COLOR INDEX DEVELOPMENT OF NAGOYA COCHIN EGGSHELL

Shoma Nagaya [1*], Ryoma Yamashita[1], Mika Akao[2], Hiromitsu Miyakawa[2], Akihiro Nakamura[2], Toshihiko Tsukada[3], and Mikiko Kawasumi[1]

[1]Meijo University, Japan
[2] Aichi Agricultural Research Center, Japan
[3]Aichi Institute of Technology, Japan

Background and Purpose

The purpose of this study is to survey an attractive color range and develop a color visualization system for eggshells of Nagoya breed (commonly known as Nagoya Cochin) to manage their visual quality. This system is expected to be a useful and practical tool for agricultural researchers to continue traditional breeding to obtain regional products.

Unique visual characteristic:
"Sakura Fubuki" (桜吹雪)
1. Pink colored body
2. White spots

Nagoya breed　Breed A　Breed B

Fig. 1: Eggshell color differences for 3 breeds

Survey Results and Current System

< Survey Results >

We determined the practical color index using Hunter Lab for quality control based on visual evaluation experiments (2021).

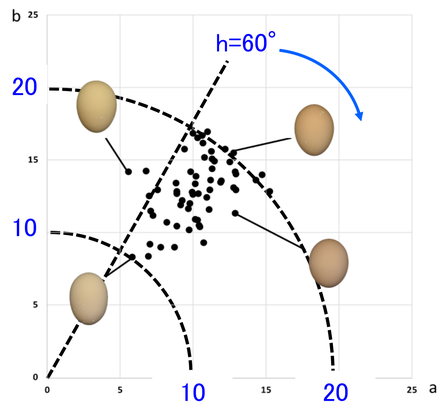
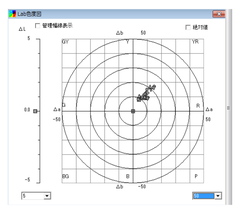


Fig. 2: Attractive color range

< Current System at Research Center >

Inspectors measure colors of about 1,000 eggs each 3 months by current system to maintain Nagoya breeds.

Color Difference Meter TC-8600A
by Tokyo Denshoku



User Interface

Fig. 3: Current measurement system

Development of Color Measurement and Visualization System

< Hardware > **Fig. 4**

It consists of a portable Spectrophotometer, a laptop, and an input device.

Egg

Spectrophotometer CM-700d
SDK(Software Development Kit)
by Konika Minolta

Laptop computer

Input device

Fig. 4: Color Measurement and visualization system (Prototype)

Hen's information↓　↓Results of color measurement

← Command button of calibration

← Command button of measurement

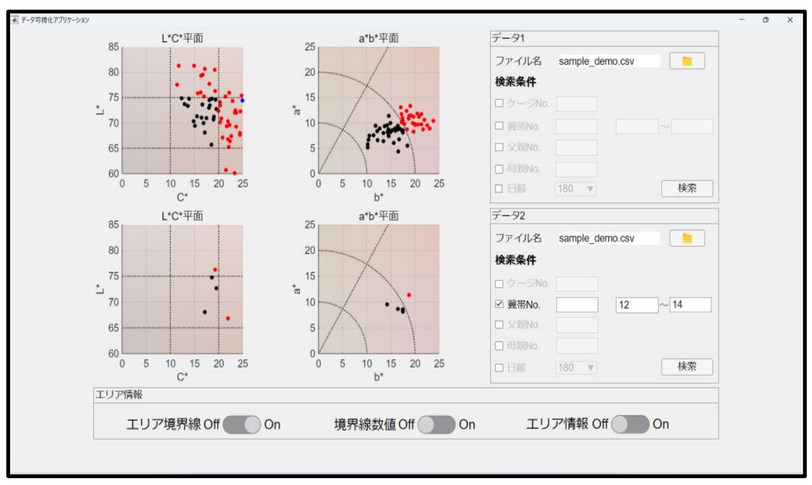
Waiting for additional input info. on site ↑

a) GUI for color measurement

● : OK
● : NG

Display of color quality →

Results to compare →



← Waiting for Search command

b) GUI for color visualization

Fig. 5: Graphical User Interface

< Software > **Fig. 5**

a) GUI(Graphical User Interface) for color measurement
- Calibration of spectrophotometer
- Color measurement
- Display of hen's information
- Waiting for additional input information on site

b) GUI for color visualization
- Display of color quality on $L^*a^*b^*$ space
- Waiting for search command

Trial and Results

< Actual Trial in the field >

Venue: Aichi Agricultural Research Center
Date: 3rd October 2023
No. of eggs: 147 Nagoya breed
Operator: Agricultural researcher

Video

Table 1: Comparison between two systems

	Current	New
Mobility of measuring part	—	★
Operation speed	★	★★
Display of color quality	—	★
Data searchability	—	★

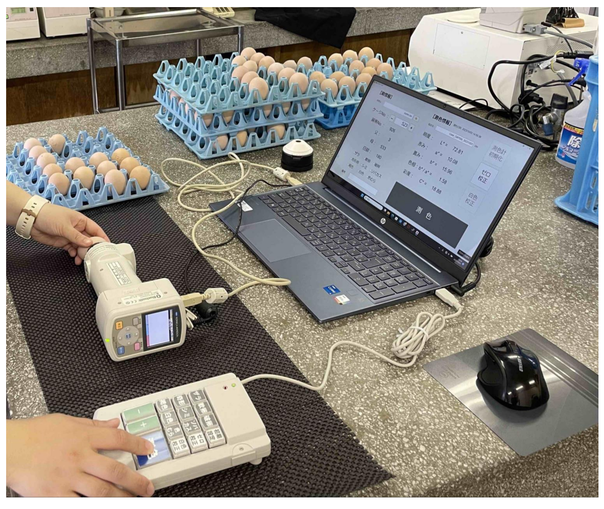


Fig. 6: Trial scene

Conclusion and Future

- After trial in the field, several functions required improvement were identified, and the GUI was modified.

- New system can work speedy and smoothly and is expected to contribute to cost reduction in time and operational effort.

- Next, we'll try to build a system that integrates to evaluate the quality of colored body and white spots as the Nagoya breed.