CONFORMATION AND PRODUCTIVITY OF "CO XANH LANG SON" DUCKS

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ABSTRACT

Research on 2 generations of "co xanh Lang Son" duck for conformation and productivity, number of 2,540 one day old "co xanh Lang Son" ducks (540 males and 2,000 females) at Dai Xuyen Duck Breeding and Research Center. Starting from 1 day of age, experimental "co xanh Lang Son" ducks were wearing the number of wings each, were kept completely in a cage (with barn filler) with a naturally ventilated playground. The results showed that: "co xanh Lang Son" duck have uniform plumage color, typically at 1 day old they were black with yellow spots on the back, the entire belly of the duck was light yellow, beak color was light pink or dark gray, with black stripes running. middle to eyes, legs were light yellow, dark gray. Adult plumage color was stable with sparrow wing color in female; Male ducks have dark blue-black neck and head feathers; The beak and legs were pale yellow, dark blue and dark gray. The age of laying at 24 weeks, body weight at 24 weeks of age was 2,408.56 - 2,416.45 g/bird, egg production 182.71 eggs /female/ 52 weeks of lay, feed consumption of 3.94 kg/10 eggs. Egg weight was 81.12 - 81.54g/egg, the rate of eggs with embryos was 92.47 - 92.80%; hatching rate/number of eggs with embryos 85.62 - 85.98%.

Keywords: *Conformation, body weight, egg production, FCR/10 eggs*.

INTRODUCTION

Poultry farming and pig farming in Vietnam are still the two main industries in the livestock industry. Our country's waterfowl number is the second largest in the world with a total population of over 102.767 million birds, of which the Red River Delta accounts for 29.34%, the Mekong River Delta accounts for 27.54% and the Northwest region accounts for 11.66% of the total waterfowl flock (GSO, 4/2024).

Our country has a high diversity of duck breeds such as "Bau Ben", "Bau Quy", "Ky Lua", "Dom" (Pat Lai), "Co" duck... with many good characteristics, highly adapted to local conditions, in Among them are the "co xanh Lang Son" duck. The "co xanh Lang Son" duck is a livestock breed close to people in Lang Son province. The duck also has other names such as: "Pat Ban", "Pat Khuong", "Pat Co Kheo", "Pat Mau sinh". The advantage of this duck breed is its beautiful appearance, the duck has gray feathers, blue and green light, the neck turns a very beautiful blue color, the commercial at 12 weeks reach from 1.8 to 2.2 kg/bird.

In particular, "co xanh Lang Son" ducks are evaluated to have the ability to adapt well to living environments in large areas, have high disease resistance, small bones, lean meat, sweet, delicious, and are very suitable for domestic animals, consumer requirements and tastes (Pham Thi Thuy An, 2023). Although it is an indigenous specialty duck breed, in recent years, due to many reasons such as people's free-grazing farming practices and the introduction of foreign duck breeds, the "co xanh Lang Son" duck flock is at risk of inbreeding and hybridization. Therefore, the "co xanh Lang Son" duck is one of the precious native duck breeds that needs to be researched, preserved and developed.

Objective: To determine the conformation, growth and reproduction ability of the "co xanh Lang Son" duck.

MATERIALS AND METHOD

Materials

The experiment was conducted on 2,540 1-day-old "co xanh Lang Son" ducks.

Time anh locations

The experiment was carried out from August 2021 to June 2024 at Dai Xuyen Duck Breeding and Research Center - Phuxuyen - Hanoi.

Experimental design and methods

The number of ducks over 2 generations is shown in Table 1.

Table 1. Number of breeding flocks of "co xanh Lang Son" ducks over 2 generations

Stage	Start generation		1st generation		Total (birds)
	Male (birds)	Female (birds)	Male (birds)	Female (birds)	
Duckling	270	1000	270	1000	2540
Rearing	155	475	155	475	1260
Breeding	45	225	45	225	540

Nutritional value of breeding "co xanh Lang Son" duck feed applied to dual-purpose duck breeds (Dai Xuyen Duck Breeding and Research Center, 2019) (Table 2)

