

## THE EFFECT OF RELATIVE HUMIDITY ON HATCHABILITY OF TURKEY EGGS<sup>1</sup>

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### Introduction

Turkey eggs in general do not hatch as well as chicken eggs. The relative humidity requirement for chicken eggs is generally agreed upon as being around 60 percent. Some investigators claim that turkey eggs require considerably less than that amount, while others say the requirements are approximately equal. The object of this work was to determine the effect of 37, 46, and 57 percent relative humidity on turkey egg hatchability.

The Kentucky Agricultural Experiment Station<sup>2</sup> reports that hatchability from incubation at dry-bulb 99½°F. was significantly poorer with wet-bulb temperature 83 to 84 degrees F. than when the wet-bulb was 85 to 86 or 87 to 88 degrees F. Expressed in relative humidity these wet-bulb readings represent approximately 51, 57, and 63 percent respectively. The manufacturer of one of the incubators used at the South Dakota Poultry Department recommends a relative humidity of 37 percent for hatching turkey eggs.

### Materials and Methods

Eggs used in this study were produced from the Experiment Station flock of Broad-Breasted Bronze turkeys. The hens that produced the eggs were kept in five separate pens. No eggs were more than 14 days old when set. Each hen's eggs were divided as equally as possible into two groups. The eggs were incubated for the first 24 days in two separate incubators. On the twenty-fifth day the eggs were transferred to a separate hatcher, and eggs from both

<sup>1</sup>Approved for publication by the Director of the South Dakota Agricultural Experiment Station as Journal Series No. 191.

<sup>2</sup>Effect of Relative Humidity and Amount of Turning on Hatchability of Turkey Eggs and Livability of Poults. W. M. Insko, D. W. MacLaury, and A. T. Ringrose, 1942, Kentucky Agri. Exp. Sta. Bull. 438.

machines were put under identical conditions, including humidity, for the last four days.

The design of the experiment permitted the three levels of relative humidity to be tested in the two machines that were available for study. It was possible to regulate the wet-bulb reading in the two incubators to a variation of  $\pm .5$  degree when normal atmospheric conditions prevailed. The two machines were forced-draft but were of different makes, so that results would not be comparable without some statistical control. Three successive hatches were taken off in each incubator. The dates of hatches were March 9, April 6, and May 4, 194. In Incubator A the wet-bulb readings of the three successive hatches were 78, 82, and 86 degrees F., respectively. Incubator B for the three successive hatches was operated with a wet-bulb reading of 86, 82, and 78 degrees F. The dry-bulb reading in both incubators for the three hatches was 100 degrees F.

Analysis of variance permits one to separate the variations due to differences in incubators, humidities, and the interaction of incubators and humidities. The interaction would also tend to take out any seasonal trend which may be present. This experimental design is an example of how handicaps of limited facilities might be eased by statistical methods.

Moisture losses were determined as the percent of weight lost during the first 24 days. A weighted average was used to express the results. Hatchability data are expressed as percent of fertile eggs and are calculated as pen totals. Individual totals would have given more degrees of freedom, but the analysis of variance would have become tedious because of missing data and disproportionate subclass frequencies.

### Results

The percentage moisture losses varied inversely with the wet-bulb reading. A comparison of the results obtained in the two machines follows:

**Wet-Bulb Readings**

	78 degrees	82 degrees	86 degrees
Incubator A -----	14.2%	13.7%	11.4%
Incubator B -----	15.2%	13.9%	11.2%

The percentage loss was practically the same for the two incubators with the exception of the 78 degree wet-bulb results. During the first ten days Incubator A had a wet-bulb reading of 78 degrees, but the dry-bulb was 0.5 degree low due to an inaccurate thermometer. Therefore, the relative humidity was greater than 37 percent, which probably accounts for the moisture loss's being lower than Incubator B.

The analysis of variance showed no significant differences in hatchability between means of the three different relative humidities. Likewise, no significant difference was found between the hatching results of the two incubators. The interaction of incubator and humidity was significant and is the proper error term for testing the significant difference between humidities. Table One gives the results of the statistical analysis. The work is being repeated, as the hatchability of fertile eggs was sub-normal.

**Table 1. Analysis of Variance**

Source of Variation	D/f	Sum of Squares	Mean Square	F Value
Total -----	29	6924.02		
Between means of incubators---	1	94.20	94.20	
Between means of humidities---	2	1332.15	691.08	
Interaction (I x H) -----	2	1610.19	805.10	5.04*
Remainder (within classes) ----	24	3837.48	159.90	

\*5% = 3.40

1% = 5.61

**Summary**

Weight losses of the eggs varied inversely with the relative humidity.

Under the condition of this experiment relative humidities of 37, 46, and 57 percent did not affect the hatchability of turkey eggs.

**Mean Values of Hatchability**

Incubator A -----	37.9 percent
Incubator B -----	34.4 percent
78 degree Wet-Bulb -----	43.9 percent
82 degree Wet-Bulb -----	27.4 percent
86 degree Wet-Bulb -----	37.2 percent