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B593: Handling and Processing Broilers in Maine: Part II—Quality Losses in Live Broilers, and Methods of Handling to Reduce Bruising and to Improve Efficiency

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Handling and Processing Broilers in Maine

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SUMMARY

The purposes of this study were to devise methods of reducing quality losses, to improve labor efficiency, and to evaluate the economic significance of these methods.

Results of grade tests conducted on 11 lots of broilers in four processing plants revealed that 77.2 per cent of the birds were Grade A, 16.9 per cent Grade B, 5.7 per cent Grade C, and .2 per cent inedible. Flesh bruises were responsible for 56 per cent of the undergrades. Breast bruise was the most common type of injury.

Rough handling by the assembly crew was the main cause of bruising. Some general recommendations that crews might follow to reduce bruising are (1) remove feeders and waterers before catching begins, (2) make small drives of 200-300 birds, and (3) use more care in catching and handling the birds. Also greater interest in and supervision of the assembly operation by management of the dressing plant would be helpful in reducing quality losses.

In controlled matched-lot experiments three alternative methods of handling broilers were compared from the standpoint of bruising, shrink, and labor efficiency. Such factors as assembly crew, and breed, sex, and weight of the birds were held constant. The three methods tested were (1) coops, (2) coops and feeding batteries, and (3) double unit combination trucking-feeding crates with large doors. Two models of combination crates were tested—one had a solid bottom and the other had a wire mesh bottom.

There were 6.5 bruises per 100 birds in the combination crate with the solid bottom, 11.5 bruises in the combination crate with the wire bottom, 12.1 bruises in regular coops, and 19.1 bruises in coops and batteries. By eliminating the transfer of birds from coops to batteries bruising was reduced 36 per cent. The larger door on the combination crate reduced bruising 46 per cent in comparison to regular coops. There was no significant difference in yield among birds held overnight for feeding in combination crates and in feeding batteries.

Tests showed that man-hours expended per 1,000 birds on loading, unloading, hanging, and reloading empty crates were 3.84 with the combination crate, 6.64 with coops and 7.42 with coops and batteries. The combination crate was more efficient because birds were handled in larger units, transfer of birds from coops to batteries was eliminated, and larger doors facilitated packing and hanging.

A comparison of two methods of weighing birds indicated that there was an 85 per cent saving in labor when the birds were weighed on the truck with bulk scales instead of in coops or batteries on platform scales. The weighing operation with the bulk scale required .05 man-hour per 1,000 birds and with the platform scale .34 man-hour.

An evaluation of the economic significance of improved handling methods showed that a change from the coop and battery method of handling birds to dressing off-the-truck with the regular coop would result in about a 24 per cent reduction in dollar losses due to bruising. If the combination crate were to replace the regular coops there would be a 51 per cent reduction in dollars lost caused by bruising.

A poultry processor handling 10 million broilers a year would save approximately 26,880 man-hours if he converted from regular coops to the combination crate.

It would take about one and a half years for the savings from reduced bruising and labor costs to equal the investment cost for changing from regular coops to the combination crate.

A processor handling 40,000 birds per day might expect to save about $15 a day by changing from the platform scale method of weighing to the bulk scale method.

HANDLING AND PROCESSING BROILERS IN MAINE

Part II. Quality losses in live broilers, and methods of handling to reduce bruising and to improve efficiency.

LLOYD J. JEWETT AND RICHARD F. SAUNDERS[1]

INTRODUCTION

The time spent in getting broilers from the farm to the processing plant is a brief interval, yet it is during this period that most bruising occurs. Bruising lowers the quality of birds. This not only results in lower returns to the industry, but also results in higher costs to the consumer because of higher production and distribution costs. Low broiler prices, compulsory federal inspection and increasing competition for markets make it extremely important that broiler growers and processors give careful attention to the quality losses. It is commonly accepted by the broiler industry that advances have been made in growing meatier broilers on less feed and in less time, but at the same time the incidence of bruising has been on the increase.

Objectives

The objectives of this study were (1) to determine the cause, and amount of quality losses in broilers when they are moved from the farm to the plant, (2) to devise methods of reducing quality losses and improving labor efficiency and (3) to evaluate the economic significance of these methods.

Method and Scope of Study

The quality of 5,811 broilers from 11 lots in four processing plants was determined immediately after they were New York dressed. Birds were graded by the same graders and in accordance with Federal Grade Standards. The nature and location of quality defects in undergrade broilers were determined and related to collection and handling practices in moving broilers from the farm to the processing plant.

