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THE PLUMAGE COLOUR PATTERN HEREDITY AND REPRODUCTIVE PERFORMANCE OF STARBLUE AND GREEN CANARY (*Serinus canaria*)

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Abstract

The aim of this research is to analysis the heredity of plumage colour pattern of canary in relation with their economic reason as well as their reproductive performance. The result from this study may be utilized as important information in relating with the strategic planning of crossing efforts to increase the probability to have desired plumage colour and valuable birds. This research was conducted in two methods: (1) A case study method for determining individual homozygous bird and (2) experimental method. The treatment using in this research are the colour plumage of canary named star blue and green. Data obtained were analysed using X^2 (chi-square) method for plumage character and t-test for reproductive performance of birds. Starblue and Green plumage colour canary of parents were crossed and their offspring resulted plumage colour types like their parental. The colour of starblue and green canary plumage is controlled by the combination of two autosom allelic. Green plumage colour is caused by a single gene (sb) that is recessive to starblue plumage gene (Sb). The main difference of plumage colour character between starblue and green can be observed in pectoral part body. The plumage colour of starblue has light grey and the plumage colour of green has light yellow. No difference of reproductive performance observed in starblue and green canary. Age of first mating was 7 months, hatchability was 79 %, pre weaning mortality was 27 %, weaning age was 25 days, day of hatching was 15 days, interval of laying after mating was 12 days. So, the best canary can be selected through their pure *colour* plumage and their reproductive performance.

Key words: Heredity, Plumage *colour*, Canary, Reproduction

Introduction

Recently, traditional genetic method has been practically utilized by canary farmer, especially in regulating plumage *colour* pattern desired. There is no exact information yet or fixed method was adopted in relation to plumage *colour* heredity. Until 2002 (Mudawamah, Tibiyanah and Syaifatullah, 2002), the starblue plumage *colour* has the most populated (46 % from the population of canary with plain *colour*) in Malang city than the others (green, yellow, white etc). Meanwhile, the preference and the price of canary depend on their *colour* plumage that is varied

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among different regions. So, a basic field study is important to determine the *colour* pattern and heredity of canaries.

The result from the study may utilize as important information in relating with strategic planning in crossing effect to increase probability to have desired plumage *colour* and valuable birds.

Materials and Methods

The canary with Starblue and green plumage pattern were used in this study. The treatment, crossing program were used in this research, are starblue crossed starblue, green crossed starblue and green crossed green.

The samples of canary were obtained from various private breeders who have been over ten females and have relatively same management.

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Results and Discussions

Plumage *colour* pattern

The result of resiproc crossing from starblue vs. starblue, green vs. green, starblue vs. green gave the same various offspring (no significant). It proved those plumage colours aren't determined by sex. It means, the *colour* of pigmented plumage is determined by autosom genes. This data are consistent with Truax and Johnson (1979) and Chikamune and Kanai (1979) who concluded that plumage *colour* of quail were due to an autosomal gene. So, the *colour* of plumage desired could be obtained without sex consideration.

Characteristic of plumage *colour*

Crosses between Starblue plumage *colour* or *inter se* crossing with Starblue resulted in, all offspring were Starblue (Table 1). The Green was done through the *inter se* crossing gave all Green offspring. Because all offspring from two crossing were derived the same *colour* as their parental, it indicate that Starblue and Green were homozygous. This condition is consistent with Bourdon (1997) who concluded that animal would called be homozygous if all offspring from the inter se crossing resulted phenotype have the same *colour* as the parental.

Table 1. Ratios from inter se mating of Starblue vs. Green

Parental Plumage *Colour*	Plumage *Colour*		Total Number	Expected Ratio	X^2
	Starblue	Green			
Starblue X Starblue Sb Sb Sb Sb	19	-	19	All	0.00
Green X Green sb sb sb sb	-	10	10	All	0.00

When Starblue plumages were crossed with Green plumage *colour*, all offspring were Starblue plumage *colour*s were called F1 (Table 2). The F1 were done inter se crossing, produced progeny with a ratio of 3 Starblue plumages to 1 Green plumage *colour* (Table 2). It is indicating that Starblue plumage *colour* is an allele of Green plumage *colour*. It was supported by the fact that all offspring were Starblue plumage when the F1 were crossed Starblue homozygous (Table 2).

The data from the various mating show that green plumage *colour*, sb is recessive to Starblue allele Sb. It suggested that Starblue plumage *colour* is wild type, which is consistent with the observation in quail by Truax and Johnson (1979).

