



RURAL INDUSTRIES RESEARCH
& DEVELOPMENT CORPORATION

Egg and Egg Shell Quality in the Australian Egg Industry

**A report for the Rural Industries Research
and Development Corporation**

by Juliet R. Roberts

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Foreword

This project has, as its major output, a booklet which provides guidelines on egg internal quality and egg shell quality for the Australian Egg Industry. This booklet will be published by the RIRDC Egg Program in the latter half of 2002. The booklet also correlates laboratory measurements of egg internal quality and egg shell quality with the percentage downgrades in the commercial situation.

This project was funded from industry revenue which is matched by funds provided by the Federal Government.

This report, a new addition to RIRDC's diverse range of over 600 research publications, forms part of our Egg Industry R&D program, which aims to support improved efficiency, sustainability, product quality, education and technology transfer in the Australian egg industry.

Peter Core

Managing Director

Rural Industries Research and Development Corporation

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This project would not have been possible without the generous cooperation of many producers and industry personnel. Their input and the tolerance that they demonstrated throughout the project are greatly appreciated.

Mr Peter Mathew, of the Teaching and Learning Centre at the University of New England produced the graphs of egg internal quality and egg shell quality of the different strains of hens at different ages.

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Executive Summary

In order to optimise the profitability of the Australian Egg Industry, it is essential to have industry guidelines or benchmarks for the quality of the end product of the industry – the egg. Different producers and egg grading facilities have their own methods of monitoring quality. Historically there has been no common standard against which producers and other industry personnel could compare egg quality.

The main outcome of this project is a booklet containing sufficient information for producers to be able to compare the egg internal quality and egg shell quality of their flocks with typical data from the industry.

In order to provide quality guidelines it was necessary to sample widely from commercial production facilities from as many parts of Australia as practicable. Researchers at several locations in Australia, including at the University of New England, conduct detailed laboratory measurements of egg internal quality and egg shell quality. There were two different types of study conducted. The first type was the “Longitudinal Studies” where individual flocks were studied at different ages. The second type was the “Cross-sectional Studies” where samples of eggs from flocks of known backgrounds were sampled, mainly from commercial grading floors. A total of 271 flocks were sampled, each of 90 eggs – a total of 24,390 eggs (16,650 from the Longitudinal Studies and 7740 from the Cross-sectional Studies). Of the 271 samplings of eggs, 221 were from New South Wales, 37 from Queensland, 2 from Victoria and 11 from South Australia.

Only the data obtained from the three main strains: Isa Brown, HyLine Brown and HiSex are included in the strain versus age comparisons. There were insufficient data from the other strains for meaningful comparisons.

Where comparisons were conducted on effects of factors such as strain, location housing or time of year, it was frequently not possible to maintain all other variables constant. This resulted in there being difficulties correlating the laboratory measurements made by researchers with the outcomes in the commercial situation. Furthermore, some producers and egg grading facilities were not able to provide records that were of sufficient detail to be suitable for the present study. These limitations need to be borne in mind when evaluating the findings of such comparisons.

It is anticipated that the booklet published from this project will enhance the use of record-keeping in the evaluation of flock performance, in order to increase the profitability of the Australian Egg Industry.

CHAPTER 1

THE EGG AND EGG SHELL QUALITY BOOKLET

Introduction

The Australian Egg Industry is a highly competitive industry. In order to optimise the profitability of the industry, it is essential to have industry guidelines or benchmarks for the quality of the end product of the industry – the egg. Different producers and egg grading facilities have their own methods of monitoring quality. However, until the production of the booklet arising from this project, there has been no common standard against which producers and other industry personnel could compare egg quality.

Researchers at several locations in Australia, including at the University of New England conduct detailed laboratory measurements of egg internal quality and egg shell quality. In addition, producers and egg grading facilities have their own processes in place for quality management. However, there have been difficulties correlating the laboratory measurements made by researchers with the outcomes in the commercial situation.

The booklet arising from this project addresses this need.

Sampling from commercial production facilities

In order to provide quality guidelines to the Australian Egg Industry, it was necessary to sample widely from commercial production facilities from as many parts of Australia as practicable. Producers and grading floor facilities had to be willing to participate and to tolerate the inconvenience associated with sampling eggs and, in most cases, sending them off via a carrier to the University of New England for the detailed analyses. They also had to be willing and able to provide information about the flocks from which the eggs originated. Some who were willing to participate were not able to provide records that were of sufficient detail to be suitable for the present study.