Eight matched-lot experiments designed to measure differences in bruising, dressing yield, and labor efficiency associated with three methods of handling broilers prior to dressing were conducted in two processing plants. Breed, sex, and average weight of the birds were held constant. Tests were conducted to determine the intensity of bruising associated with type of crate and handling method, length of haul, length of holding period, number of birds per cell and position of birds on the

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truck. Man-hour requirements of three handling methods were determined and compared.

BROILER QUALITY LOSSES DUE TO HANDLING

Grade Yields

Eleven lots of New York dressed broilers totaling 5,811 birds were graded in four plants. Seventy-seven per cent of the birds were grade A; 16.9 per cent, grade B; 5.7 per cent, grade C; and 0.2 per cent were inedible (table 1). Grade A quality in individual lots varied from 60 to 85 per cent.

TABLE 1. Grade Quality of New York Dressed Broilers
5,811 Birds, 11 Lots, 4 Processing Plants
April, August, November, and December, Maine, 1956

Quality*	Number of birds	Per cent of birds
A	4,486	77.2
B	983	16.9
C	329	5.7
Inedible	11	0.2
Total	5,811	100.0

* USDA Standard for Quality of Dressed and Ready-To-Cook Chickens (See USDA Information Bulletin No. 173).

Grade Defects

As indicated in the previous section 23 per cent of the broilers inspected were below grade A. Bruising was the major cause for birds being downgraded. Fifty-six per cent of the birds were grade B or below because of flesh bruises. Defects such as poor fleshing, breast blisters, broken bones, cuts and tears, and discoloration accounted for 8.5 per cent of the undergrades. Defects such as pin feathers, crooked breast, lack of fat covering, and bloat accounted for the remaining 1.6 per cent.

Sixty-eight per cent of the bruised broilers had breast bruises. Leg bruises were less common, occurring in 30 per cent of the bruised broilers. Two per cent of the bruised broilers had a combination of leg and breast bruises.

Causes of Bruising

Bruises are one of the most important quality defects to consider in eliminating losses in handling live broilers. By observing the handling of broilers from farm to plant and through the dressing operation, it was possible to determine the handling practices used and the causes of bruising.

There were several places that bruising occurred in the movement

TABLE 2. Grade Defects in New York Dressed Broilers*
1,325 Birds, 11 Lots, 4 Processing Plants
April, August, November, and December, Maine, 1956

Defect	No. of birds	Per cent	Range—Individual lots
Bruises			Per cent
Breast bruise	502	8.6	2.4 - 11.5
Leg bruise	227	3.9	2.5 - 5.6
Comb. leg and breast bruises	14	0.2	0 - 1.0
Total bruises	743	12.7	5.4 - 18.9
Other Defects			
Fleshing	161	2.8	
Breast blister	118	2.0	
Broken wing bone	77	1.3	
Cuts & tears	73	1.3	
Discoloration	66	1.1	
Bloat	16	0.3	
Fat covering	15	0.3	
Deformation	13	0.2	
Crooked breast bone	10	0.2	
Conformation	10	0.2	
Poor bleeding	3	0.1	
Combination of defects	20	0.3	
Total other defects	582	10.1	
TOTAL UNDERGRADES	1,325	22.8	5-40

* Broilers were handled in coops and batteries.

of live broilers from the farm to the processing plant. Catch pens were designed to handle about 200 birds, but usually nearer 400 birds were driven in. In the process of being driven the birds fell over feeders and waterers, and tended to pile up in corners of the house and in catch pens. To prevent smothering, the men would push their feet through the pile of birds in a very careless manner in order to scatter them. When birds were caught and carried or passed to the carrying crew they were often dropped over the tops of window sills. Birds were passed to the man on the truck who grabbed them around the thigh and put them in crates, six or seven at a time through an opening large enough for only one or two birds. If the birds didn't go into the crate easily, they were pushed in.

When birds arrived at the plant they were taken from the crates and put into batteries. On the unloading platform there was a man on each side of the battery, who took birds from the crate and literally threw them into the battery one at a time. Some went head first and some went in whatever position they happened to be in when they entered the opening in the battery.

Breast bruises, because of their frequent occurrence and because the breast is the most valuable part of the bird, were a serious problem in the processing plants studied. Rough handling by pick-up crews was the main cause for the large number of breast bruises.

Leg bruises, although not as numerous as breast bruises, were serious because of the discount these birds received on the market. Leg bruises were due mainly to the way birds were caught, carried, and

placed in crates. Many leg bruises may have been the result of either excessive thumb pressure when birds were picked up or from carrying too many birds at a time.

The whole operation was very fast but also very careless. The men handling birds had little regard for damage to the birds. The crew member's main concern was to beat a previous time record.

Also when birds were put in crates, transferred to holding batteries, and taken out again, a great many bruises of all types occurred. It would be incorrect to say that all bruising could be eliminated by more careful handling on the part of pick-up crews. In some instances, improper management practices during the growing period may be the cause of grade defects in broilers. Lack of adequate floor space might result in injuries and in low quality birds.

