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Complete Blood Count and Blood Chemistry of Samae Dam Chickens (*Gallus Gallus*) in Small-Holder Farmers, Thailand

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Abstract: Complete blood count and blood chemistry of Samae Dam chickens (*Gallus gallus*) in smallholder farmers, Thailand as part of the study on production performance of native samae dam chickens (*Gallus gallus*) of breeders in small-holder farmers. Complete blood count and blood chemistry were studied in thirty-six healthy small-holder farmers-Samae Dam chickens (*Gallus gallus*) (male, n = 18; female, n = 18), at the age of 8 months, which had been small-holder farmers at Uthai Thani Province in Thailand. The results found that red blood cells, hemoglobin, hematocrit, MCV, MCH, and MCHC were in the reference range, while male and female Samae Dam chickens (*Gallus gallus*) of small-holder farmers in Thailand had similar red blood cell and blood chemistry at age 0-3 months the difference was not statistically significant ($P>0.05$), and at the age of 3-6 months and 6-8 months, it was found that male hemoglobin values were higher than female hemoglobin values were significantly different ($P<0.05$). The average proportion at 8 months of age is as follows: Lymphocytes (43.26±0.44%), neutrophils (42.63±3.65%), white blood cells (35.63±3.65%), monocytes (1.26±0.44%), eosinophils (0.0%) and basophils (11.50±0.36%).

Keywords: Samae Dam Chickens (*Gallus gallus*), Small-Holder Farmers, Thailand, Complete Blood Count, Blood Chemistry

Introduction

The hens grown in the countryside are a diverse bunch. Consumers like the chicken from the area. As a result, there is a lot of interest in the market. Native chicken flesh can be used as a low-cost source of protein. It is also a good source of supplementary revenue and is easily available for home consumption. (Duangjinda *et al*., 2012; Daikwo *et al*., 2011) Native chickens from Samae Dam have a long history of being raised and are reasonably priced. A study should be conducted to establish a local samae dam hybrid chicken breed. Kanyakit (2018) concluded that farmers raise native chickens by allowing the parents to breed naturally. As a result, the size of the native chickens is getting smaller and smaller and more closely bred. Native chicken breeds have decreased in size as they are kept as a breeder Samae Dam chicken (*Gallus gallus*), an ancient and endangered species. Samae Dam chicken (*Gallus gallus*), is one of the four primary colors of the Black-tailed (Apuno *et al*., 2011; Yaemkong, 2014). There is proof of that (Mekchay *et al*., 2014; Maw *et al*., 2015; DL, 2021). Blood testing is one of the most important methods for identifying the functioning of organs within the body or as an analysis of animal health risk factors. This will help diagnose certain abnormal diseases or candies in the body. (Nawaporn, 2010; Oranong, 2017; Sujit, 2020). The hemoglobin concentration and cellular compaction are due to androgens. The hematologic values of the chickens were both similar and different from the domestic fowl reported in textbooks or reference values taken from international databases, even though those domestic fowls developed from red (Nawaporn, 2010; Oranong, 2017). The red jungle fowl (*Gallus gallus*) is considered the progenitor of the modern chicken breeds used today in commercial agriculture. The exact time and this may have occurred more than once during human history It's believed that the modern chicken derives from birds kept by the people of the Harappan culture (2500-2100 B.C.) (Aengwanich and Tanomtong, 2007). As a result, this research focuses on the blood cell features and hematological values of black macaque hens raised by smallholder farmers in Thailand to preserve and educate the need for effective species conservation. In general, documents about blood cell characteristics and hematological values. Therefore, the objective of this study was to establish the hematological values Basic knowledge from this study is important to assess the

general health, clinical-pathological diagnosis, and in-depth study of these birds.

Materials and Methods

This trial was reviewed through funding and animal ethics and conducting a committee for scientific work experimentation with NSRUIACUC No 202117 certificate. complete blood count and blood chemistry, with the following methods.

Trial design: Protocol for sampling for preliminary data recording of Samae Dam chicken (*Gallus gallus*) by interviewing farmers and personal records of small-holder farmers in Uthai Thani Province, Thailand.

