

**第19回
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*Japanese Study Group on Artificial Reproduction of
Endangered Animals (J-AREA)*

姫路市立動物園・姫路セントラルパーク

姫路市立水族館・神崎農村公園 ヨーデルの森

*Himeji City Zoo, Himeji Central Park,
Himeji City Aqualium & Kanzaki Yodel Forest Park*

Heri Dwi Putranto

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3. Project Aves (鳥類人工繁殖プロジェクト)

[INTRODUCTION OF INDIGENOUS BENGKULU CHICKEN,
POPULATION DISTRIBUTION, FEMALE PRODUCTION
AND REPRODUCTIVE ORGANS DESCRIPTION]

○Heri Dwi Putranto^{1,2}

¹Animal Science Department, Faculty of Agriculture, University of Bengkulu

²Graduate School of Natural Resources and Environmental Management,
Faculty of Agriculture, University of Bengkulu)

There are various sub-species of Indonesia indigenous native and wild chickens. Some are cross-breeds from a wild sub-species, semi-domesticated and free ranged in a backyard farming system in rural area. Bengkulu Province has a native chicken called burgo with small and compact body size, smaller than kampung chicken bigger than wild chicken. Aim of the research were; 1) to investigate the existence of Burgo chicken by calculating the number of population, population density and distribution pattern of Burgo chicken under traditional domestication system on five districts of Bengkulu Province, 2) to identify the effects of extract of *Sauropus androgynus* (ESA) supplementation on female burgo chicken's egg production (number and weight) and female reproductive organs measurements (weight of ovarium and oviduct, and length of oviduct). In the first experiment, a survey method was applied, the collected data were analyzed for Variance-Mean Ratio and formula Density, which were descriptively discussed. Then it was continued by adding the extract of *Sauropus androgynus* (ESA) into drinking water with 3 different levels (non-supplemented, 9, 18 and 27 g/chicken/day) during 8 weeks of the second experiment. The result showed that the highest population percentage of Burgo chicken (32%) was in Rejang Lebong district and the highest population density of 0.071 chicken/km² was in Central Bengkulu district. The population distribution pattern were categorized as group random distribution. The supplementation of ESA dosed 9 to 27 g/chickens/day had no significantly affected egg production and reproductive organs weight and length ($p > 0.05$). However, as a conservation effort, the 27 g/chicken/day of ESA supplementation level resulted the highest egg production compared to another levels. It can be concluded that two determinant factors in Burgo chicken domestication in those districts of Bengkulu Province were socio economic and local cultural factors. We believe that several further development and exploration should be conducted to discover more beneficial aspect of traditional herbs (ESA) on its production and reproductive organs performances.

**INTRODUCTION OF INDIGENOUS BENGKULU CHICKEN, POPULATION
DISTRIBUTION, FEMALE PRODUCTION AND REPRODUCTIVE
ORGANS DESCRIPTION**

Heri Dwi Putranto^{1,2)}

E-mail : heri_dp@unib.ac.id

¹⁾ Animal Science Department, Faculty of Agriculture, University of Bengkulu, Jalan Raya Kandang Limun, Bengkulu, Indonesia, ²⁾ Graduate School of Natural Resources and Environmental Management, Faculty of Agriculture, University of Bengkulu, Jalan Raya Kandang Limun, Bengkulu 38371A, Indonesia
Telp +62 736 21170 ext.219 Fax +62 736 21290

ABSTRACT There are various sub-species of Indonesia indigenous native and wild chickens. Some are crossbreeds from a wild sub-species, semi-domesticated and free ranged in a backyard farming system in rural area. Bengkulu Province has a native chicken called burgo with small and compact body size, smaller than kampung chicken bigger than wild chicken. Aim of the research were; 1) to investigate the existence of Burgo chicken by calculating the number of population, population density and distribution pattern of Burgo chicken under traditional domestication system on five districts of Bengkulu Province, 2) to identify the effects of extract of *Sauropus androgynus* (ESA) supplementation on female burgo chicken's egg production (number and weight) and female reproductive organs measurements (weight of ovarium and oviduct). In the first experiment, a survey method was applied, the collected data were analyzed for Variance-Mean Ratio and formula Density, which were descriptively discussed. Then it was continued by adding the extract of *Sauropus androgynus* (ESA) into drinking water with 3 different levels (non-supplemented, 9, 18 and 27

