

The Effect of Angle of Turning Eggs During Incubation on Hatchability

E. M. FUNK AND JAMES FORWARD



Figure 1. Inside view of incubator used in egg turning experiments. Left to right the columns of trays were turned 45° , 30° , and 40° .

UNIVERSITY OF MISSOURI

COLLEGE OF AGRICULTURE

AGRICULTURAL EXPERIMENT STATION

J. H. LONGWELL, *Director*

BULLETIN 599

Columbia, Missouri

JUNE, 1953

ACKNOWLEDGMENTS

The investigations reported in this bulletin were carried on by the Missouri Agricultural Experiment Station as the Department of Poultry Husbandry Research Project No. 40 B-1 entitled, "Hatching Eggs." This work was supported by a grant from the American Poultry and Hatchery Federation.

The Effect of the Angle of Turning Eggs During Incubation on Hatchability

E. M. FUNK AND JAMES FORWARD
Department of Poultry Husbandry

A review of the literature did not reveal any experimental evidence as to the effect of angle of turning eggs during incubation on hatchability. However, the manufacturers of incubators have studied this problem but their data have not been made public.

EXPERIMENTAL PROCEDURE

In the fall of 1952, arrangements were made to incubate eggs in trays turned 20°, 30° and 45° from the horizontal plane thus tilting the eggs in the trays the same angles from the vertical plane. Later, the angles were changed to 30°, 40° and 45°. All of the trays were in the same Bundy Incubator in order to maintain other conditions the same and thus vary only the angle of turning. Eggs produced by the same flocks were selected at random for the experimental lots.

RESULTS

From the results of the first series of experiments (Table 1) it was evident that the angle the eggs were turned was very important and

Table 1 -- The Effect of the Angle of Turning Eggs During Incubation on Hatchability.

Delaware x New Hampshire Eggs from the W. B. Smith Hatchery.

Date Set	Angle Turned	Eggs Set	Infer- tile	D ₁	D ₂	D ₃	Chicks Hatched	% Hatch All Eggs	% Hatch Fertile Eggs
9-11-52	20°	702	108	12	106	106	370	52.71	62.29
	30°	702	109	17	82	75	419	59.69	70.66
	45°	702	121	16	57	37	471	67.09	81.07
9-18-52	20°	693	82	13	97	97	404	58.30	66.12
	30°	693	81	10	76	53	473	68.25	77.29
	45°	694	71	10	55	30	528	76.08	84.75
10-2-52	20°	699	76	9	114	88	412	58.94	66.13
	30°	699	83	7	62	54	493	70.53	80.03
	45°	698	66	18	59	25	530	75.93	83.86
10-9-52	20°	707	58	5	46	67	531	75.11	81.82
	30°	707	56	11	35	40	565	79.92	86.79
	45°	706	42	15	41	23	585	82.86	88.10
G. Total	20°	2801	324	39	363	358	1717	61.30	69.32
	30°	2801	329	45	255	222	1950	69.62	78.88
	45°	2800	300	59	212	115	2114	75.50	84.56

that turning the eggs 45° from the vertical position when trayed large end up increased the hatch of fertile eggs by 15.2 per cent over 20° turning.

Turning the eggs at greater angles reduced the dead embryos during the later stages of incubation; the eggs left on the hatching trays were reduced from 12.78 per cent to 4.11 per cent and the dead between the 18th day and the 21st day were reduced from 12.96 per cent to 7.57 per cent. (See Figure 2).