Experimental animals: Local chickens used real Samae Dam (Gallus gallus) to create the test animals. The project began with the upbringing and data collection of father-mother hens aged 0 to 8 months. During the month, there were 18 men and 18 females, for a total of 36. At the age of 3, 6, and 8 months, blood was obtained using a 22 G × 1.5 inch blood needle. Wings made of chicken (0. 7 × 40 mm.) Collected at the Medical Technical Laboratory, Muang District, Nakhon Sawan Province, in the amount of 5 mL each chicken, stored at a temperature of roughly 0-4°C. from drilling to check the complete blood count and blood chemistry (Campbell, 1995).

Statistical analysis: The results were given as mean ± SD, complete blood count and blood chemistry between males and females were compared by t-test from SAS system (SAS Institute, 2003) and a level of significance at $P<0.05$.

Results

Complete blood count and blood chemistry at age 0-3 months showed that red blood cells (4.24±1.02), MCV (98. 04±9.33), and MCH (34. 66±6.21), were in the reference range, the hemoglobin value (11.24±5.21), hematocrit (35.14±7.14), and MCHC (28.35±5.25) were out of the reference range. while cholesterol, triglyceride, HDL, LDL, BUN, white blood cell, lymphocyte, neutrophils, monocyte, eosinophil, and basophil were mean 105.23±8.36, 1,425.21±14.25, 126.4.0±9.36, 39.25±2.14, 3.12±0.24, 34. 78±4.25, 49.58±5.36, 39.54±3.00, 1.5±0.11, 0.0 and 13.58±1.36, respectively, as shown in Table 1. Complete blood count and blood chemistry at the age of 36 months showed that red blood cells, hemoglobin, hematocrit, MCV, MCH, MCHC, 3.21±0.12, 9.97±1.36, 35.22±4.11, 100.55±8.24, 31.58±4.25, and 34.68±3.95 are not in the reference range, but male hemoglobin values are higher than females, while mean values for cholesterol, triglyceride, HDL, LDL, BUN, white blood cell, lymphocyte, neutrophils, monocyte, eosinophil, and basophil were mean 107.98±7.45, 1,528. 69±12.58, 131.54±5.99, 43.56±3.54, 3.36±0.28, 44.58±3.55, 40.78±3.78, 47.33±4.98, 3.47±0.75, 0.0, and 12.08±0.98 respectively as shown in Table 2. As for complete blood count and blood chemistry 6-8 months of red blood cell, hemoglobin, hematocrit, MCV, MCH, and MCHC, the mean values were 4.12±1.63, 12.54±2.14,38.36±6.87, 96.14±9.58, 28.85±5.23. and 32.96±4.17 values were in the reference range and male hemoglobin values are higher than females, while mean values for cholesterol, triglyceride, HDL, LDL, BUN, white blood cell, lymphocyte, neutrophils, monocyte, eosinophil, and basophil were the mean of 107.12±8.12, 1,580.24±12.65, 135.74±7.45, 48.78±5.89, 2.35±0.29, 26.12±4.69, 44.69±6.58, 56.21±5.14, 0.5±0.07, 0.0 and 11.25±1.56 respectively as shown in Table 3 to 6. For the mean proportions throughout the study of the values in order: White blood cell (35.63±3.65%), lymphocyte (43.26±0.44%), neutrophils (42.63±3.65%), monocyte (1.26±0.44%), eosinophils (0.0%) and basophil (11.50±0.36%).

Discussion

In rural Thailand, biodiversity is widely raised in practically every farmer's household. Native hens are a diverse and valuable national resource. A study of the elements that influence the diversity of traits in native chickens will aid production planning and encourage farmers to grow them. Wuttichai and Panupan (2019). Consider how important native chickens are to your family and community's economy and way of life if you are from an indigenous community. Feed your family and yourself by keeping native chickens and laying hens. Abinawanto and Effendi (2017). Farmers in San Sai District, Chiang Mai Province, use their spare time to research the success of breeding native chickens. The majority of farmers prefer to rear their local hens in semi-locked and semi-released species. Breeding, nutrition, and illness prevention were discovered to be issues and obstacles in chicken rearing. Tikhamporn (1999). Farmers' success in the endeavor to promote and develop production standards is influenced by their choice and conservation of native chicken breeds. Farms with suitable disease prevention and rearing techniques are certified. Increased earnings as a result of promotional programs. In rural areas, sustainability is based on sufficiency, the economic idea that farmers can create their kinds (Watchara *et al*., 2016; Watee *et al*., 2013; Watchara *et al*., 2015).

