserve shipping space. The problem over a long-time period is improved packaging of wool for market through sorting of wool prior to packaging.

Literature Cited

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