5-1976

Effects of Egg Proximity During Incubation on Hatching Success in Coturnix and Button Quail Eggs

Elaine M. Thrune

These starred papers submitted by Elaine M. Thrune in partial fulfillment of the requirements for the Degree of Master of Arts at St. Cloud State University are hereby approved by the final evaluation committee.

Alfred H. Grewe, Jr., Chairman

John F. McCue

Wendell M. Pou

Lowell R. Gillett
Dean, School of Graduate Studies

EFFECTS OF EGG PROXIMITY DURING INCUBATION ON HATCHING SUCCESS IN COTURNIX AND BUTTON QUAIL EGGS #1012-A

. . . . . .

ECONOMIC IMPORTANCE OF THE COMMON SNAPPING TURTLE *CHELYDRA SERPENTINA* LINNAEUS IN THE UNITED STATES #1012-B

. . . . . .

TIPS ON CULTURING WOOD TICKS #1012-C

by

Elaine M. Thrune

B.S., Winona State College, 1970

Starred Papers

Submitted to the Graduate Faculty

of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree

Master of Arts

St. Cloud, Minnesota

May, 1976

ACKNOWLEDGEMENTS

I am grateful to my advisor, Dr. A. H. Grewe, Jr. for his patience and assistance during the research and preparation of these papers. Thanks to Christopher Bailey and Dr. Standley Lewis for the photographs. I sincerely acknowledge the kind help and cooperation of Dr. Ralph Gundersen, Dr. John McCue, Dr. Steven Williams, Dr. David Kramer, Dr. Wendell Pou, and my husband, Steve.

EFFECTS OF EGG PROXIMITY DURING INCUBATION ON HATCHING SUCCESS IN COTURNIX AND BUTTON QUAIL EGGS

by

Elaine M. Thrune

B.S., Winona State College, 1970

A Starred Paper

Submitted to the Graduate Faculty

of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree

Master of Arts

St. Cloud, Minnesota

May, 1976

TABLE OF CONTENTS

Introduction

Synchronous hatching in an incubator is promoted by physical contact of the eggs during incubation. This led me to wonder if proximity of the eggs also affects hatchability.

Fertility and hatchability are two terms inherent in poultry and game bird rearing operations. Fertility of birds is marked by the production of viable or fertile eggs. Hatchability refers to the capability of eggs to hatch and is expressed as percent of fertile eggs that hatch. Fertility can be affected by age, mating ratio, inbreeding (Woodard et al. 1973), and density of birds (Ernst and Coleman 1966). Hatchability can be affected by age, diet, and inbreeding of parent stock (Woodard et al. 1973); density of birds (Ernst and Coleman 1966); duration (Woodard et al. 1973, Maclaury and Moran 1959), temperature and humidity of storage before incubation (Cain and Wormeli 1972); physical damage to the egg shell (Howes 1967); bacterial contamination (Maclaury and Moran 1959); temperature, humidity, ventilation (Howes 1967, Cain and Wormeli 1972), and turning frequency during incubation (Marsh 1975).

This study was designed to determine if egg proximity during incubation affects hatchability in coturnix and button quail eggs. Innumerable factors may affect fertility and hatchability, but in this study all eggs were from the same parent stocks, and all birds in the parent stocks were subject to similar conditions during the

study period. All eggs in each batch were treated the same so that the only variable parameter was proximity during incubation.

Materials and Methods

Laboratory populations of *Coturnix coturnix japonica*, coturnix or Japanese quail, and *Excalfactoria chinensis*, button quail, provided the eggs for this study. Eggs gathered each day were carefully cleaned and stored at 68°F and 30 to 40% relative humidity for not more than seven days. All eggs were turned once each day.

Just prior to incubation, coturnix and button quail eggs were each randomly divided into two equal-sized groups. One group each of coturnix and button eggs was put into one-quarter-inch-mesh wire baskets so that each egg touched at least two other eggs. Hereafter, these are referred to as "proximate" groups. The other group of each type was placed on an incubator tray so that each egg was at least one inch away from the nearest egg. These are called "remote" groups. All eggs of each batch began incubation simultaneously.

Nine batches of eggs were incubated in successive weeks from 20 December 1974 to 18 February 1975. Four additional batches were set from 18 July to 15 August 1975. Button quail eggs were unavailable for the first and twelfth settings.

