Methods for Brooding Chicks

radiant panels, infrared lamps compared for electricity used, weight gains, feed needs, mortality, feathering

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Two widely used brooding methods—radiant heat panels and infrared lamps—were tested in the winter and fall of 1951 on the University of California Poultry Farm at Davis.

The chicks for each test were kept in two adjacent pens 10′ x 14′ separated by wire partitions. Wood shavings were used for litter. Cardboard draft shields 12″ high were used in all pens for the first week. Both tests lasted for six weeks.

The winter test began January 26, 1951 and the fall test began September 12. The control brooder was started at 95° F; the temperature was dropped 5° each week. All chicks were fed the same ration. White Leghorns and New Hamphires were used in the winter tests, and New Hamphires were used in the fall experiments.

Winter Test

The brooder in the control pen was an electric fan-ventilated unit with an insulated hover 56″ in diameter. The heating element was 550 watts. A wafer thermostat and microswitch controlled the temperature under the brooder.

The radiant heat panel was constructed of tempered glass plate which had been fitted with a grid made of aluminum alloy. This served as a 1,000-watt heating element. The panel was 18″ x 24″. A cartridge type of an on-off thermostat controlled the heat.

Infrared heat lamps were placed on a frame. The lamps were tilted outward at a 30 degree angle from vertical. Four 250-watt lamps were used. One lamp was connected to an on-off type of thermostat.

Fall Test

The control brooder was the same as was used in the winter test.

Four 125 infrared heat lamps on a frame were controlled with a manually operated voltage regulator.

A radiant heat panel brooder was made to utilize low temperature heating elements covering an area 4′ x 6′. The brooder was hinged at the rear to one wall at a height of 10″. The front was raised and lowered by means of rope and pulleys.

Records were made of kilowatt hours—KWH—consumed, body weight gains, feed consumption, mortality, feathering,

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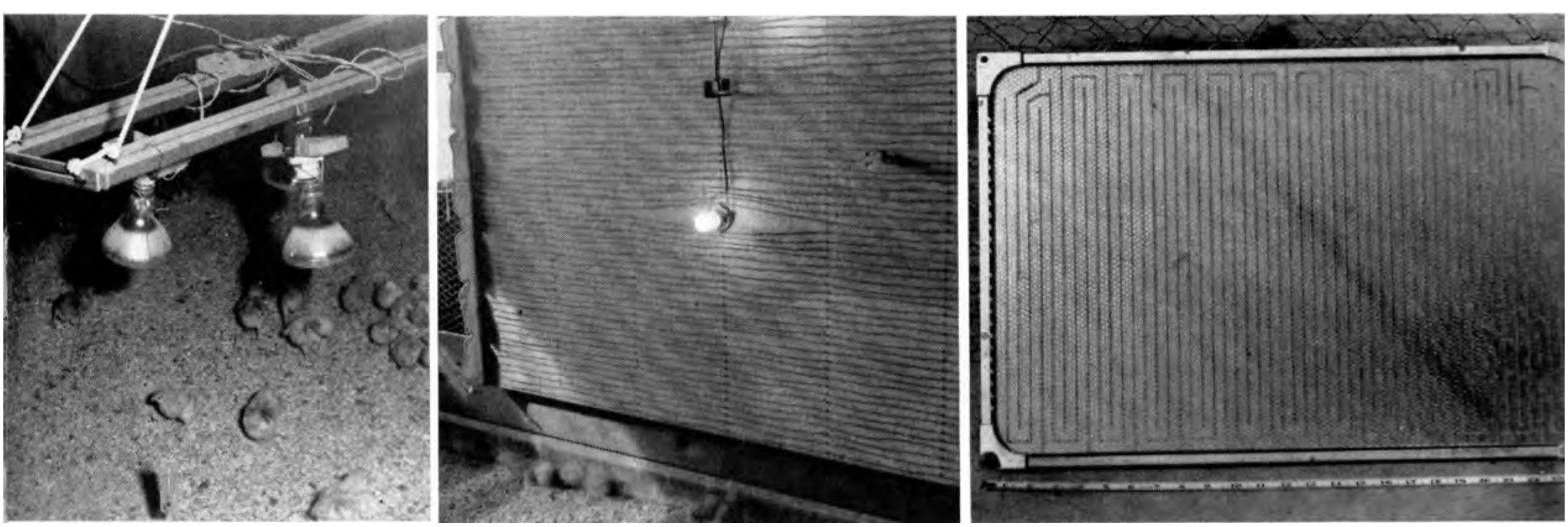
Comparison of Electrical Brooding Methods
Data for six-week period

	Chicks per group	Total KWH	KWH per chick	Body wt. gms.	# Feed/ # gain	No. slow feathering	Mortality No.
Test 1 started Jan. 26. ended Mar. 9, 1951.	**Weekly air temperature range 55°–68° F.**						
Infrared	WL.–99	548	3.3	220 WL	2.69	5	38
	NH.–65			436 NH			
Small Radiant Panel	WL.–98	477	3.0	241 WL	2.42	18	47
	NH.–62			470 NH			
Control Elect. Brooder	WL.–100	268	1.6	249 WL	2.33	10	37
	NH.–65			490 NH			
Test 2 started Sept. 12. ended Oct. 24, 1951.	**Weekly air temperature range 65°–80° F.**						
Infrared	NH.–197	512	2.6	528	2.90	30	2
Large Radiant Panel	NH.–197	118	.6	531	2.85	27	2
Control Elect. Brooder	NH.–197	70	.4	526	2.86	25	4

Left: **Infrared lamp placed in an adjustable frame for breeding chicks.** ***Center:*** **Large radiant panel used in fall test.** ***Right:*** **Small radiant panel used in winter test.**



HARVESTING

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Conveying of the tomato directly on a belt is a suitable means of mechanically handling the fruit by bulk or semibulk methods.