Table 2. Nutritional value of feed for "co xanh Lang Son" ducks

Target	Duckling stage		Rearing stage	Breeding stage
	(01 day old - 4 weeks)	*(5 - 8 weeks)*		
CP (%)	21,0	19,0	14,5	17,5
ME (kcal/kg)	2.900	2.900	2.900	2.700
Canxi (%)	0,7 - 1,0	0,7 - 1,0	0,7 - 1,0	2,5 - 3,5
Phospho (%)	0,5 - 0,8	0,5 - 0,8	0,5 - 0,8	1,0 - 1,5
Lysine (%)	0,65	0,65	0,65	0,60
Methionine - Cystine (%)	0,3	0,3	0,3	0,5

Monitor physical characteristics at 1 day old and 38 weeks of age by direct observation and photography. Select feather, beak and leg color according to the target. There is selection for egg productivity based on appearance characteristics and monitoring of individual egg productivity until 38 weeks of age to replace the flock for the next generation. Ducks are each given a wing number and kept in a cage (with bedding) with a naturally ventilated playground. Raised and cared for according to biological safety and veterinary hygiene procedures for ducks of the Dai Xuyen Duck Breeding and Research Center.

Tracking targets

Survival rate (%), body weight (g/bird). Laying age (days), laying rate (%), egg production (egg/female/52 weeks of lay), feed consumption/10 eggs (kg), egg weight (g/egg), some indicators egg quality. Embryo rate (%) and hatching rate (%) (Bui Huu Doan et al., 2011)

Data and statistical analysis

Data are collected, monitored and processed according to statistical analysis methods using Minitab 16.2 software.

Statistical analysis model:

$$\mathbf{Y_{ijk} = \mu + M_i + e_{ijk}}$$

Which: Y_{ijk}: is each observation data,

μ: is the overall mean of the records,

M_i: is the effect of the i^{th} generations (i = starting, 1),

e_{ijk}: is the random error.

RESULTS AND DISCUSSION

Conformation and dimensions of some measurements of "co xanh Lang Son" duck

Conformation

The results of conformation of "co xanh Lang Son" ducks are presented in Table 3.

Table 3. Conformation (feather color, beak, feet) of "co xanh Lang Son" duck

Items		Conformation	Start generation		1st generation	
			Male (n =270)	Female (n=1,000)	Male (n=270)	Female (n=1,000)
Feather color	1 old day	Black with yellow spots on the back and light yellow on the belly	100.0	100.0	100.0	100.0
	38 weeks	The male duck have blue-black feathers on the head, wings and tail	100.0		100.0	
		The female has sparrow-shaped wings, blue-black wing feathers with white spots on the wing tips, and dark blue-black head feathers		100.0		100.0
Beak	1 old day	Light pink, dark gray	100.0	100.0	100.0	100.0
	38 weeks	Light yellow, dark blue	100.0	100.0	100.0	100.0
Legs	1 old day	Light yellow, dark gray	100.0	100.0	100.0	100.0
	38 weeks	Light yellow, dark gray	100.0	100.0	100.0	100.0

Results Table 3 shows: 01 day old ducks have black feathers with yellow spots on their backs, the entire duck's abdomen is light yellow, the beak color is light pink or dark gray, there is a black stripe running from the middle to the eye, the legs are light yellow, dark gray. The adult feather color is stable with the color of the female duck'wings; the male duck has dark blue-black head and neck feathers; the beak and legs are pale yellow, dark blue and dark gray. This result shows that the "co xanh Lang Son" duck has a uniform and stable appearance.

Dimensions of some body measurements of "co xanh Lang Son" duck

Body size of "co xanh Lang Son" ducks at 8 weeks of age was measured, the results are presented in Table 4.