A Montgomery Ward Model LZ355 forced air egg incubator was used throughout the study. The temperature was maintained at 99.5 to 100.5°F as monitored by a Sears, Roebuck and Co. incubator thermometer and a Scientific Products no. T2010-1 chemical thermometer, range -30 to 120°F. Two supplementary glass dishes on the top egg tray

were kept full of water as well as the three-section water pan below the egg trays. A plastic spray bottle kept in the incubator was used to spray a warm-water mist over the eggs each time they were turned. The relative humidity was thereby maintained between 65 and 70%, as shown on the wet-dry bulb thermometer mounted in the incubator. Incubator temperature and humidity were periodically checked by a Bacharach Industrial Instrument Co. recording hygrothermograph.

Distilled water was used in water pans and the spray bottle thereby eliminating frequent cleaning of water pans and reducing disturbance to incubating eggs. Less scum appeared on the water surface than with tap water. A surface film may inhibit evaporation, lower relative humidity, and when accumulated on eggs may cause a respiration problem.

The incubation period for coturnix and button quail eggs is 16 to 17 days. All incubating eggs were turned three times per day Monday through Friday and twice each day during weekends through the fourteenth day of incubation. Eggs were sprayed with a fine mist of warm distilled water each time they were turned; after the fourteenth day they were sprayed but not turned. Eggs were not candled.

Dry chicks were removed from the incubator only at regular egg turning times. All unhatched eggs in each batch were removed from the incubator 48 hours after the first chick hatched, opened, and examined macroscopically for infertility, dehydrated contents, and dead embryos.

Hatching success was calculated for each group of eggs as follows:

$$\text{total eggs set} - \text{infertile, cracked rotten eggs} = \text{fertile undamaged eggs set}$$

$$\frac{\text{eggs hatched}}{\text{fertile undamaged eggs set}} = \text{percent fertile undamaged eggs hatched}$$

Results and Discussion

Comparison of the hatchability percentages for proximate and remote groups for each species (Table 1) indicates differences of up to 26 percent. However, this varies from 26 percent higher in a coturnix remote group to 25 percent higher in a coturnix proximate group. Hatchability was higher in the coturnix proximate groups seven times and six times in the coturnix remote groups. This seems to indicate a slight advantage in using the proximate group technique for coturnix eggs. For button quail eggs, however, the proximate and remote groups each had higher hatchability five times; at one setting hatchability was equal for the two groups.

A study such as this is valuable if the results can be evaluated on a practical basis. A dependent t-test was performed on the data for each species comparing the proximate group technique to the remote group technique. The tests indicated that there is no significant difference between the techniques at the 0.05 probability level; egg proximity during incubation did not significantly affect hatchability in this study.

Table 1. Percent fertile undamaged eggs hatched for proximate and remote groups of coturnix and button quail eggs. Dashes indicate lack of data.

Batch	Coturnix Quail		Button Quail	
	Proximate	Remote	Proximate	Remote
1	38.46	61.54	-----	-----
2	42.11	25.00	62.50	80.00
3	37.93	37.50	54.16	56.00
4	35.29	31.82	47.06	65.71
5	58.33	33.33	55.55	44.44
6	33.33	60.00	56.52	54.55
7	26.67	38.46	59.09	46.15
8	28.57	20.00	35.29	47.06
9	61.54	35.71	33.33	50.00
10	60.00	40.00	28.57	20.00
11	50.00	58.82	50.00	47.37
12	57.89	62.50	-----	-----
13	55.55	57.14	52.38	52.38

REFERENCES CITED

Cain, J. R. and B. C. Wormeli. 1972. Japanese Quail (Coturnix): Care, Management, Propagation. Texas Ag. Exp. Sta. Bull. 1123. 14 pp.

Ernst, R. A. and T. H. Coleman. 1966. The influence of floor space on growth, egg production, fertility and hatchability of the *Coturnix coturnix japonica*. Poultry Sci. 45:437-440.

Howes, J. R. 1967. Hatchery management and disease prevention for coturnix quail. Lab. Animal Dig. 3:12-14.

Maclaury, D. W. and A. B. Moran. 1959. Bacterial contamination of hatching eggs. Kentucky Ag. Exp. Sta. Bull. 665. 27 pp.

Marsh, A. F. 1975. Quail Manual. 7th ed. Marsh Farms, Garden Grove, California. 52 pp.

Woodard, A. E., H. Abplanalp, W. O. Wilson and P. Vohra. 1973. Japanese Quail Husbandry in the Laboratory. Marsh Farms, Garden Grove, California. 22 pp.