g/chicken/day) during 8 weeks of the second experiment. The result showed that the highest population percentage of Burgo chicken (32%) was in Rejang Lebong district and the highest population density of 0.071 chicken/km² was in Central Bengkulu district. The population distribution pattern were categorized as group random distribution. The supplementation of ESA dosed 9 to 27 g/chickens/day had no significantly affected egg production and reproductive organs weight and length ($p > 0.05$). However, as a conservation effort, the 27 g/chicken/day of ESA supplementation level resulted the highest egg production compared to another levels. It can be concluded that two determinant factors in Burgo chicken domestication in those districts of Bengkulu Province were socio economic and local cultural factors. We believe that several further development and exploration should be conducted to discover more beneficial aspect of traditional herbs (ESA) on its production and reproductive organs performances.

Key words: Burgo chicken, Population, Production, Reproduction.

INTRODUCTION

In Indonesia, there are various sub-species of indigenous chickens and can be categorized as one of Indonesia treasure and should be conserved immediately. They are well domesticated and well known as fancy fowls or landrace chickens among Indonesians. However, there are also wild sub-species of indigenous chicken, unfortunately this rare sub-species have some weakness such as difficult to domesticated and could not adapt to a captivity condition, which affected their survival number *ex situ*. Therefore, conservation program would be one effort to increase their population by improving the reproductive performances.

One of those wild sub-species of Indonesia indigenous chicken called Burgo chicken. It is an endemic indigenous chicken of Bengkulu, a province which is located in Sumatera island. Burgo chicken is crossbreed of male Red Jungle fowl (*Gallus gallus* or *Gallus bankiva*) with female Kampung chicken (*Gallus domestica*). Burgo chicken has been kept by rural communities for many generations in Rejang Lebong regency, Bengkulu Province, therefore it is also known as Rejang chicken. It is also domesticated by some farmers in other regencies such as Lebong regency, Kepahiang regency, North Bengkulu regency and Central

Bengkulu regency recently. Farmers in rural area of Bengkulu keep burgo chicken live naturally by a backyard farming system. However, similar to their parental characteristics (kampung chicken and wild chicken) which is a low reproduction rate and a low growth rate resulted in a low population growth rate.

In this study, we would like to investigate: first, the existence of Burgo chicken by calculating the number of population, population density and distribution pattern of Burgo chicken under traditional domestication system on five districts of Bengkulu Province, and second, to identify the effects of extract of *Sauropus androgynus* (ESA) supplementation on female burgo chicken's egg production (number and weight) and female reproductive organs measurements (weight of ovarium and oviduct).

MATERIAL AND METHOD

First Study

Aim of the first study was to investigate the existence of Burgo chicken by calculating the number of population, population density and distribution pattern of Burgo chicken under traditional domestication system on five districts of Bengkulu Province. This study was conducted during July to August 2009.

The sensus team was consisted of 6 investigators. They were well trained prior the study began and well informed about Burgo chicken phenotypically description and the 5 regencies topographical information. A survey method was applied, the collected data were analyzed for Variance-Mean Ratio and formula Density, which were descriptively discussed.

Second Study

This study was conducted at Commercial Zone and Animal Laboratory, Department of Animal Science, Faculty of Agriculture, University of Bengkulu, Indonesia during May to July 2010. Sixteen female burgo chickens age ranged between 10 to 12 months were used in

this study. Each female burgo chicken was housed in a postal cage size 1.0 x 0.8 m² facilitated with feeding and drinking water tools. Cage and the tools were sprayed by disinfectant a week prior the study. During the first 10 days, chickens were in adaptation period for the cage, tools and formulated animal feed.