Table 4. Body dimensions of "co xanh Lang Son" duck at 8 weeks of age (cm)

Items	Start generation				1st generation			
	Male (n=30)		Female (n=30)		Male (n=30)		Female (n=30)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Body lenght	23.52	0.19	22.42	0.15	23.76	0.21	22.53	0.18
Chest circle	29.63	0.17	27.56	0.16	29.83	0.16	27.86	0.20
Chest circle/Body length	1.26		1.23		1.26		1.24	
Breast lenght	12.68	0.16	12.25	0.14	12.72	0.18	12.32	0.16
Leg tall	7.40	0.08	7.23	0.06	7.37	0.07	7.28	0.07
Wing feather lenght	11.87	0.10	12.65	0.11	11.77	0.13	12.57	0.12

The body length measurement of "co xanh Lang Son" ducks over 2 generations is 23.52 - 23.76cm for male and 22.42 - 22.53cm for female, the breast length of male and female reaches respectively is 12.68 - 12.72cm; 12.25 - 12.32cm, corresponding to the wing feather length of 11.77 - 11.87cm; 12.57 - 12.65cm, Chest circle/Body length ratio is 1.26 for males and 1.23 - 1.24 for females. These results show that the "co xanh Lang Son" duck has the appearance of a duck that also serves as meat and eggs.

Dang Vu Hoa (2015), research on "Dom" ducks shows that at 8 weeks of age, the body length of the male and female is 23.09 and 22.54cm respectively. When compared to "co xanh Lang Son" duck, "Dom" duck has a shorter body length.

Bui Thi Tham (2016), research on "Ben Bau" ducks raised at Dai Xuyen Duck Breeding and Research Center showed that: at 8 weeks of age have a breast length of 10.80cm for males and 10.40cm for females; the average wing feather length reaches 10.40 and 10.47cm. The "co xanh Lang Son" ducks have a longer breast and wing feather length than "Bau Ben" ducks.

Le Thi Mai Hoa et al. (2017) research on "Co Lung" ducks raised at Dai Xuyen Duck Breeding and Research Center showed that: the body length of 8 weeks of age male ducks was 22.65cm and female was 22.18cm. The Chest circle/Body length ratio for both male and female was 1.20. The above results are lower than the body length and Chest circle/Body length ratio of "co xanh Lang Son" ducks.

Thus, the results of the study of some dimensions show that "co xanh Lang Son" duck has the appearance of a duck that also serves as meat and eggs.

Growth ability of "co xanh Lang Son" duck through weeks of age

Survival rate through stages

The survival rate of "co xanh Lang Son" ducks through age stages is presented in Table 5.

Table 5. Survival rate of "co xanh Lang Son" ducks in duckling and rearing stages (%)

Stages	Start generation				1st generation			
	Male		Female		Male		Female	
	n (bird)	Survival rate (%)	n (bird)	Survival rate (%)	n (bird)	Survival rate (%)	n (bird)	Survival rate (%)
01 old day	270		1000		270		1000	
01 old day - 8 weeks	257	95.19	950	95.00	260	96.30	956	95.60
9 weeks	155		475		155		475	
9 - 22 weeks	154	99.35	471	99.16	154	99.35	472	99.37
01 old day - 22 weeks		94.81		94.60		95.93		95.30

Results Table 5 shows that: "co xanh Lang Son" through 2 generations, at the duckling stage (1nt-8 weeks of age), have a high survival rate of 95.19 - 96.30% in male ducks, female ducks reach 95.00 - 95.60%. In the stage of 9-22 weeks of age, there is little loss of ducks, the survival rate is over 99.00% for both male and female ducks. On average, from 1 day old to 22 weeks of age, the survival rate of "co xanh Lang Son" ducks for both males and females is 94.81 - 95.93% and 94.60 - 95.30%, respectively.

The survival rate of Sin Cheng ducks raised in Lao Cai from 1 day to 4 weeks of age was 98.11%, from 1 day to 8 weeks of age was a 97.45% and from 1 day - 25 weeks of age was 96.38% (Bui Huu Doan et al., 2017). The survival rate of Hoa Lan ducks raised in Tien Giang from 0 - 8 weeks of age was 96-97.7% (Hoang Tuan Thanh and Duong Xuan Tuyen, 2016).

Nguyen Thi Thuy Nghia et al. (2012) researched on Bau Ben ducks: has a rate of the survival rate Bau Ben ducks from 1 day to 8 weeks of age reached 91.72%, from 9 to 20 weeks of age reached 91.72%. On average, the survival rate of Bau Ben duck from 1 day old to 20 weeks of age reached 91.72%.

