



The effect of pre-adult and adult light on reproductive performance of white leghorn pullets
by Thomas W Wilcox

A THESIS Submitted to the Graduate Faculty In partial fulfillment of the requirements for the degree
of Master of Science in Animal Industry
Montana State University
© Copyright by Thomas W Wilcox (1961)

Abstract:

Egg production of White Leghorn pullets subjected to light-dark cycles of 20, and 16 hours was investigated. Pullets were pre-conditioned on light-dark ratios of 12-12, 8-12, 12-8, 4-12, and 12-4 from 12 to 18 weeks of age. The birds were then re-randomized and given the same light-dark ratios to 54 weeks. Observations made during the experiment were age at first egg, rate of production to 54 weeks of age, number of eggs laid during the first 100 days of production, and egg weights.

Pullets exposed to 12 hours of pre-adult dark per cycle laid their first eggs at approximately the same average time. Those that received less than 12 hours of dark per cycle were retarded from 5 to 17 days.

Birds receiving 12 hours of adult light per cycle were nearly equal in response. Those that received less than 12 hours of light per cycle were retarded from 21 to 34 days.

In rate of production to weeks, 12 hours of adult light increased the rate of lay, shorter lengths reduced rates. Pre-adult light had no effect on rate.

In number of eggs to 100 days, 12 hour adult light increased numbers of eggs, shorter photoperiods reduce egg numbers. Pre-adult light had no effect on egg numbers.

Egg weight was not affected by the various lighting regimes.

No interactions were found between pre-adult and adult light in any of the observations.

THE EFFECT OF PRE-ADULT AND ADULT LIGHT ON
REPRODUCTIVE PERFORMANCE OF
WHITE LEGHORN PULLETS

by

THOMAS W. WILCOX

A THESIS

Submitted to the Graduate Faculty

in

partial fulfillment of the requirements

for the degree of

Master of Science in Animal Industry

at

Montana State College

Approved:

Fred S. Willson

Head, Major Department

George J. Davis

Chairman, Examining Committee

Leon J. Brown

Dean, Graduate Division

Bozeman, Montana
June, 1961

N378
W644
cop. 2

- 2 -

ACKNOWLEDGMENTS

I wish to express my sincere appreciation to Dr. G. T. Davis, Head, Poultry Industry Department, for his invaluable suggestions and guidance throughout my graduate program and in the preparation of the manuscript.

I wish to thank Dr. O. O. Thomas and Dr. D. W. Blackmore for their assistance in the preparation of this thesis. Appreciation is extended to the other staff members of the Poultry Industry Department for their help in collecting these data.

Grateful and sincere appreciation is expressed to my wife, Hansi, for her help, understanding and encouragement during my graduate work.

149528

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	2
INDEX TO TABLES	4
INDEX TO FIGURES	5
ABSTRACT	6
INTRODUCTION	7
REVIEW OF LITERATURE	8
Response of Chickens to Adult Light-Dark Cycles	8
Response of Chickens to Adolescent Light-Dark Cycles	15
Light Effect Upon Egg Size	16
Light Intensity	17
Transmission of Light Stimulus	18
Carry-over Period	18
MATERIALS AND METHODS	20
RESULTS AND DISCUSSION	25
Effect of Light on Age at Sexual Maturity	25
Effect of Pre-Adult and Adult Light on Per Cent Production to 54 Weeks of Age	27
Effect of Light on Number of Eggs to 100 Days	29
Effect of Pre-Adult and Adult Light on Egg Weight	30
SUMMARY	32
LITERATURE CITED	35

INDEX TO TABLES

I	Light-Dark Treatment Combinations	40
II	Analysis of Variance of Light Effect on Sexual Maturity	41
III	Mean Age at Which First Egg was Laid	42
IV	Analysis of Variance of 12 Hour Adult Light Effect on Age at First Egg	43
V	Analysis of Variance of Light Effect on Per Cent Production to 54 Weeks	44
VI	Mean Rate of Production From Time First Egg to 54 Weeks of Age	45
VII	Analysis of Variance of 12 Hour Adult Light Effect on Per Cent Production to 54 Weeks	46
VIII	Analysis of Variance of Light Effect on Number of Eggs to 100 Days	47
IX	Mean Eggs to 100 Days of Production From Time of First Egg . .	48
X	Analysis of Variance of 12 Hour Adult Light Effect on Number of Eggs to 100 Days	49
XI	Analysis of Variance of Light Effect on Egg Weight	50
XII	Mean Weight of Eggs in Grams (6 Months)	51

INDEX TO FIGURES

1	Effect of Pre-Adult Light on Average Daily Egg Production	52
2	Effect of Adult Light on Number of Eggs	53