The effect of picking on a conveyor is evaluated as resulting in an average savings in time of 32.7% and an average increase in production of 49.4% or a reduction in manpower of 49.4%. Since the conveying method will require additional manpower for operating equipment and loading fruit, the picking time of the tests is increased by 25% for this contingency. Since the operation would now compare with picking and stacking on a highway truck, 10% has been added to time for existing method to provide for this. Comparisons now indicate a savings in time of 23.6% and an increase in production of 31.4% or a reduction in manpower of 31.4%. All results include time spent on carrying conveyor down the rows as needed and as such are a more conservative estimate of the values of the conveyor studied.

The results of the preliminary tests of the conveyor indicate that eliminating materials-handling from harvesting will yield the results estimated. Materials-handling required 20% of harvesting process so eliminating it would produce a savings in time of 23% and an increase in production of 31%.

Tests for Conveyor Type

Two possible types of conveyors might be used in harvesting, the in-row type and a cross-row type.

A cross-row type could be mounted across the rows and travel down the rows at a predetermined rate of speed. The pickers could be stationed in each row between plants and pick plants on both sides, following the conveyor down the row.

Tests were performed to provide indications as to feasibility of the use of a cross-row conveyor. These tests involved: *1.* The movement of equipment over plants and down the rows between plants. *2.* Picking plants using a 2-man crew, one picker on each side of the plant. *3.* The use of folk-lift equipment to move pallets of lugs from trailer to truck.

In the first test a high tractor was used to drive down the rows between plants. Planting was Pearson tomato on a 6′ row by 3′ spacing. The tractor wheel span was opened to 6′ for the test. Additionally a short wheel-base truck having a 6′ wheel span was also driven down the rows between plants. Estimates of the damage to plants and fruit were then made. These turned out to be comparable to and smaller than most damage found after a group of pickers has been in a field.

In the test of a 2-man crew for picking, each man picked one side of a plant and placed the fruit into a common lug located next to the plant. A reduction in time of 6% was obtained. The same results should hold when picking on a conveyor and moving along behind it.

Fork-lift equipment was tested but the results were inconclusive because only very heavy equipment was available and while the job of transferring pallets was accomplished it was very time consuming.

Immediate Steps

Steps to improve productivity of harvesting practices which can be taken by all growers immediately are: *1.* Use 2-man crews for picking, one picker on each side of plant-row. *2.* Pick directly into lugs and have lugs carried out after one or two are filled rather than all at once. *3.* Give more training to low-producing pickers to bring up their skills. *4.* Carry out some selection of pickers. It is not merely a matter of using low producers but actually a matter of increasing yield by reducing waste due to trampling of plants and fruit. *5.* Take steps to improve working conditions, such as providing a supply of cold water at work areas and salt tablets in containers at each water barrel; requiring the use of rest periods in mid-morning and mid-afternoon; and experimenting with moving the working time during the day so that harvesting starts at a very early hour and is completed in the early afternoon to reduce the effects of heat.

Conveyors Compared

Experience during the 1951 survey indicated that the in-row type of conveyor may not be as satisfactory as the cross-row type. There may be losses in picking time associated with moving the conveyor from one row to the next. These losses can result in reducing the savings as evaluated in the survey.

Estimates of the value of the use of conveyors in harvesting based on tests during the survey are 15% to 25% savings in time and 25% to 30% reduction in labor or increase in production.

The survey reported here, should be considered as preliminary. Many questions having a bearing on the efficiency of harvesting operations are still unanswered. Some of them need further study—planning and developing conveyors, bulk handling, new plant types, mechanical picking, field layout, preparation and irrigation, work efficiency in regard to rest periods, working time and period, fatigue studies and cost studies.

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CHICKS

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pasting-up, maximum-minimum temperatures in room and brooder temperatures. The same data were recorded in both tests. The table on page 9, Comparison of Electrical Brooding Methods, combines the results of both tests.

Results of Tests

The table shows the relatively large amount of electricity used by the infrared lamps. The kilowatt hours per chick in the infrared lot was double that for the control lot in the first test. In the second test the current consumption was seven times as large as in the control lot. The difference in current consumption between winter and fall brooding was four fold. The birds in the fall test grew much faster and suffered less mortality than those in the winter test.

A simple comparison of current consumption for the different units may not be quite fair. For example, the large radiant panel brooder was operated at 57% of its chick capacity while the control unit was at 80% of its capacity. On an adjusted basis these two units would have about the same current consumption per chick.

A 125-watt infrared lamp will care for 50 to 75 chicks when the room temperature is not below 55° F. On this basis the infrared lamps in the present tests were operating at near 100% rated capacity, with the manual voltage regulator, the night voltage was reduced five volts per week. The daytime voltage was approximately 15 volts lower than the night setting.

Comparison of Methods

The results confirm that infrared brooding has advantages and disadvantages as compared with conventional electric brooding.

Advantages	Disadvantages
1. All chicks are readily visible.	1. Operating costs much higher.
2. Initial cost very low.	2. Voltage regulator required to reduce operating cost expensive.
3. Lamps permit early roosting.	3. Removal of moisture by ventilation becomes a serious problem.
4. Less tendency for birds to pile up.	4. Outages become a more serious problem.
5. Easier to start poults to eat.	

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