Table 2. Ratios from mating involving Starblue heterozygous

Parental Plumage *Colour*	Plumage *Colour*		Total Number	Expected Ratio	X^2
	Starblue	Green			
Starblue X Green (Sb Sb) (sb sb)	10	-	10	All	0.00
Starblue X Green (Sb sb) (sb sb)	8	6	14	1 : 1	0.28
Starblue X Starblue (Sb sb) (Sb sb)	19	6	25	3 : 1	0.02

From this result, it was suggested that Starblue without mosaic could be obtained from crossing among plain *colour* of Starblue, as well as green canary without mosaic that only derived from crossing green vs. green canary.

The characteristic of Starblue vs. Green plumage in their Day O Canary (DOC), ten days old (day 10) and adult respectively have shown in Table 3.

Table 3. The characteristic of Starblue and Green Plumage *Colour*

Items	Characteristics					
	DOC		10 days		2 months	
	Starblue	Green	Starblue	Green	Starblue	Green
Head	white*	white*	Dark brown green	brown	Dark grey green	Dark
Neck	-	-	Dark brown green	Brown	Light grey green	Light
Pectoral	-	-	White brown green	Brown	Light grey yellow	Green
Abdominal	-	-	Brown white Yellow	Green	Dark grey yellow	Dark
Dorsum	white*	white*	Dark brown brown	Green	Dark grey green	Dark
Wings	-	-	Dark brown brown	Green	Black brown green	Dark
Tail	-	-	Dark brown brown	Green	Dark red red	Dark
Shank	dark red	dark red	Dark red	Dark red	Black	Black
Eyes	#	#	Black	Black	Black	Black
Beak	dark red	dark red	Dark black	Dark black	Whiteness black	White

* cotton feathered
- no feathered and the skin *colour* is dark red
\# closed condition

The *colour* of Green and Starblue can be well distinguished at 2 months of age, however in 10 days old bird the different of *colour* still weak and there are no different of visual *colour* in Day O Canary. In days ten, the specific *colour* showed in pectoral part that is bright grey for Starblue and yellowish green for green canary. The difference of Green and Starblue at the mature age is very clear that was reflected in several part of body like head, dorsum, abdominal, tail, wing and dorsum. So, main different laid each in dominant grey *colour* for Starblue and dominant green for Green bird in their same part of body.

Reproduction Performance

There are no significant different ($P>0.05$) in reproduction performance Starblue *colour* compared with Green (Table 4).

Table 4. The mean of reproduction performance of Starblue and Green Canary

Reproduction Performance	Starblue	Green	Literatur
Age of first mating (months)	7,30	7,43	12
Mothering Ability			
a. hatchability (%)	79,08 %	79,21 %	-
b. pre weaning mortality (%)	26,50	26,68	-
Weaning age (days)	24,86	24,50	21 – 24 1) 2)
Total eggs production	3,73	3,80	4 - 6 2)
Number Eggs hatching	2,95	3,01	-
Day of hatching (days)	15	15	13-14 1) 2)
Interval of laying egg after mating (days)	12,47	12,32	7 – 10 1)

Note:
1. Wolnik (1992)
2. Anonimus (2002)

This result showed that hatching days occurred in averages of 15 days that is different with its obtained by Wolnik (1992) and Anonymous (2002) which hatching in 13 – 14 days. In the normal condition usually eggs will hatched in about 13th days. These longer days of hatching may because of traditional methods of hatching used of farmer in relation with temperature and humidity control. In the field, there are no heating additional using even in the colder temperature.

The interval of eggs laying after mating is 12 days, that is longer 71 to 20 % than compared with literature mention in Table 4. The late of weaning age of birds (4 to 19 % compared with the reference used) may give more available time for the female to feed and look after their offspring, so will decrease the brooding stimulation.

So, from Table 4, It can be predicted that the canary in first period of laying could be mate 3 times each equal with 7 offspring, meanwhile hen canary with 6 times of mating could produce about 14 offsprings.

Conclusion and Suggestion

There are some result achieved from this research:
1. The green *colour* (sb/sb) is recessive to Starblue (Sb/-)
2. The Starblue and Green *colour* could be well observed in the 2 months of age in certain part of body, which is dominant grey in Starblue and green for Green canary.
3. It can be suggested that Starblue offspring without mosaic can be obtained from plain *colour* of Starblue vs. plain *colour* of Starblue as well as green canary that derived only from green vs. green canary.

4. Base on their reproductive performance, it can be predicted that the canary at first period of laying could be mate 3 times each equal with 7 offspring, meanwhile female canary with 6 times of mating could produce about 14 offspring.

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