Reducing Bruising

If plants are to reduce quality losses through handling, they must begin with, and concentrate on, the assembly operation. Observations showed that an increase in the amount of supervision by the management of poultry processing plants, even to the point of employing one man for quality control, would be helpful in reducing quality losses. By sample grading each lot of broilers it would be possible for a processor to maintain quality control information on the extent and kind of undergrades running through his plant. Without such knowledge and records, it is difficult to trace the source of the defect and to make progress in correcting the problem.

Pick-up crew members should be taught how to handle birds and should be shown the results of careless handling before they start picking up birds at farms. After each man has become acquainted with the proper procedure of handling birds, he should be expected to follow this procedure. A bonus might be offered to pick-up crews for lots of birds that grade out according to a previously established standard. Some general recommendations are (1) see that feeders and waterers are removed from the pens before catching begins, (2) make small drives of 200 or 300 birds at a time, and (3) avoid kicking and throwing broilers. If a man is continually careless he should be penalized.

Poultry handlers interested in reducing bruising might want to consider using a different crate—a larger crate with a larger door, one with a round door, or one with more compartments, or some other advancement in design. Consideration might well be given to using roller conveyors and fork-lifts in the unloading operation. Unloading platforms should be on a level with the truck body so when crates are taken off the truck, they will less likely be dropped or jarred. Where hand un-

loading is practiced, it is preferable to have a long platform so that the side of the truck is against the platform. Such an arrangement allows more working area. The platform should preferably be under cover so that birds, as well as unloading crews, are protected from inclement weather.

The grower should be encouraged to see that his buildings and other facilities, as well as the birds, are ready when the pick-up crew arrives. He should (1) adapt his buildings to loading, (2) be present when the pick-up crew arrives, (3) see that feed hoppers and waterers are removed so that birds are not driven over them, (4) remove projections that are apt to injure broilers, (5) make smaller pens to reduce movement and help curb some of the bruising, and (6) visit the dressing plant to see his broilers processed.

EFFECT OF ALTERNATIVE METHODS OF HANDLING LIVE BROILERS ON BRUISING AND YIELD

During the summers of 1956 and 1957 a series of matched-lot experiments were made to measure differences in bruising and yield associated with three methods of handling broilers prior to processing in two poultry processing plants. The influence of assembly crew, and breed, sex, and weight of the birds were held constant. Variable factors related to intensity of bruising were (1) type of crate and handling method, (2) length of haul, (3) length of holding period, (4) number of birds per cell, and (5) position of birds on the truck.

Type of Crate

One method of handling studied involved the use of regular coops and holding batteries (figure 1). Regular coops alone were used in another method with the birds being dressed soon after arrival at the plant (figure 2). In the third handling method a specially designed crate was used to serve as a combination trucking-feeding crate for broilers (figure 3a). This allowed for a one-crate operation with the birds remaining in the same unit until they were hung on the dressing line.

The newly designed crate is about twice the size of the regular coop.[2] The crate is 31 x 47 inches at the top, 25½ x 47 inches at the base and is 13 inches high. A row of dowels across the center divides the crate into two compartments of equal size. The dowels on the ends of the crate are 1½ inches on center and those on the sides are 2 inches on center. The two large doors located on the top of the crate are 18 x 23

[2] Crates used in these trials were made of wood. The authors suggest that for commercial use the crates should be fabricated from extruded aluminum (figure 3b).