Do Ngoc Ha (2019), "Co Lung" ducks: in the period of 0 - 4 weeks of age, the survival rate is 98.33%, in the period of 0 - 8 weeks of age, the survival rate is 98.00%, the period of 9 - 22 weeks of age, the survival rate is 97.61%. For the period from 0 to 22 weeks of

age, the survival rate reaches from 95.67%.

Thus, it can be seen that the survival rate of "co xanh Lang Son" ducks is lower than "Sin Cheng" and "Hoa Lan" ducks, but higher than that of "Bau Ben" ducks.

Body weight of "co xanh Lang Son" duck

The results of body weight of "co xanh Lang Son" ducks are shown in Table 6.

Table 6. Body weight of "co xanh Lang Son" duck at weeks of age (g)

Weeks of age	**Start generation**				**1st generation**			
	Male (n = 30)		Female (n = 30)		Male (n = 30)		Female (n = 30)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
1 day old	53.03[a]	0.35	53.57[a]	0.33	52.95[a]	0.27	53.26[a]	0.41
4	802.32	7.42	728.5	6.48	790.67	8.88	702.33	7.42
8	1688.37[a]	25.48	1503.86[x]	20.84	1673.90[a]	26.26	1495.12[x]	19.45
12	1998.7	23.51	1876.15	24.40	1980.43	24.52	1863.65	23.75
16	2252.29	25.42	2049.74	23.77	2259.43	25.47	2056.00	24.03
20	2465.22	26.17	2273.2	22.52	2454.20	26.74	2269.33	24.26
22	2514.35[a]	27.79	2368.76[x]	23.28	2527.33[a]	25.83	2372.93[x]	24.71

Note: on the same row by gender, mean values with the same letters have no signification difference P>0.05.

Table 6: The body weight of duckling ranges in 2 generations ranged from 52.95-53.57 g/duck, with no difference between male and female ducks (P>0.05). At 8 weeks of age, the body weight increase in both male and female ducks respectivety to 1,673.90 - 1,688.37 g/male and 1,495.12 - 1,503.86 g/female. At 22 weeks of age, the body weight of "co xanh Lang Son" ducks reaches 2,514.35 - 2,527.33 g/male and 2,368.76 - 2,372.93 g/female. At 8 weeks of age and 22 weeks of age, it had differences in body weight between male and female ducks (P<0.05).

Nguyen Duc Trong et al. (2009) reported that "Dom" duck breed, when raised and kept in the gene pool at the Dai Xuyen Duck Breeding and Research Center, had a laying weight (25 weeks of age) of 2100 - 2300g/bird. According to Dang Vu Hoa (2015), "Dom" ducks at 1 day old have a body weight of 41.28 - 42.06g/bird, at 8 weeks of age body weight is 1,281.69 - 1,347.83g/bird, at the end of the rearing phase, body weight of female is 1,682.41 - 1,778.57g/bird.

"Bau Ben" duck raised in conservation at the Dai Xuyen Duck Breeding and Research Center, at one day old, body weight is 39.0g (Nguyen Duc Trong et al., 2011); 41.0 - 42.0g/head (Nguyen Thi Thuy Nghia et al., 2012); 39.0 - 44.0g/bird (Vu Dinh Trong et al., 2015). At 8 weeks old, ducks have a weight of: 1212.0g/bird (Nguyen Duc Trong et al. 2011); 1,207.2 - 1,220.1g/bird (Nguyen Thi Thuy Nghia et al. 2012); 1,238.1 - 1,336.4g/bird (Vu Dinh Trong et al. 2015). At the end of the rearing stage, they move to laying Bau Ben ducks with a weight of 2,008.0 g/bird (Nguyen Duc Trong et al. 2011);

1790.0g/bird (Nguyen Thi Thuy Nghia et al. 2012); 1,790.0 - 1,857.3g/bird (Vu Dinh Trong et al. 2015). "Hoa Lan" ducks raised in Tien Giang when newly hatched have a weight of 39.2 - 42.7g/bird; 4 week old female duck 599.3g/bird; 8 weeks old 1295.7 g/bird; 12 weeks old weighs 1523.3g/bird and 16 weeks old weighs 1692.7g/bird (Hoang Tuan Thanh and Duong Xuan Tuyen, 2016).

So, "co xanh Lang Son" ducks have a higher body weight at 8 and 22 weeks of age than "Dom", "Bau Ben" and "Hoa Lan" ducks.