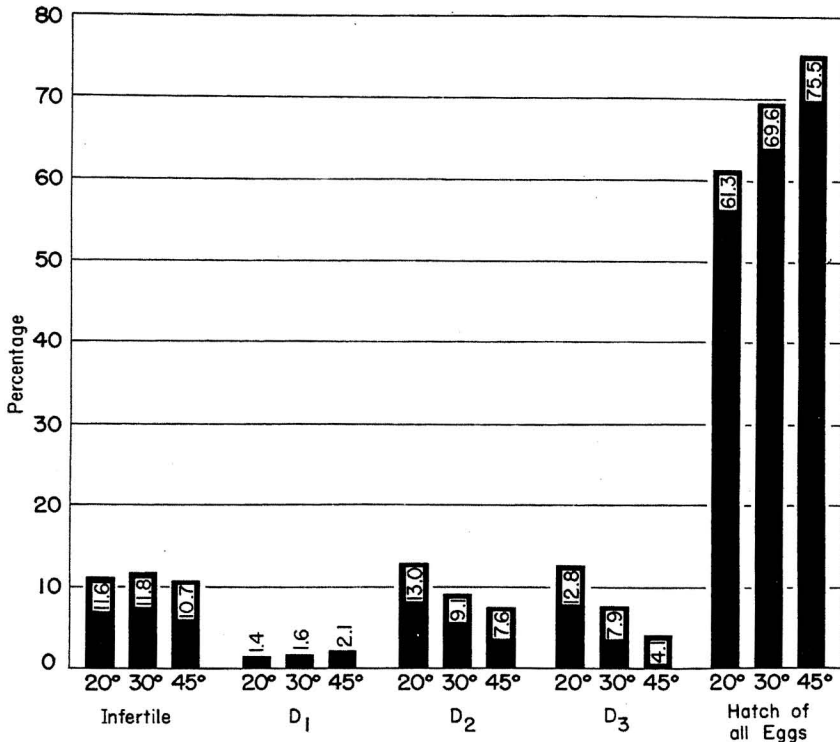


Figure 2. The Effect of Angle of Turning Eggs During Incubation on the Percentage of Dead Embryos (D₁, D₂, and D₃) and the Hatch.

Table 2 presents the results obtained with Delaware x New Hampshire eggs from a hatchery breeding flock that were turned 30° , 40° , and 45° from their vertical position while they were being incubated. There was an increase in the percentage of hatch of all eggs set of 5.2 per cent when the eggs were turned 40° as compared to 30° . With these eggs there was no significant increase when they were turned 45° as compared to 40° .

Table 2 -- The Effect of the Angle of Turning Eggs During Incubation on Hatchability.

Delaware x New Hampshire Eggs from the W. B. Smith Hatchery.						
Date Set	Egg Trays Turned 30°		Egg Trays Turned 40°		Egg Trays Turned 45°	
	Eggs Set	Percentage Hatch of All Eggs	Eggs Set	Percentage Hatch of All Eggs	Eggs Set	Percentage Hatch of All Eggs
1-7-53	100	80.0	99	81.8	105	76.2
1-28-53	202	78.7	200	85.5	202	86.6
2-4-53	199	78.9	198	85.4	190	86.8
2-18-53	223	82.1	224	80.8	224	83.9
2-25-53	200	70.5	198	81.8	197	80.7
Totals	924	77.9	919	83.1	918	83.6

Table 3 shows the results of turning eggs held 1-21 days 30°, 40°, and 45°. These eggs were produced on the University Poultry Farm from matings of Delaware x New Hampshires. With eggs held one to seven days the percentage of hatch of all eggs was increased by 1.9 per cent by turning the eggs 40° instead of 30° and by 11.1 per cent when the eggs were turned 45° as compared to 30°. Eggs held 8-14

Table 3 -- The Effect of Angle of Turning Eggs of Different Ages on Hatchability.

Delaware x New Hampshire Eggs Produced by the University of Missouri						
Date Set	Egg Trays Turned 30°		Egg Trays Turned 40°		Egg Trays Turned 45°	
	Eggs Set	% Hatch of All Eggs	Eggs Set	% Hatch of All Eggs	Eggs Set	% Hatch of All Eggs
Eggs Held 1-7 Days						
11-19-52	71	62.0	70	74.3	71	77.5
12-17-52	54	46.3	55	58.2	53	62.3
1-7-53	40	62.5	38	60.5	40	72.5
3-18-53	54	66.7	53	66.0	54	59.3
4-8-53	52	55.8	53	39.7	50	76.0
Totals	271	58.7	269	60.6	268	69.8
Eggs Held 8-14 Days						
11-19-52	70	64.3	68	63.2	64	57.8
12-17-52	56	41.1	58	50.0	55	41.8
1-7-53	41	63.4	39	53.9	39	66.7
3-18-53	53	39.6	54	50.0	54	68.5
4-8-53	54	48.2	57	59.7	57	63.2
Totals	274	51.5	276	55.8	269	59.1
Eggs Held 15-21 Days						
11-19-52	69	60.9	70	68.6	71	47.9
12-17-52	61	37.7	61	39.3	57	50.9
1-7-53	47	27.7	48	43.8	49	51.0
3-18-53	63	31.8	64	34.4	62	38.7
4-8-53	52	40.4	55	67.3	55	49.1
Totals	292	40.8	298	51.0	294	47.3
1-21 Days	837	50.1	843	55.6	831	58.4