Blood tests are important in detecting the completeness of the blood cells. It is made by a medical device that can count any type of blood cell. how much including the size and shape of some blood cells as well by checking the completeness of standard blood cells but at the age of 3-6 months and 6-8 months, it was found that male hemoglobin values were higher than female hemoglobin values were significantly different ($P<0.05$). The result for hemoglobin was only the protein constituent of red blood cells. Serves as a carrier of oxygen for use in various processes in cells. Measurements indicate the oxygen-carrying capacity of the blood, in which the amount of hemoglobin depends on the number of red blood

cells. which may not be able to identify the specific characteristics of the Samae Dam chickens (*Gallus gallus*). For this result, it was only to know the blood condition of the Samae Dam chickens (*Gallus gallus*). A direct relationship between blood testing and conservation efforts could not be explained. But the blood condition of the Samae Dam chickens (*Gallus gallus*) from the experiment was close to the standard blood values of the common native chickens and there were factors from the study under the conditions of raising by small farmers. making it possible to explain the initial relationship. The blood condition of Samae Dam chickens (*Gallus gallus*) was close to the standard blood values and under the raising conditions of smallholder farmers in Thailand. It can be considered as the preservation of the native chicken bloodline, the primary breed of Samae Dam chickens (*Gallus gallus*) in the area.

Hemoglobin is an important protein found in red blood cells and helps carry oxygen to different parts of the body. The key constituent of hemoglobin is heme, which contains iron. and serves to capture and release oxygen one of its important functions is to store oxygen for muscle function (Chainarong *et al*., 2008), and this oxygen is used for energy production in the respiratory process. The study found that during the Samae Dam chickens (*Gallus gallus*) aged 0-3 months, the hemoglobin values of males and females were not different, but the hemoglobin values of males were higher than females between the ages of 3-6 and 6-8 months due to the aforementioned age range the behavior of fighting for the top and fighting during the youth. And under the raising conditions of smallholder farmers in Thailand by Samae Dam chickens (*Gallus gallus*), males are more active and use muscles than females during this age, resulting in higher hemoglobin values for males than females Fig. 1 to 3.

Table 1: Complete blood count and blood chemistry differential in 0-3 month

Parameters	Males (n =18)	Female (n =18)	Range (mean ± SD)	Reference (Appleby *et al*.,1992)
Red Blood Cell (10^6/mm^3)	4.22000 ±0.560	4.260 ±00.25	4.2400 ±01.020	4.020 -005.40
Hemoglobin (g/dL)	11.33000 ±1.330	11.150 ±01.25	11.2400 ±05.210	12.000 - 016.00
Hematocrit (%)	36.13000 ±4.870	34.150 ±04.98	35.1400 ±07.140	36.000 - 045.00
MCV (fL)	100.25000 ±8.650	96.500 ±08.36	98.0400 ±09.330	80.000 - 100.00
MCH (pg)	35.22000 ±4.250	33.100 ±04.38	34.6600 ±06.210	27.000 - 036.00
MCHC (g/dL)	28.11000 ±4.200	28.570 ±03.35	28.3500 ±05.250	32.000 - 036.00
Cholesterol (mg/dl)	107.66000 ±7.480	106.110 ±07.25	105.2300 ±08.360	
Triglyceride (mg/dl)	1,450.00000 ±12.33	1,400.000 ±11.29	1,425.2100 ±14.250	
HDL (mg/dl)	132.83600 ±6.520	120.210 ±06.39	126.4000 ±09.360	
LDL (mg/dl)	40.66000 ±3.200	38.220 ±03.99	39.2500 ±02.140	
BUN (mg%)	3.19000 ±0.110	3.050 ±00.21	3.1200 ±00.240	
White blood cell (10^3/mm^3)	35.69000 ±3.330	33.930 ±03.52	34.7800 ±04.250	
Lymphocyte (%)	50.36000 ±3.470	48.500 ±03.64	49.5800 ±05.360	
Neutrophils (%)	42.78000 ±4.550	36.700 ±04.25	39.5400 ±03.000	
Monocyte (%)	1.90000 ±0.200	1.100 ±00.14	1.5000 ±00.110	
Eosinophil (%)	0.00000 ±0.000	0.0		
Basophil (%)	14.25000 ±0.360	12.700 ±0.66	13.5800 ±1.3600	