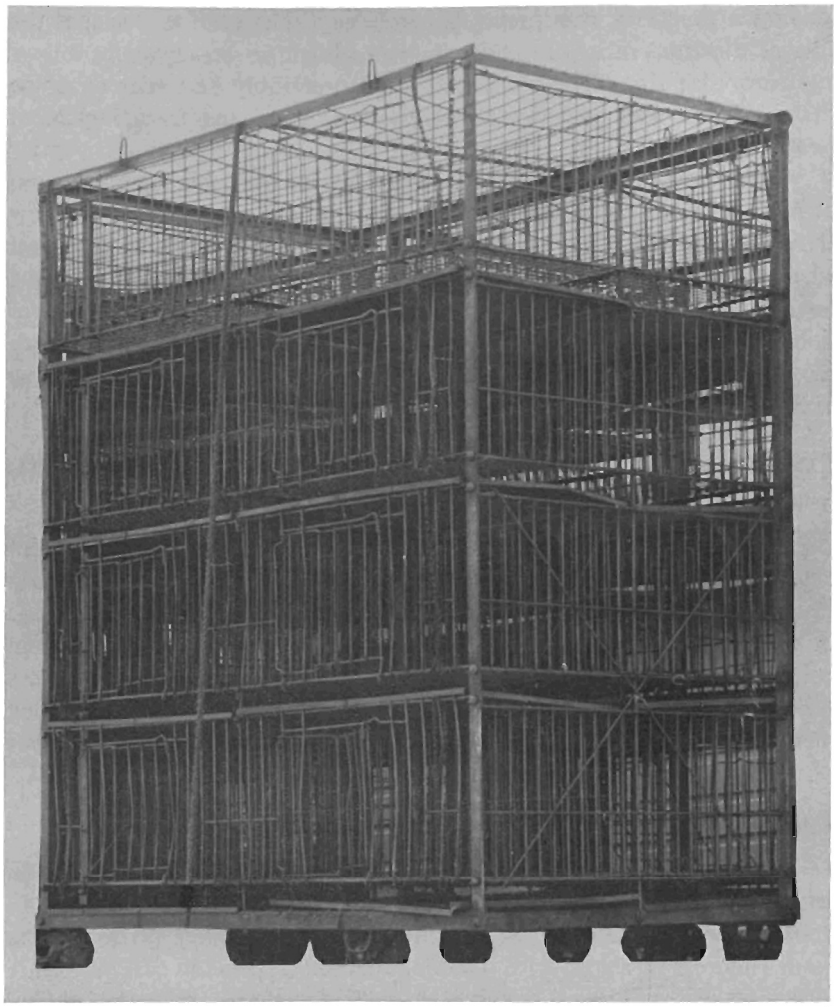

FIGURE 1. A Holding or Feeding Battery.

inches each, and facilitate easy movement of the birds into and out of the crate. The slanted sides on the crate form channels which provide for improved air circulation and in which feeders and waterers can be placed when the crates are stacked and used as feeding units. The air temperature in the center of the truck loaded with combination crates was 10-20° F. cooler than the air temperature in the center of a truck loaded with regular coops. The outside air temperature was 83° F. Two models of the combination crate were tested—one had a wire mesh bottom and the other had a fiberboard solid bottom.

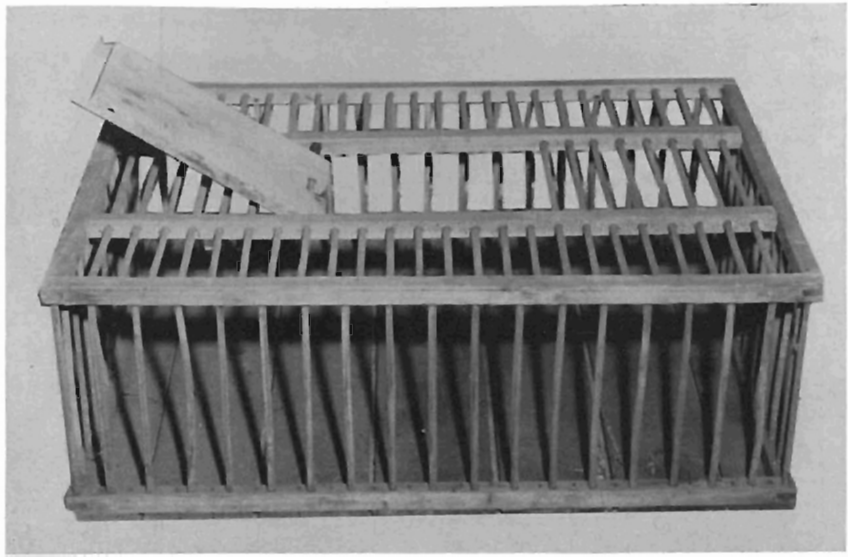

FIGURE 2. Regular Coop.

The type of crate and method employed in handling live broilers prior to dressing had a substantial effect on the intensity of bruising (table 3). The rate of bruising was 6.5 bruises per 100 birds with the solid-bottom combination crate compared with 12.1 bruises per 100

TABLE 3. Effect of Type of Crate on Bruising
2 Maine Processing Plants, 1956-57

	Combination crate (solid-bottom)	Combination crate (wire-bottom)	Coops	Coops & batteries
Number of tests	8	8	8	8
Number of birds	1554	1826	3330	1995
		Per cent bruising		
Breast bruises	1.9	4.4	3.6	7.1
Leg bruises	3.0	5.4	6.3	5.6
Wing bruises	1.6	1.7	2.2	6.4
Total	6.5	11.5	12.1	19.1

birds using regular coops and dressing-off-the-truck, a difference of 46 per cent. With the wire-bottom combination crate the number of bruises per 100 birds was 11.5 and with coops and batteries the bruising rate was 19.1 per 100 birds. The lower rate of bruising with the solid-bottom combination crate was due to the wide doors and the fact that birds were handled a fewer number of times. The relatively high incidence of bruising with the wire-bottom combination crate can be attributed to the fact that birds do not settle down well when transported on wire.