Reproductive ability of "co xanh Lang Son" duck

Some reproductive indicators of "co xanh Lang Son" duck

The results of some reproductive indicators of "co xanh Lang Son" ducks are shown in Table 7.

Table 7. Some reproductive indicators of "co xanh Lang Son" ducks

Items	unit	Start generation (n = 225)	1st generation (n = 225)
Age of laying 5%	weeks of age	24	24
Body weight at laying (female)	g	2408.56	2416.45
Body weight at laying (male, n = 45)	g	2593.40	2603.32
Laying rate	%	49.94	50.13
Egg productivity/female/year	egg	181.79	182.71
FCR/10 eggs	kg	4.18	3.94

Table 7: "co xanh Lang Son" ducks through 2 generations have a laying age of 24 weeks of age. Body weight at laying reached 2,408.56 - 2,416.45 g/female; 2593.40 - 2603.32g/male, average laying rate 49.94 - 50.13%, egg productivity/female/year reached 181.79 - 182.71 eggs, FCR/10 eggs is 4.18 - 3.94 kg.

Thus, "co xanh Lang Son" ducks lay later than the research results of Nguyen Thi Minh Tam et al. (2006a, 2006b) the first laying age of "Ky Lua" ducks raised at National Institute of Animal Sciences is 160 days of age (23 weeks of age); Pham Cong Thieu et al. (2004) on "Bau Quy" ducks (23 - 24 weeks of age) and Bau Ben ducks (22 weeks of age); Nguyen Duc Trong et al. (2009) the age of laying the first egg of dual-purpose "Dom" ducks (PL2 line) is 22 - 23 weeks of age.

Some studies on the laying rate of native duck breeds show that: "Ben Bau" ducks raised in Hoa Binh have an average laying rate/52 weeks of laying of 47.67%, egg production is 174 eggs/female/year. (Ho Khac Oanh et al., 2011). At Dai Xuyen Duck Breeding and Research Center, "Ben Ben" ducks have an average laying rate/52 weeks of laying: 46.79%, egg production reaches 168.33 eggs/female/year (Nguyen Duc Trong et al., 2011); respectively 48.11%, 170.3 eggs/female/year (Nguyen Thi Thuy Nghia et al., 2012) and 44.16 - 46.4%, 164.65 - 170.3 eggs/female/year (Vu Dinh Trong et al., 2015).

"Dom" ducks have an average laying rate/52 weeks of laying: 45.16%, 164.63 eggs/female/year (Nguyen Duc Trong et al., 2011); 46.58% (Doan Van Xuan et al., 2011). When selected over 3 generations, "Dom" ducks have an average laying rate of 45.16 -

48.4% (Nguyen Duc Trong et al. 2011).

Do Ngoc Ha (2019): "Co Lung" ducks have a laying rate of 48.09%/52 weeks of laying; Egg production reaches 175.06 eggs/female/year; FCR 4.17kg/10 eggs

Nguyen Van Duy and et al. (2020) Nuclear "Bau Ben" ducks raised at Dai Xuyen Duck Breeding and Research Center have an average laying rate of 4 generations of 44.16 - 46.50%, egg production of 164.65 - 169.26 eggs/female/year of lay.

Research results on feed consumption for egg production in native duck breeds show that "Ben Bau" ducks raised in conservation at Dai Xuyen Duck Breeding and Research Center have a food consumption per 10 eggs of 4.53 kg (Nguyen Thi Thuy Nghia et al. 2012). According to Dang Vu Hoa (2015), "Dom" ducks were raised in the years 2010 - 2011; 2011 - 2012 and 2012 - 2013 had feed consumption/10 eggs respectively: 5.47; 4.29 and 5.43 kg.

Thus, "co xanh Lang Son" duck has a higher laying rate, egg productivity and lower food consumption per 10 eggs than the "Bau Ben" duck and "Dom" duck.

Some egg quality indicators of "co xanh Lang Son" duck

Evalution of "co xanh Lang Son" duck eggs at 38 weeks of age, the results are presented in Table 8.

