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## **Flock Composition, Effective Population Size, Actual Population Size and Rate of Inbreeding of Kamang Duck in Kamang Magek Regency Agam District**

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### **Abstract**

Duck (*Anas platyrhynchos*) is one of the most important domestic avian species in the world. This study aims to obtain the flock composition, effective population size, actual population size and rate of inbreeding of Kamang duck. This study was used a sample Kamang duck raised from 126 small farmers in Kamang Magek Village. This research conducted was survey method with purposive random sampling. The variables were calculated in the study, namely the number of adult male ducks ( $N_m$ ), number of adult female ducks ( $N_f$ ), number of young male and young female ducks, number of male and female ducklings, actual population size ( $N_a$ ), effective population size ( $N_e$ ), and the rate of inbreeding per generation ( $\Delta F$ ). The result of this study showed that the Kamang duck population in the Kamang Magek regency was 4.298 head. The flock composition of the Kamang duck in the Kamang Magek regency was an adult male ducks (7.58%), adult female ducks (42.46%), grower male ducks (8.45%), grower female ducks (12.77%), ducklings (28.73%). Effective population size ( $N_e$ ) Kamang ducks was 1.106 head and the rate of inbreeding per generation is 0.04%.

**Keywords:** Flock composition, effective population size, actual population size, Kamang duck, rate of inbreeding.

### **Introduction**

An animal germ plasm conservation program will require decision on the population. The local ducks represents a large pool of untapped genetic resource. There are many local breeds of ducks in Indonesia, and they can be found widely spread across the country. The local ducks as descendants of the Indian Runner have the potential of high egg production, but they have not shown their egg production optimally. There are many local breeds of ducks in Indonesia, and they can be found widely spread across the country. Ducks in Indonesia get name with the name of the place where the duck were bred for generations or domesticated as Kamang duck, Bayang duck, Pitalah duck. Many of them, however, are often maintained in small populations, owing to their comparatively poor performance in egg production and growth rate (Amini et al., 2015). Facing the challenge from much more efficient commercial duck strains, almost all of the indigenous duck breeds are decreasing in population size, and even of more concern, some of the indigenous duck breeds are on the verge of extinction. The reduction of effective population size would reduce genetic variation and the ability of a population. A population is a summation of all the organisms of the same group or species, which live in a particular geographical area, and have the capability of interbreeding (Falconer and MC Kay, 1996). Knowledge of the size population and the rate of population decline a clumps of ducks is very important to classify the status of the cattle

population. One of an early stage in the preservation germplasm program is to determine the status of livestock population. Population status can be determined by counting the number of adult depicted on the number of adult females and the effective population size (Subandriyo, 2004).

### Methodology

This research utilized the survey method . A total some 126 smal farmers used as respondents in this study in Kamang Magek regency, Agam district of West Sumatera Province. and intensive direct examination. Data on flock composition were estimated using the mean procedure of statistic using SPSS (2010). Furthermore, rate of inbreeding was calculated in the population. Effective population size (Ne) for a randomly mated population was calculated as  $Ne = (4NmNf)/(Nm+Nf)$  where Ne = effective population size, Nm = number of breeding males in the flock and Nf = number of breeding females in the flock. The rate of inbreeding (F) was calculated from Ne as  $F = 1/2Ne$  (Falconer and MacKay, 1996). The ratio of the effective population size to actual population size Ne/Na is an indicator of the extent of genetic variation expected in a population. Male: female ratio (Nm/Nf) is defined as the number of inbreeding males upon the number of breeding females in a population (Lariviere et al., 2011).

### Result and Discussion

The size of population is simply the number of individual in it. However, scientist are more concerned with the flow of genes within the number of individuals contributing gametes to the next generation (NRC, 1993). The flock composition of Kamang ducks in household farmer in the study area, estimated Ne, Ne/Na and Nm/Nf and the rate og inbreeding is given in Table 1.

No	Villages	Nm	Nf	Nm/Nf (%)	Na	Ne	Ne/Na	F (%)
1	Kasiak	57	322	17.70	379	193	50.92	0.25
2	Gatah	29	129	22.48	158	94	59.49	0.53
3	Kubang	22	114	19.29	136	73	44.78	0.61
4	Koto Kaciak	26	143	18.18	169	88	52.07	0.56
5	Lurah Bawah	19	70	27.14	89	59	66.28	0.84
6	Ambacang	19	80	23.75	99	61	61.61	0.81
7	Kampung Bawah	6	16	37.50	22	17	77.27	2.94
8	Sawah Ladang	36	226	15.93	262	124	47.33	0.40
9	Lurah Ateh	10	253	3.95	263	38	14.14	1.31
10	Simpang Kacang	22	98	22.44	120	71	59.16	0.70
11	Guguak Pincuran	15	78	19.23	83	50	60.24	1.00
12	Pulai	23	83	27.71	106	72	67.92	0.69
13	Cubadak	39	196	19.89	235	130	55.32	0.38
	Kamang Magek	323	1808	17.86	2121	1070	50.45	0.04

Flock structure and dynamics help in the identification of the age and number of animals to be maintained breeding population (Okeno et al., 2012). The proportion heads of mature hens in a flock is used to estimate egg and poultry production (Yakubu, 2010). The low sex ratio on the farms studied is an indication that the breeding flock is an indication that the population is not controlled by the farmers (Zahraddeen et al., 2011). The Ne/Na and

Nm/Nf ratio on Kamang ducks were 50.45% and 17.86% (1:6), respectively. Is important to asses effective population size (Ne) The relative number of effective parent of each sex in a population. There are a few breeding males in a population, then the effective size will be much smaller than its actual population size. This finding was relative similar to what had been found in research of Bayang duck conducted by Liza *et al.*(2016). Nm/Nf ratios 1: 7 is in line with Meuwissen and Wooliams (1994) suggested that Ne between 30 and 250 is needed for natural selection to prevent inbreeding depression. The effective population size (Ne) and the rate of inbreeding (F) calculated for the indigenous Kamang duck flock considering the existing flock size and management practice were Ne 1070 head. Ne is a measure of genetic variability within a population where large values of Ne indicate more variability and small values of Ne indicate less genetic variability (Maiwashe *et al.*, 2006; Cervantes *et al.*, 2008).

When the inbreeding rate of Kamang ducks in this study was 0.04% per generation, it is assumed that 0.04% of heterozygosity is lost in one generation. Inbreeding is also an indication for the probability that two alleles at any locus in an individual are identical by descent relative to a base population (Falconer and MacKay,1996). The rate of inbreeding in the free-range of Kamang duck population was low. The low value of F is an indication that the KBC population is not at the risk of extinction.

## Conclusion

The flock composition of the Kamang duck population in the Kamang Magek regency was an adult male ducks (7.58%), adult female ducks (42.46%), young male ducks (8.45%), young female ducks (12.77%), ducklings (28.73%). Effective population size (Ne) Kamang ducks was 1.106 head and the rate of inbreeding per generation is 0.04%. Ratio (Nm/Nf) was 17.86% (1:6) and ratio Ne/Na 50.45%

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