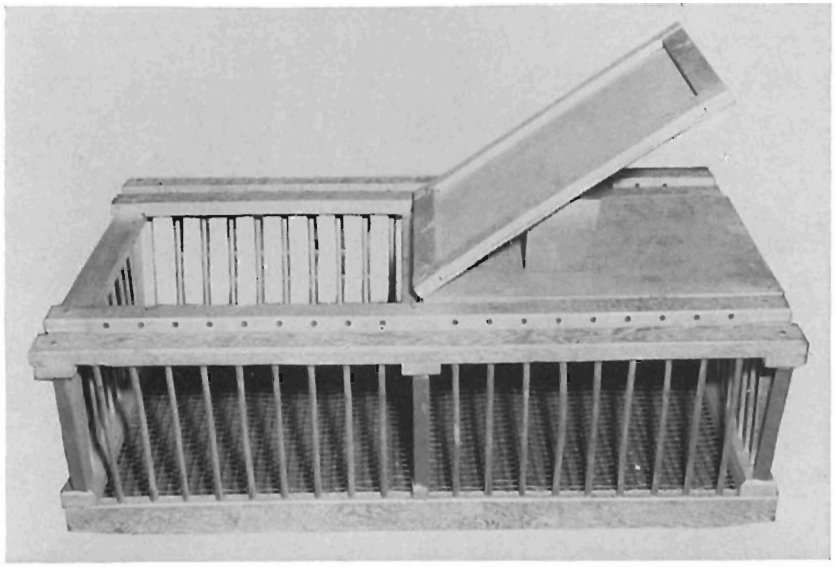

FIGURE 3a. Pilot Model Wood Combination Crate.

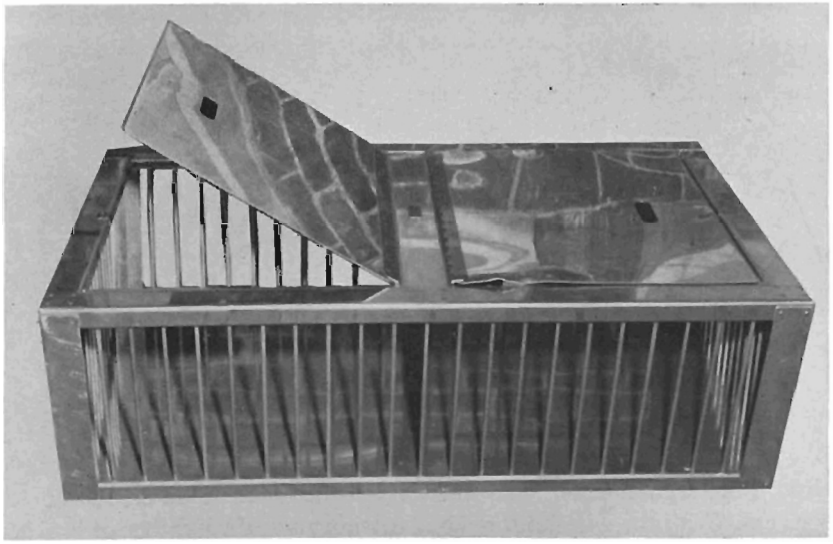

FIGURE 3b. Pilot Model Aluminum Combination Crate.

The crate is 31 x 47 inches at the top, 25½ x 47 inches at the base and is 13 inches high. A row of dowels across the center divides the crate into two compartments of equal size. Dowels on the ends of the crate are 1½ inches on center and those on the side are 2 inches on center. The two large doors located on the top of the crate are 18 x 23 inches each.

The number of bruises per 100 birds in wire-bottom crates was 10.5 on short hauls and 14.2 on long hauls (table 4). Elimination of the transfer of birds from coops to batteries reduced bruising 36 per cent.

Length of Haul

There was a direct relationship between length of haul and intensity of bruising (table 4). For each of the four handling methods the rate of bruising was substantially higher on longer hauls. Longer hauling

TABLE 4. Degree of Bruising on Long and Short Hauls by Type of Crate 2 Maine Processing Plants, 1956-57

	Short-haul*				Long-haul**			
	Comb. solid	Comb. wire	Coops	Coops & batt.	Comb. solid	Comb. wire	Coops	Coops & batt.
No. tests	4	4	4	4	4	4	4	4
No. birds	792	1303	2658	999	762	523	672	996
				Per cent bruising				
Breast	1.6	4.0	3.6	6.3	2.2	5.4	3.7	7.8
Leg	3.0	5.8	6.3	5.2	2.9	4.6	6.1	6.0
Wing	.4	.7	1.9	5.9	2.9	4.2	3.6	6.9
Total	5.0	10.5	11.8	17.4	8.0	14.2	13.4	20.7

* Short-haul—average 11.5 miles (range 5 to 25 miles)
** Long-haul—average 79 miles (range 65 to 92 miles)

distances had the least effect on bruising for birds transported in coops. The difference in bruising between the solid-bottom crate and the wire-bottom crate was greater on long hauls than on short hauls. Again this points out that birds do not settle down well when transported on wire.