Table 8. Some egg quality indicators

Items	**unit**	**Start generation (n = 35)**	**1st generation (n = 35)**
Egg weight	g	81.12	81.54
Morphological index (D/d)	-	1.38	1.39
Haugh unit	HU	89.76	90.11
Yolk rate	%	32.05	32.16
Egg white rate	%	56.81	56.72
Shell rate	%	11.14	11.12

Table 8: "co xanh Lang Son" ducks through 2 generations have egg weights of 81.12g and 81.54g respectively. The morphological index (D/d) reached 1.38 - 1.39, within the typical range of poultry breed eggs (1.36 - 1.43). The egg quality indicators of "co xanh Lang Son" ducks are high and within the allowable range: Haugh unit is 89.76 and 90.11; yolk ratio reached 32.05% and 32.16%; shell rate 11.14% and 11.12%.

Vuong Thi Lan Anh (2020). Egg weight of Sea 15 - Dai Xuyen duck raised in freshwater and saltwater environments reached 82.51g, morphological index reached 1.41, Haugh unit reached 90.52. According to Nguyen Thi Thuy Nghia et al. (2012), egg weight of "Dom" duck is 72.65g; morphological index is 1.38; yolk ratio is 35.3%; Haugh unit is 84.6.

So, egg weight of the "co xanh Lang Son" duck is smaller than that of the Sea 15 - Dai Xuyen duck and higher than that of "Dom" duck.

Hatching eggs of "co xanh Lang Son" duck

In each generation, duck eggs were incubated at 39, 40 and 41 weeks of age, and the hatching results are presented in Table 9.

Table 9. Hatching results of "co xanh Lang Son" duck eggs

Items	unit	Start generation	1st generation
Total eggs	egg	850	930
Number of eggs with embryos	bird	786	863
Number of duckling	bird	673	742
Number of type 1 duckling	bird	650	718
Embryos rate	%	92.47	92.80
Hatching rate/Total eggs	%	79.18	79.78
Hatching rate/Eggs with embryos	%	85.62	85.98
Ratio of type 1 duckling/number of duckling	%	96.58	96.77

Table 9 shows: "co xanh Lang Son" ducks over 2 generations have the rate of eggs with embryos reaching 92.47 - 92.80%, the rate of hatching/eggs with embryos is 85.62 - 85.98%; Hatching rate/total number of eggs incubated reached 79.18 - 79.78%; The ratio of type 1 duckling/number of hatched duckling is 96.58 - 96.77%.

According to Vuong Thi Lan Anh, (2020) Sea Duck - 15 Dai Xuyen has the rate of eggs with embryos reaching 94.01%, the rate of type 1 ducklings/number of hatched ducks reaching 96.54%. This result is equivalent to that of a "co xanh Lang Son" duck.

Also doing research on Bau Ben ducks at the Dai Xuyen Duck Research Center Bui Thi Tham (2016) showed that nuclear-raised Bau Ben ducks have an egg-to-embryo rate of 95.36%, hatching rate/embryo is 87.64 %, the rate of type 1 ducklings reached 94.61%.

CONCLUSIONS

The "co xanh Lang Son" duck have uniform plumage color, typically at 1 day old they were black with yellow spots on the back, the entire belly of the duck was light yellow, beak color was light pink or dark gray, with black stripes running. middle to eyes, legs were light yellow, dark gray. Adult plumage color was stable with sparrow wing color in female; Male ducks have dark blue-black neck and head feathers; The beak and legs were pale yellow, dark blue and dark gray. The age of laying at 24 weeks, body weight at 24 weeks of age was 2,408.56 - 2,416.45 g/bird, egg production 182.71 eggs /female/ 52 weeks of lay, feed consumption of 3.94 kg/10 eggs. Egg weight was 81.12 - 81.54g/egg, the rate of eggs with embryos was 92.47 - 92.80%; hatching rate/number of eggs with embryos 85.62 - 85.98%.

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REFERENCES

Pham Thi Thuy An. 2023. Techniques for rearing the "co xanh" duck breed. http://khuyennongthaibinh.vn/Tin-Tuc/Left1/1258_Ky-thuat-cham-soc-nuoi-duong-giong-vit-%E2%80%9CCo-xanh%E2%80%9D.