How the information was collected

The data presented in this booklet are the actual measurements made on eggs collected from commercial situations. There were two different types of study conducted. The first type was the “longitudinal studies” where individual flocks were studied at different ages. The second type was the “cross-sectional studies” where samples of eggs from flocks of known backgrounds were sampled, mainly from commercial grading floors. In all, 36 flocks were sampled in the longitudinal studies (9 HyLine Brown, 12 HiSex and 14 Isa Brown) with a total of 185 sampling occasions (37 HyLine Brown, 57 HiSex and 91 Isa Brown). Eighty-six flocks were sampled for the cross-sectional studies (one sampling from each flock – 35 HyLine Brown, 25 HiSex, 17 Isa, 6 Lohmann, 1 HyLine W36, 1 HyLine Gray, 1 Ingham Tint). This resulted in a total of 271 samples from flocks, each of 90 eggs – a total of 24,390 eggs (16,650 from the Longitudinal Studies and 7740 from the Cross-sectional Studies). The flocks sampled were mainly from three strains of birds: Isa Brown, HyLine Brown and HiSex. However, limited data were collected from Lohmann Brown, HyLine W36 (white egg layers), HyLine Gray (tinted eggs), Ingham Tint (tinted eggs). Of the 271

samplings of eggs, 221 were from New South Wales, 37 from Queensland, 2 from Victoria and 11 from South Australia.

For some of the eggs sampled, it was possible to obtain records of percentage downgrades at the farm or at the grading floor. The percentage downgrades was correlated with the detailed laboratory measurements so that it will be possible for producers and other industry personnel to estimate the percentage of downgrades that will result from flocks, if they know the detailed characteristics of the eggs from that flock, e.g. shell breaking strength.

The Contents of the Booklet

The booklet contains information under the following headings:

Introduction

How the Information Contained in this Booklet was Collected
The Structure of the Egg

Measurement of Egg Shell Quality and Egg Internal Quality

[Measurements made of egg internal quality as well as egg shell quality are described]

Internal quality

- albumen height
- Haugh Units (the equation by which Haugh Units are calculated from egg weight and albumen height is included)
- yolk colour score

Egg shell quality measurements

- egg weight
- shell colour
- shell breaking strength
- deformation
- shell weight
- shell thickness
- shell weight : egg weight ratio (calculated)

Effect of Hen Age and Strain

Egg Shell Quality

- Egg weight
- Shell Reflectivity
- Shell Breaking Strength
- Shell Deformation
- Shell Weight
- Percentage Shell
- Shell Thickness

Egg Internal Quality

- Albumen Height and Haugh Units

Other Comparisons

- Strain Comparisons
- Type of Feed
- Mash versus Pellets/Crumble
- Type of Grain Used
- Use of Feed Enzymes
- Vaccination Protocols
- Production System
- Shed Type
- Time of Year
- Location

Effect of Storage Conditions on Egg Internal Quality

- Time, temperature and humidity effects on weight loss in eggs
- Time, temperature and humidity effects on albumen height and Haugh
Units

Correlations between Laboratory Measurements of Egg Quality and the Commercial Situation

Relevant References

CHAPTER 2

OVERALL CONCLUSIONS AND RECOMMENDATIONS

The main outcome of this project is a booklet which will be published and marketed by the RIRDC. The booklet contains sufficient information for producers to be able to compare the egg internal quality and egg shell quality of their flocks with typical data from the industry. It will therefore be possible for producers and other industry personnel to determine if a flock is performing within the expected range for its strain, age and other conditions or if it is falling below industry standards.

The data contained in the booklet are aggregates from a number of producers, strains, locations etc. However, the broad guidelines provided will enhance quality control in the Australian Egg Industry.

During this project, it was obvious that record keeping in the current Australian Egg Industry ranges from minimal to excellent. Record keeping is obviously time-consuming and expensive and producers and grading floors keep only what records are important to them. However, there is convincing evidence that good record keeping and subsequent strategic use of these records are the cornerstone of a successful and profitable operation.

It is anticipated that the booklet published from this project will enhance the use of record keeping in the evaluation of flock performance, in order to increase the profitability of the Australian Egg Industry.