The type and condition of the roads over which the birds were transported from farm to plant were checked. Birds transported long distances generally traveled over poorer roads than those transported short distances. The type and condition of roads may have had more effect on bruising than the distance traveled. Short hauls in the test ranged from 5 to 25 miles and long hauls 65 to 92 miles.

Length of Holding Period

Comparisons were made between birds processed within two or three hours after arrival at the plant and those held for 24 or more hours before being processed to determine the effect of the holding period on bruising. When birds were held for 24 or more hours, injured flesh had an opportunity to darken and show up prominently; when birds were dressed within two or three hours after arrival at the dressing plant, many bruises did not darken before the birds were killed. There was a relatively high incidence of bruising recorded on birds held 24 or more hours (table 5). The number of bruises per 100 birds when feeding batteries were used increased from 17.4 for birds dressed upon arrival

at plant to 20.7 when birds were held 24 or more hours before being processed, an increase of 19 per cent.

TABLE 5. Effect of Length of Holding Period on Bruising by Type of Crates*
2 Maine Processing Plants, 1956-57

	Dressed upon arrival**			Held 24 or more hours***		
	Comb. solid	Comb. wire	Coops & batt.	Comb. solid	Comb. wire	Coops & batt.
No. tests	6	6	6	2	2	2
No. birds	1056	1567	999	498	259	996
			Per cent bruising			
Breast	1.6	4.2	6.3	2.6	5.8	7.8
Leg	2.8	5.5	5.2	3.2	5.0	6.0
Wing	.5	.8	5.9	4.0	7.0	6.9
Total	4.9	10.5	17.4	9.8	17.8	20.7

* Coops were not included because coops are not used for holding birds over.
** The birds are processed within two or three hours after arrival at the dressing plant.
*** The birds are held for 24 or more hours in the feeding station and fed grain and water.

With the solid bottom combination crate the rate of bruising was 4.9 per 100 birds dressed-off-the-trucks and 9.8 per 100 birds held 24 or more hours before being processed.

Number of Birds Per Cell

In the solid bottom combination crate with 10 birds per cell there were 7.6 bruises per 100 birds, and with 12 birds per cell, 6.3 bruises per 100 birds (table 6). The opposite relationship existed when coops and batteries were used—with 10 birds per cell there were 18.0 bruises per 100 birds and with 12 birds per cell 19.8 bruises per 100 birds. The percentage difference in bruising between birds in the solid bottom combination crate and birds handled in the coops and batteries was smaller with only 10 birds per cell. There were no dead birds found in the tests.

TABLE 6. Effect of Number of Birds Per Cell on Degree of Bruising by Type of Crate

	10 per cell		12 per cell	
	Comb. solid	Coops & batt.	Comb. solid	Coops & batt.
No. tests	2	2	6	6
No. birds	237	839	1317	1156
			Per cent bruising	
Breast	3.4	6.4	1.7	7.5
Leg	2.1	5.2	3.1	5.9
Wing	2.1	6.4	1.5	6.4
Total	7.6	18.0	6.3	19.8

Position on Truck

The incidence of bruising for birds in the combination-solid crate and the regular coops was practically the same regardless of location of birds on the truck. Birds transported in wire-bottom combination crates, located on the rear of the truck, had 39 per cent more breast and wing bruises than those located on the front (table 7).

TABLE 7. Effect of Location of Birds on Truck on Bruising by Type of Crate 2 Maine Processing Plants, 1956-57

	Front				Rear			
	Comb. solid	Comb. wire	Coops	Coops & batt.	Comb. solid	Comb. wire	Coops	Coops & batt.
No. tests	5	5	4	5	3	3	4	3
No. birds	957	993	1661	1167	597	833	1669	828
				Per cent bruising				
Breast	2.1	3.3	3.4	6.9	1.7	5.6	3.8	7.2
Leg	2.9	5.3	6.5	5.7	3.0	5.5	6.0	5.4
Wing	1.4	1.1	2.1	6.6	2.0	2.4	2.4	6.2
Total	6.4	9.7	12.0	19.2	6.7	13.5	12.2	18.8

Yield

One of the important factors affecting costs of processing poultry is yield rate. Yield is the weight remaining after the removal of blood, feathers, head, feet, inedible viscera, and grading out unusable carcasses. Yield has two important effects on the profit or loss of the processor. First average labor and overhead costs on an eviscerated weight basis are increased as yield decreases; and secondly, the cost of live birds is relatively greater with low yields.