Mean ± SE without superscript and the data by rows differed not significantly (P>0.05)

Table 2: Complete blood count and blood chemistry differential in 3-6 month

Parameters	Males (n =18)	Female (n =18)	Range (mean ± SD)	Reference (Appleby *et al*., 1992)
Red Blood Cell (10^6/mm^3)	3.1300 ±1.230	3.2900±1.020	3.2100 ±0.120	4.02-50.40
Hemoglobin (g/dL)	11.7000 ±2.22*	8.2400±2.450	9.9700 ±1.360	12.00-16.00
Hematocrit (%)	37.7900 ±6.870	33.6500±6.210	35.2200 ±4.110	36.00-45.00
MCV (fL)	101.9000 ±8.990	99.2000±9.750	100.5500 ±8.240	80.00-10.00
MCH (pg)	32.7600 ±5.550	30.4000±5.720	31.5800 ±4.250	27.00-36.00
MCHC (g/dL)	35.1600 ±4.360	33.2000±4.550	34.6800 ±3.950	32.00-36.00
Cholesterol (mg/dl)	105.2600 ±8.780	106.7000±8.660	107.9800 ±7.450	
Triglyceride (mg/dl)	1,530.2400 ±11.97	1,527.1400±12.44	1,528.6900 ±12.58	
HDL (mg/dl)	132.7500 ±6.990	130.3300±7.480	131.5400 ±5.990	
LDL (mg/dl)	42.8600 ±5.260	45.2600±5.690	43.5600 ±3.540	
BUN (mg%)	3.3800 ±0.390	3.3400±0.360	3.3600 ±0.280	
White blood cell (10^3/mm^3)	43.8500 ±5.780	45.3100±5.360	44.5800 ±3.550	
Lymphocyte (%)	42.5600 ±5.880	38.0000±6.990	40.7800 ±3.780	
Neutrophils (%)	48.7600 ±5.990	46.9000±5.330	47.3300 ±4.980	
Monocyte (%)	3.5000 ±0.100	3.4400±0.060	3.4700 ±0.750	
Eosinophil (%)	0.0000 00.000	0.00		
Basophil (%)	12.0600 ±1.330	12.0700±1.24	12.08 ±0.98	

*Within row in each parameter, Mean ± SE with no common superscript differs significantly (P<0.05)

Table 3: Complete blood count and blood chemistry differential in 6-8 month

Parameters	Males (n = 18)	Female (n = 18)	Range (mean ± SD)	Reference (Appleby *et al*.,1992)
Red Blood Cell (10^6/mm^3)	4.65±00.290	3.59±00.250	4.12±01.630	4.02-05.40
Hemoglobin (g/dL)	14.53±00.99*	10.55±00.870	12.54±02.140	12.0-016.00
Hematocrit (%)	39.58±04.780	37.11±04.550	38.36±06.870	36.0-045.00
MCV (fL)	97.25±05.320	95.65±05.690	96.14±09.580	80.0-100.00
MCH (pg)	30.25±03.440	26.12±03.210	28.85±05.230	27.0-036.00
MCHC (g/dL)	34.88±01.020	30.11±01.250	32.96±04.170	32.0-036.00
Cholesterol (mg/dl)	109.32±08.660	105.11±08.140	107.12±08.120	
Triglyceride (mg/dl)	1,635.11±12.540	1,525.20±11.690	1,580.24±12.650	
HDL (mg/dl)	135.95±07.550	135.01±07.250	135.74±07.450	
LDL (mg/dl)	49.22±03.870	47.14±03.650	48.78±05.890	
BUN (mg%)	2.55±00.420	2.00±00.360	2.35±00.290	
White blood cell (10^3/mm^3)	27.44±04.690	25.88±04.250	26.12±04.690	
Lymphocyte (%)	45.39±05.980	43.53±06.110	44.69±06.580	
Neutrophils (%)	57.11±04.880	55.22±05.280	56.21±05.140	
Monocyte (%)	0.80±00.210	0.3±000.650	0.50±00.070	
Eosinophil (%)	0.0	0.0	0.0	
Basophil (%)	11.30±1.470	11.20±1.580	11.25±1.56	