Completely randomized design (CRD) was used as research design with 4 treatments. There were 16 females burgo chickens distributed into 4 treatments. The treatments were :

H1 : female burgo chicken with no supplementation as control group.

H2 : female burgo chicken supplemented SA extract dose 9 g.

H3 : female burgo chicken supplemented SA extract dose 18 g.

H4 : female burgo chicken supplemented SA extract dose 27 g.

The production parameters were collected during the study period. In the end of study period, female chickens were slaughtered and reproductive organs were measured. All collected data was analysed by using analysis of variance, any significant results tested by using Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The phenotypic characteristic of Burgo chicken are as followings; wide ear and white coloured, feather colour are mostly red to yellow and black to blue, black to silver leg, smaller body size than kampung chicken in common and bigger body size than the Red Forest chicken. Besides compact body form, mature Burgo cock have piercing crow and ornamental beautiful feather's colour (Figure 1).

Burgo cock has body height between 10 to 15 cm with leg length between 5 to 7 cm and body weight varied between 800 to 1,250 g. Burgo hen has body height between 10 to 12 cm with leg length between 4 to 6 cm and body weight varied between 500 to 1,250 g.



Figure 1. Burgo cock profile

First Study

After three months of sensus period conducted on 5 regencies in Bengkulu province, we found the total of population in the year of 2009 was 302 chicken which was consisted of 189 males and 113 females (Table 1). The highest population (32.45%) of Burgo chicken was found in Rejang Lebong regency, and the lowest (8.28%) was found in Kepahiang regency.

Table 1. Captived Burgo chicken in Bengkulu Province in the year of 2009.

	Regencies					Total Population	%
	Leb ^{a)}	RL ^{b)}	Kph ^{c)}	BT ^{d)}	BU ^{e)}		
Male^{*)}	31	64	21	36	37	189	62,58
Female^{*)}	7	34	4	51	17	113	37,42
Total^{*)}	38	98	25	87	54	302	100
%	12,58	32,45	8,28	28,81	17,88		

Note: ^{a)} Lebong regency, ^{b)} Rejang Lebong regency, ^{c)} Kepahiang regency, ^{d)} Central Bengkulu regency, ^{e)} North Bengkulu regency, ^{*)} Calculated in number of chicken.

Data also shown that 62.58% of those captived Burgo chicken were males, and that number was approximately 2-times higher than females number which is 37.42%. The farmers preferred to kept male than female because the male Burgo chicken has several

potencial aspects such as economical value and the male was assumed as a fancy fowl and classified as a long crower type fowl.

Table 2. Population Distribution of Captived Burgo Chicken in Bengkulu Province (year of 2009)

	Regencies					Average
	Leb ^{a)}	RL ^{b)}	Kph ^{c)}	BT ^{d)}	BU ^{e)}	
Male*)	0,016	0,043	0,030	0,029	0,007	0,125
Female*)	0,004	0,023	0,006	0,042	0,003	0,077
Total*)	0,020	0,066	0,036	0,071	0,010	0,202

Note: ^{a)} Lebong regency, ^{b)} Rejang Lebong regency, ^{c)} Kepahiang regency, ^{d)} Central Bengkulu regency, ^{e)} North Bengkulu regency, ^{*)} Calculated in number of chicken per km².

In Table 2, the population density was 0,018 chicken/km² with 0,011 chicken/km² for male and 0,007 chicken/km² for female. The highest population density was found in Central Bengkulu regency (0,071 chicken/km²) and followed by Rejang Lebong regency (0,066 chicken/km²).

In 2003, Rejang Lebong regency had the highest Burgo chicken population (0,4 chicken/km²). This number decreased approximately 0.33 and we assumed it indicated the decreasing of captived Burgo chicken population. In fact, farmers caught wild Burgo chicken from their *in situ* habitat without any conservation understanding. If this poaching process does not followed by a conservation efforts, the population will decrease and this sub-species of indigenous chicken would extinct in the future.