Suppose, for example, that 3.5 pound broilers purchased for 20 cents per pound, yield 2.8 pounds of eviscerated product in plant A and 2.6 pounds in plant B. This is a 20 per cent and 27 per cent shrink, respectively. It can be seen that the cost per pound of eviscerated product will amount to 25 cents for plant A and 27 cents for plant B.

There was no significant difference in yield between birds held overnight in the combination crate and those held in feeding batteries (table 8).[3] Under temperatures ranging from 85° to 100° F. there was some indication that 12 birds to a cell in the combination crate were too many for overnight holding. It was observed that they did not feed and drink readily.

[3] With the F analysis the difference was not significant at the 50 per cent level.

TABLE 8. Effect of Type of Feeding Unit on Yields
2 Maine Processing Plants, 1957

	Coops & batteries		Combination crate	
	No. of birds	Pounds	No. of birds	Pounds
No. tests	5		5	
Live	2439	9011	1828	7045
Eviscerated	2422	7274	1814	5721
Shrink*	17	1736	14	1324
Per cent yield	99.30	80.73	99.23	81.21

* Shrink was computed by subtracting the weight of the birds after they were eviscerated, cooled, and ready for shipment to market from the live weight of the birds.

EFFECT OF ALTERNATIVE METHODS OF ASSEMBLING LIVE BROILERS ON LABOR EFFICIENCY

Controlled matched-lot experiments also were conducted to determine the labor requirements associated with three types of crates in handling broilers between the farm and the dressing line. The three types of crates used were (1) coops, (2) coops and batteries, and (3) combination crates. The operations studied were (1) loading at the farm, (2) unloading at the plant, (3) weighing, (4) hanging, and (5) loading empties.

Loading, Unloading and Hanging

The labor requirements for the three methods of handling broilers are shown in table 9. An average of 3.84 man-hours per 1,000 birds was required to load, unload and hang the birds when the combination crate was used; 6.64 man-hours with coops and 7.43 man-hours with coops and batteries.

There was a difference of .5 man-hour or a 19 per cent reduction in the labor expended in *loading* 1,000 birds with combination crates compared with the regular coops. The saving was due to the larger doors on the combination crate and the handling of a double unit compared with the single unit for the coops. With the larger door birds were easily placed in the crate—no pushing or cramming was necessary.

The handling of a double unit and the elimination of bird transfer from coops to batteries had a substantial effect on the man-hours required for *unloading*. Requirements for unloading were 1.28 man-hours per 1,000 birds less with combination crates than with coops, and 1.74 less with combination crates than with coops and batteries.

In the *hanging* operation, the use of combination crates was more efficient than the use of coops by .87 man-hour per 1,000 birds because the larger doors on the crate made it easier to remove birds. There was an even larger difference in man-hour requirements for the hanging operation using combination crates as compared with batteries. This

TABLE 9. Relationship of Type of Crate to Labor Requirements
2 Maine Processing Plants, 1956-57

	Combination crate	Coops	Coops & batteries
No. tests	8	8	8
No. birds	3380	3330	1995
	Man-hours per 1000 birds		
Loading	2.10	2.60	2.60
Unloading	.36	1.64	2.10
Hanging	.80	1.67	2.00
Loading empties	.58	.73	.73
Total	3.84	6.64	7.43

difference was due to the crates being directly under the hanging line, thus eliminating a one-half turn by the hangers. The large doors in the combination crate made it easier to remove the birds from the crate than from batteries. The hangers sometimes had problems getting the battery doors open and reaching into the batteries for birds.

Loading, unloading, hanging and loading empties required 2.8 man-hours per 1,000 birds less with combination crates than with regular coops, and 3.59 man-hours less than with coops and batteries. This amounts to a 42 per cent and 48 per cent reduction in man-hours, respectively. The combination crate was more efficient in all four operations studied.

Weighing

Two methods of weighing live birds were compared from the standpoint of labor efficiency. Platform scales at the plant are commonly used for weighing birds. The platform scale held 6 to 8 regular coops or one battery. With this method a scaler and a helper were usually used. Another method tested was the use of bulk scales. With this system the entire truck load was weighed in one operation. The bulk weighing used two men—the scaler and the truck driver.

The bulk weighing method required 85 per cent fewer man-hours per 1,000 birds than the platform scale method. The usual platform scale method of weighing consumed .34 man-hour per 1,000 birds and the bulk method .05 man-hour (table 10). Use of the bulk scale provides an opportunity to take advantage of large unit handling.