*Within row in each parameter, Mean ± SE with no common superscript differs significantly (P<0.05)

Table 4: Comparison of red blood cells and blood chemistry between males and females of Samae Dam Chickens (*Gallus gallus*) of small-holder farmers, Thailand: in 0-3 month

Parameters	Males	Female
Red Blood Cell (10^6/mm^3)	2.60 ± 0.23	2.5800±0.033
Hemoglobin (g/dL)	8.60 ± 1.56	8.5000±1.05
Hematocrit (%)	35.00 ± 4.66	33.2000±4.33
MCV (fL)	134.60 ± 8.36	128.7000±8.64
MCH (pg)	33.10 ± 5.24	32.9000±5.23
MCHC (g/dL)	24.60 ± 4.12	25.6000±4.65
Cholesterol (mg/dl)	168.00 ± 8.99	178.0000±8.99
Triglyceride (mg/dl)	58.00 ± 6.32	63.0000±6.35
HDL (mg/dl)	115.00 ± 8.13	125.0000±8.65
LDL (mg/dl)	45.00 ± 5.32	34.0000±4.96
BUN (mg%)	2.50 ± 1.36	1.5000±1.26

Table 5: Comparison of red blood cells and blood chemistry between males and females of Samae Dam Chickens (*Gallus gallus*) of small-holder farmers, Thailand: in 3-6 month

Parameters	Males	Female
Red Blood Cell (10^6/mm^3)	3.02±1.05	2.19±1.55
Hemoglobin (g/dl)	9.90±1.33	6.00±1.95
Hematocrit (%)	41.60±4.12	27.40±2.14
MCV (fl)	137.70±8.47	125.10±8.45
MCH (pg)	32.80±4.37	27.40±4.22
MCHC (g/dl)	23.80±3.22	24.10±3.00
Cholesterol (mg/dl)	1580±7.35	167±7.33
Triglyceride (mg/dl)	167±8.98	160±7.65
HDL (mg/dl)	60±6.21	62±5.21
LDL (mg/dl)	45±5.47	31±5.12
BUN (mg%)	1.60±0.32	2.50±0.31

Table 6: Comparison of red blood cells and blood chemistry between males and females of Samae Dam Chickens (*Gallus gallus*) of small-holder farmers, Thailand: in 6-8 month

Parameters	Males	Female
Red Blood Cell (10^6/mm^3)	3.470±1.00	3.12±1.25
Hemoglobin (g/dl)	12.600±3.08	10.80±3.65
Hematocrit (%)	47.700±3.87	41.60±3.98
MCV (fl)	137.100±9.25	133.30±9.44
MCH (pg)	36.200±5.25	34.60±5.78
MCHC (g/dl)	26.400±4.14	26.00±4.33
Cholesterol (mg/dl)	165.000±9.36	175.00±8.69
Triglyceride (mg/dl)	56.000±5.96	61.00±5.14
HDL (mg/dl)	112.000±9.25	122.00±9.38
LDL (mg/dl)	42.000±3.65	31.00±3.56
BUN (mg%)	0.400±0.07	3.10±0.08