Table 3. Population Distribution of Captived Burgo Chicken in Bengkulu Province

	Regencies					Average
	Leb ^{a)}	RL ^{b)}	Kph ^{c)}	BT ^{d)}	BU ^{e)}	
Burgo	13,29	34,27	4,32	28,46	1,58	1,56

Note: ^{a)} Lebong regency, ^{b)} Rejang Lebong regency, ^{c)} Kepahiang regency, ^{d)} Central Bengkulu regency, ^{e)} North Bengkulu regency.

Population distribution based on Variance-Mean Ratio was 1.58 (Table 3). The population distribution pattern were categorized as group random distribution because the value of Variance-Mean Ratio was higher than 1. We found that there were 2 or 3 villages or areas in each regency have captured Burgo chickens. We assumed that local cultural or interest factor became one of Burgo chicken domestication reason.

The local socio-economic is also became the domestication factor of Burgo chicken. It can be seen by the number of male:female kept by farmers. Male Burgo population was higher than female, and the reason for this situation is male Burgo was classified as fancy fowl and expensive.

Second Study

Production Performances

The result shown that ESA supplementation had no significantly effect ($P > 0,05$) on female Burgo average of egg production and egg weight (Table 4).

Tabel 4. The average of egg production and egg weight (egg number per chicken and gram per egg)

Treatment	Production		Average	Weight		Average	Probability
	Repetition			Repetition			
	1	2	1	2			
H1	11,0	19,0	15,0 ^a	34,8181	37,0555	35,9368 ^a	ns
H2	28,0	21,0	24,5 ^a	34,4164	38,6666	36,5415 ^a	ns
H3	29,0	19,0	24,0 ^a	40,4285	38,0000	39,2142 ^a	ns
H4	28,0	24,0	26,0 ^a	39,2857	39,3333	39,3095 ^a	ns

Note : H1: female burgo chicken with no supplementation as control treatment, H2: female burgo chicken supplemented ESA dose 9 g/chicken/day, H3: female burgo chicken supplemented ESA dose 18 g/chicken/day, H4: female burgo chicken supplemented ESA dose 27 g/chicken/day, ^a, ns: superscribe indicate the group mean is significantly different ($P < 0.05$).

Eventhough statistically non significant different, the H4 treatment had a higher egg production and egg weight compared to other treatment. We believe, the supplementation of

ESA which is contain of benzoate acid, fenil malonate acid, 2-pyrrolidinon and methyl pyroglutamate have a important role in female Burgo egg production improvement.

In the other side, eventhough statistically non significant different, the result showed that ESA supplementation treatment can improve the female Burgo egg weight. ESA has high protein (approximately 6.4 g) and this high protein can improve the egg weight, egg albumin and egg yolk.

Reproductive Organs

The result shown that ESA supplementation had no significantly effect ($P > 0,05$) on the average of female Burgo reproductive organs (ovarium and oviduct) weight (Table 5 and Table 6).

Tabel 5. Average of left and right ovarium weight (gr/chicken)

Treatment	Left		Average	Right		Average	Probability
	Repetition			Repetition			
	1	2		1	2		
H1	0,5128	0,3003	0,4065 ^a	0,0994	0,2326	0,166 ^a	ns
H2	0,0454	0,0578	0,0516 ^a	0,1891	0,1819	0,185 ^a	ns
H3	0,3278	0,0427	0,1852 ^a	0,1827	0,2053	0,194 ^a	ns
H4	0,0656	0,0559	0,0607 ^a	0,2348	0,1051	0,169 ^a	ns

Note : H1: female burgo chicken with no supplementation as control treatment, H2: female burgo chicken supplemented ESA dose 9 g/chicken/day, H3: female burgo chicken supplemented ESA dose 18 g/chicken/day, H4: female burgo chicken supplemented ESA dose 27 g/chicken/day, ^a, ^{ns}: superscribe indicate the group mean is significantly different ($P < 0.05$).

Ovarium is a main female reproductive organs and it function as follicle production, maturation and ovulation process. The non significant different effect caused by the domestication system which would decrease the female Burgo chicken appetite. When the feed consumption decrease, this condition could affected the weight of ovarium, follicle maturation and its function.