TABLE 10. Relationship of Weighing Methods
to Labor Requirements
2 Maine Processing Plants, 1956-57

Method	Man-hours per 1,000 birds
Platform scale	.34
Bulk weighing	.05

ECONOMIC SIGNIFICANCE OF IMPROVED HANDLING METHODS

In deciding whether to change from one method to another, consideration should be given to labor requirements, quality of product and relative costs. Probably a cost efficiency improvement should not be made if it means sacrificing quality or consumer satisfaction.

Bruising

In 1957 there were at least 159,267,894 pounds of eviscerated broilers sold by Maine processing firms. Twenty per cent or 46,187,689 pounds was breast meat, 32 per cent or 50,965,765 pounds was legs and thighs, and 11 per cent or 17,519,468 pounds was wing meat (table 11).

The average wholesale price differential between "A" and "B" grades for the year 1957 was 7 cents per pound for the breast, 7.5 cents for the legs, and 4 cents for the wings.[4] Using these price differentials and the bruising rates obtained in this study, it was possible to estimate the dollars lost due to bruising for the various handling methods. This loss, assuming each method was the only one used for the year, would be $498,297 with the coop and battery method, $377,611 with the coops, and $189,947 with the combination crates (table 11). Also bruising necessitates cutting-up the whole bird in order to recover the "A" parts and sell these parts for their full value.

A change from the coop and battery method of handling birds to dressing-off-the-truck with the regular coop would result in about a 24 per cent reduction in dollars lost due to bruising. If the combination crate were to replace the regular coops, the annual gross savings to Maine poultry processors would be approximately $187,644 or a 51 per cent reduction in dollars lost due to bruising.

[4] *Producers Price Current,* January 1, 1957-December 31, 1957, Urner-Barry Company, New York 7, New York.

TABLE 11. Estimated Dollar Losses Due to Bruising with Various Handling Methods
6 Processing Plants, Maine, 1957

Pounds of processed broilers in Maine, 1957—159,267,894
Pounds of Breast (20%)—46,187,689
Pounds of Legs (32%)—50,965,726
Pounds of Wings (11%)—17,519,468

	Combination Crate (solid bottom)			Coops			Coops & Batteries		
	Breast	Legs	Wings	Breast	Legs	Wings	Breast	Legs	Wings
Per cent bruising	1.9	3.0	1.6	3.6	6.3	2.2	7.1	5.6	6.4
Pounds of "B" grade meat	877,566	1,528,972	280.311	1,662,757	3,210,841	385,428	3,279,326	2,854,081	1,121,246
Price differential between "A" and "B" grades (cents/lb.)	7.3	7.5	4.0	7.3	7.5	4.0	7.3	7.5	4.0
Estimated dollars lost	64,062	114,673	11,212	121,381	240,813	15,417	239,391	214,056	44,850
Estimated total dollars lost		189,947			377,611			498,297	

Labor Efficiency

Type of crate—If the combination crate were used in place of the regular coops, the annual gross saving in labor to a typical processor handling 9.6 million birds a year would amount to about $33,600 (table 12). This saving is based on an average hourly wage rate of $1.25.

TABLE 12. Estimated Savings in Man-Hours and Dollars Saved When the Combination Crate is Used in Place of the Regular Coop

Unit per processor	Man-hours saved	Dollars saved*
Per 1,000 birds	2.8	$ 3.50
Per day or 40,000 birds	112.0	140.00
Per week or 200,000 birds	56.0	700.00
Per year or 9,600,000 birds**	26,880.0	33,600.00

* Hourly wage rate—$1.25
** Fifty weeks

The estimated cost of converting to the combination crate method of handling birds for a typical processor handling about 9.6 million broilers a year would be approximately $92,380 (table 13). Figuring an annual gross saving per processing plant (table 11) of $31,277 for reduced bruising and $33,600 for reduced labor expense gives a total saving of $64,877. It would take about 1.4 years for the savings to equal the investment.

Weighing method—A change from the platform scale method of weighing to the bulk scale method should save 11.6 man-hours or $14.50 a day when calculated on a 40,000 bird basis. Yearly gross savings

TABLE 13. Estimated Cost for One Processor with an Output of 40,000 Birds Per Day to Convert to Combination Crates, Fork Lifts and Conveyors

Item	Amount
1,500 combination crates @ $50.00	$75,000
2 fork-lifts	10,000
Conveyor system	2,500
Pallets	500
Interest on investment @6%	4,380
Total	$92,380

would amount to about $3,480 for a typical processor. The approximate cost of converting to bulk scale is $14,000. It would take about 4.02 years for the savings to equal investment.