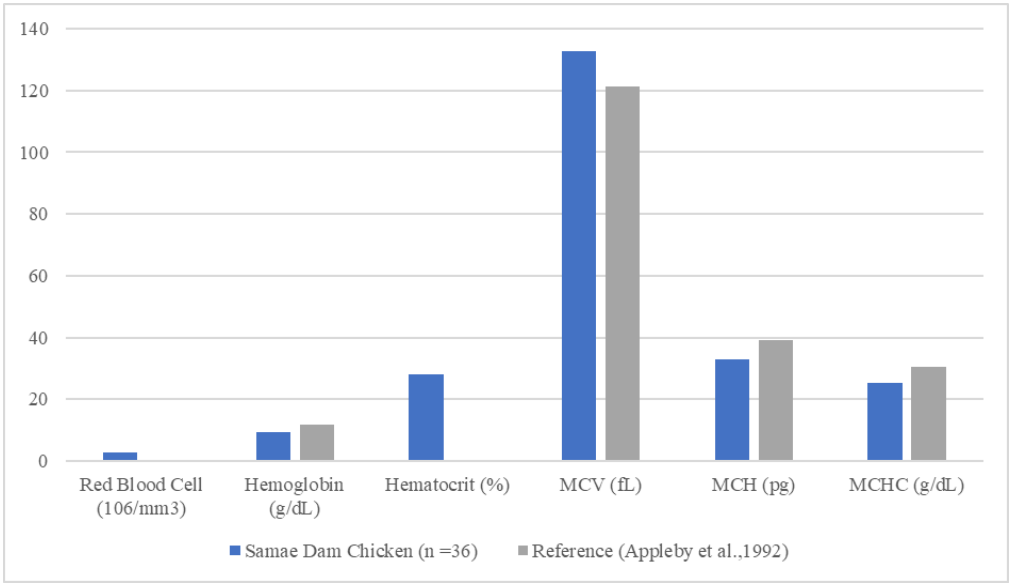

Fig. 1: Shows a comparison of red blood cell values compared to standard values small-holder farmers in Thailand are raising Samae Dam Chickens (*Gallus gallus*) from the age of 0 to 8 months

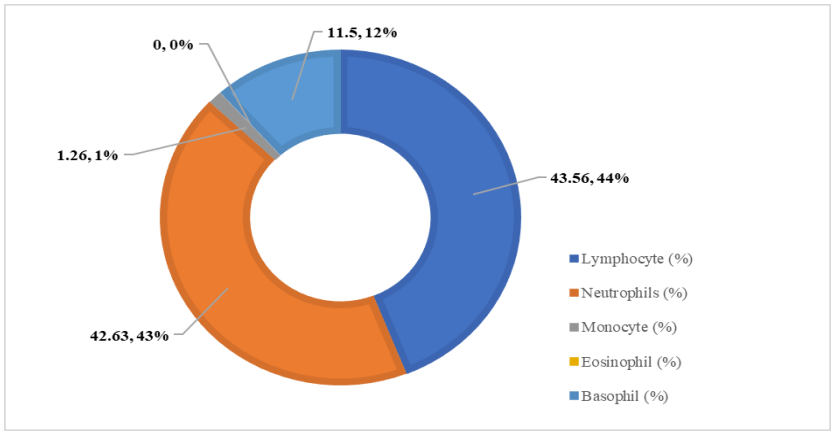

Fig. 2: Proportions of white blood cell Samae Dam Chickens (*Gallus gallus*) rearing age 0-8 months of small-holder farmers in Thailand

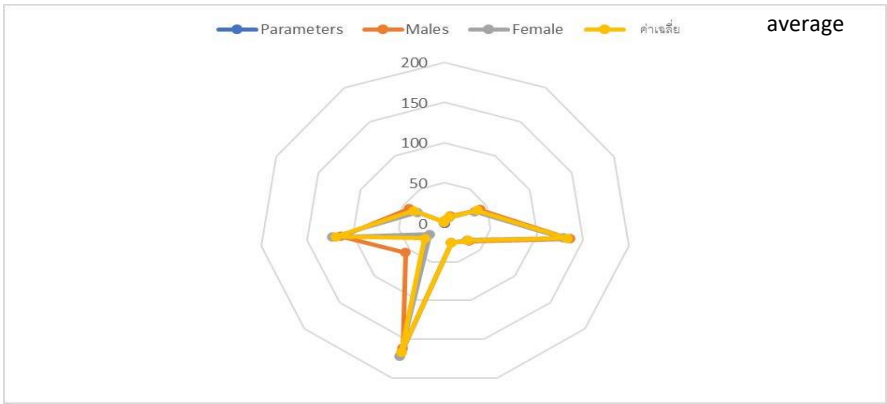

Fig. 3: Shows the red blood cell and blood chemistry of males, and females, and the average of Samae Dam Small-scale farmers' chickens (*Gallus gallus*) in Thailand: At 0-8 months

Conclusion

Complete blood count and blood chemistry of Samae Dam chickens (*Gallus gallus*) in smallholder farmers, Thailand had similar red blood cell and blood chemistry at age 0-3 months were not different and at the age of 3-6 months and 6-8 months, it was found that male hemoglobin values were higher than female hemoglobin values.

Ethics

This article is original and contains unpublished material. The authors declare that are no ethical issues and no conflict of interest that may arise after the publication of this manuscript.

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