days also responded to increased turning by 4.3 per cent and 7.6 per cent respectively for 40° and 45° turning. Eggs held 15-21 days also responded to increased turning but 40° turning gave better results than 45° turning.

The results indicated that 40° and 45° turning gave much better hatches than 30° turning. They also indicated that 45° turning was slightly better than 40° turning when fresh eggs (1-7 days old) were incubated. Investigation of other angles of turning and tilting eggs during incubation are being made at this station.

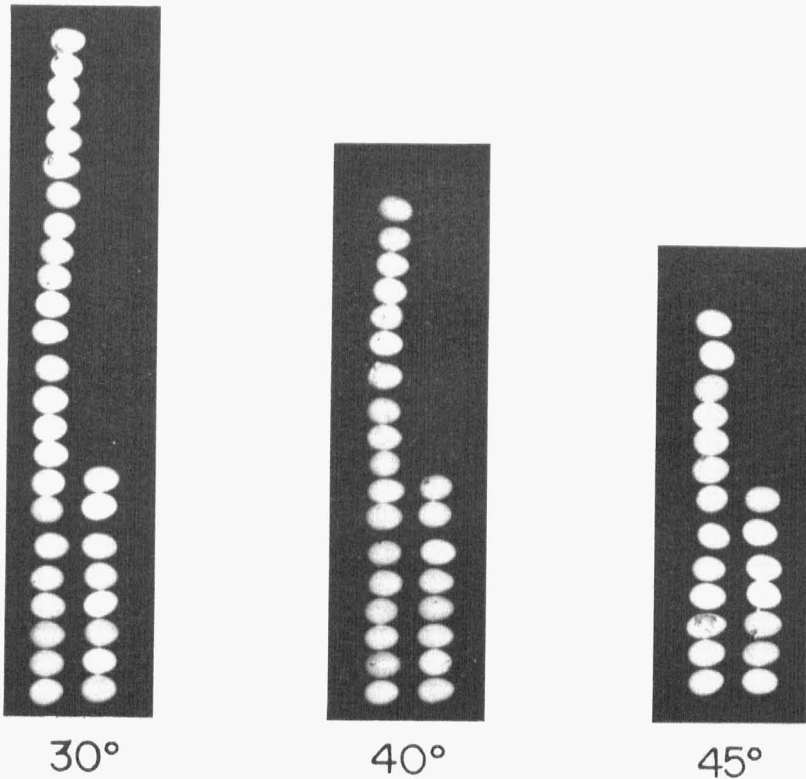


Figure 3. Eggs that failed to hatch (D_3) that were turned 30°, 40° and 45°. Eggs set 4-8-53. There was a total of 160 eggs in each lot.

CONCLUSIONS

The angle of turning eggs during incubation affects hatchability very greatly.

Turning eggs 30° as compared to 20° increased the percentage of hatch from 61.3 per cent to 69.6 per cent or 8.3 per cent.

In three series of experiments, turning eggs 45° as compared to 30° increased the percentage of hatch by 5.9 per cent.

Turning eggs 40° as compared to 30° increased the percentage of hatch of all eggs by 5.2 per cent and 3.6 per cent in two experiments.

In two series of tests with fresh eggs (1-7 days) turning eggs 45° as compared to 40° resulted in an increase of 0.5 per cent in one series and 9.2 per cent in the other series.

Increased turning improved the percentage of hatch of all eggs set for eggs held one, two or three weeks.