The treatment of ESA supplementation had an impact to ovarium which was the average of supplemented ESA chicken's ovarium weight is higher than non supplemented chicken. Benzoate acid in ESA was converted into estradiol benzoate and the converted estradiol benzoate has a important role in reproduction function.

Table 6. Average of oviduct weight (gr/chicken)

Treatment	Oviduct		Average	Probability
	Repetition			
	1	2		
H1	4,3432	5,0293	4,6862 ^a	ns
H2	0,6423	9,7793	5,2108 ^a	ns
H3	9,4680	9,8178	9,6429 ^a	ns
H4	6,1856	5,3797	5,7826 ^a	ns

Note : H1: female burgo chicken with no supplementation as control treatment, H2: female burgo chicken supplemented ESA dose 9 g/chicken/day, H3: female burgo chicken supplemented ESA dose 18 g/chicken/day, H4: female burgo chicken supplemented ESA dose 27 g/chicken/day, ^{a, ns}: superscribe indicate the group mean is significantly different (P < 0.05).

The supplementation of ESA with level of 18 gr/chick/day (H3) had a higher oviduct weight (9,6429 gr/chick) compared to other treatments. Eventhough there was no significant effect, the ESA supplementation treatment had a higher obviduct weight than non supplemented chicken. ESA contains FSH and LH, and these hormones would improve the steroidogenesis. These hormones also have a role function in the growth and development of female reproductive organs.

CONCLUSION

From these researches, it can be concluded that two determinant factors in Burgo chicken domestication in those districts of Bengkulu Province were socio economic and local cultural factors. We believe that several further development and exploration should be

conducted to discover more beneficial aspect of traditional herbs (ESA) on its production and reproductive organs performances.

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(6) 希少動物人工繁殖研究会概要(H18.4.1一部改定)

1. 名 称： 希少動物人工繁殖研究会(*J-AREA : Japanese Study Group on Artificial Reproduction of Endangered Animals*)
2. 設立年月日： 1993年10月27日
3. 理 念： 地球規模での環境破壊により多くの野生動物が絶滅の危機に瀕しており、それらの種の保存は我々人類の急務である。本会は、機関や専門分野の枠を越えて希少動物の人工繁殖のための技術協力や情報交換を図ることを目的とする。
4. 活 動 内 容： (1)対象動物を選定し、研究グループを組織して、その繁殖生理を明らかにするとともに、それに応じた自然繁殖の工夫や人工繁殖技術の開発を行う。
(2)各研究プロジェクトの進捗状況を公開し、自由な意見交換を行うための会議を年1回以上開催する。
5. 入 会 資 格： 本会の理念と活動内容を理解し、それに賛同する個人または施設とする。なお購読会員は、本会の会議資料などの発行物の入手のみを希望する会員(公共施設のみ、個人は対象外)とする。
6. 年 会 費： 個人会員と施設会員は年間1,000円、購読会員は年間1,500円とする(研究グループに参加する場合は、年会費とは別に研究経費の一部負担を要請することがある)。
7. 運 営 組 織： 会 長：上井 守(岐阜大学応用生物科学部)
副 会長：福岡 敏夫(姫路市立動物園)
代表幹事：佐藤 哲也(アニマルエスコートサービス)
幹 事：川上 茂久(群馬サファリパーク)
幹 事：竹田 正人(大阪市天王寺動植物公園事務所)
幹 事：中田 都(鯖江市役所)
幹 事：大池 辰也(南知多ビーチランド)
幹 事：楠 比呂志(神戸大学大学院農学研究科)
事務局：神戸大学大学院農学研究科動物多様性保全繁殖研究室内
〒657-8501 神戸市灘区六甲台町1-1
☎&FAX(078)803-5936
E-mail:kusunoki@kobe-u.ac.jp
http://www.soeinet.or.jp/~safvet



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会 長：土井 守 (岐阜大学応用生物科学部)

事務局：〒657-8501 神戸市灘区六甲台町1-1

神戸大学大学院農学研究科動物多様性保全繁殖研究室内

Tel & Fax (078) 803-5936

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