Vuong Thi Lan Anh. 2020. Some biological characteristics and production capabilities of Sea duck breed 15 - Dai Xuyen raised in freshwater and saltwater environments. Doctor Thesis in Agriculture, National Institute of Animal Sciences.

Nguyen Van Duy, Nguyen Thi Thuy Nghia, Nguyen Thi Hai, Nguyen Thi Muoi and Bach Thi Dieu. 2020. Conformation and production ability of “Ky Lua” duck. Journal of Agriculture and Rural Development, October 2020, p. 56-62.

Bui Huu Doan, Nguyen Thi Mai, Nguyen Thanh Son and Nguyen Huy Dat. 2011. Some consumer indicators in Poultry research. Hanoi Agricultural Publishing House.

Bui Huu Doan, Pham Kim Dang, Hoang Anh Tuan, Doan Van Soan and Nguyen Hoang Thinh. 2017. Reproductive performance of Sin Cheng ducks in Lao Cai province, Viet Nam. Proceedings internatinal conference on: Animal production in Southeast Asia: Current status and future. pp. 72 - 77.

Do Ngoc Ha. 2019. Research on some biological characteristics and production capabilities of “Co Lung” ducks, Thanh Hoa. Doctor Thesis in Agriculture, Vietnam Academy of Agriculture.

Dang Vu Hoa .2015. Some biological characteristics and production capabilities of “Dom” ducks (Pat Lai) and crosses between “Dom” ducks and T14 ducks (CV. Super M3). Doctor Thesis in Agriculture, National Institute of Animal Sciences.

Le Thi Mai Hoa, Nguyen Van Duy, Vuong Thi Lan Anh, Pham Van Chung, Dong Thi Quyen, Ta Phan Anh .2017. Research on selecting nucleus flock of “Co Lung” ducks raised at Dai Xuyen Duck Breeding and Research Center. Scientific Report .2017. Dai Xuyen Duck Breeding and Research Center, p. 49 - 63.

Nguyen Thi Thuy Nghia, Nguyen Duc Trong, Nguyen Van Duy, Pham Van Chung, Mai Huong Thu, Luong Thi Bot, Dong Thi Quyen and Dang Thi Vui .2012. Conformation and production ability of “Bau Ben” and “Dom) ducks. Scientific Report Dai Xuyen Duck Breeding and Research Center - National Institute of Animal Sciences. p. 44 - 50.

Ho Khac Oanh, Hoang Van Tieu, Nguyen Duc Trong, Pham Van Truong, Nguyen Thi Minh, Pham Huu Chien, Bui Van Thanh and Bui Van Chum .2011. Research on gene conservation of the “Ben Bau” duck in Hoa Binh. Collection of Research and Transfer of Technical Advances in Duck and Muscovy duck, Dai Xuyen Duck Breeding and Research Center - National Institute of Animal Sciences, p. 169 - 172.

Nguyen Thi Minh Tam, Tran Long, Pham Cong Thieu, Ho Lam Son and Luong Thi Hong .2006a. Research on the production capacity of “Ky Lua” ducks at the National Institute of Animal Sciences. Scientific report of the National Institute of Animal Husbandry 2006, Research section on livestock breeds. p. 1 - 11.

Nguyen Thi Minh Tam, Tran Long, Pham Cong Thieu, Ho Lam Son and Luong Thi Hong .2006b. Research on genetic characteristics of body weight of “Ky Lua” ducks. Scientific report of the National Institute of Animal Sciences in 2006, Research on livestock breeds. p. 11 - 18.

Hoang Tuan Thanh and Duong Xuan Tuyen. 2016. Conformation and production ability of “Hoa Lan” ducks raised for conservation in Tien Giang. Journal of Animal Science and Technology, vol. 63. p. 38 - 47.

Bui Thi Tham. 2016. Conformation and production ability of nuclear “Bau Ben” ducks raised at Dai Xuyen Duck Research Center. Master's Thesis in Agricultural Sciences. Vietnam Academy of Agriculture.

Pham Cong Thieu, Luong Thi Hong, Ho Lam Son, Tran Quoc Tuan and Vo Van Su .2004. Results of monitoring the appearance and production ability of “Bau Quy” ducks over 3 generations at the National Institute of Animal Sciences. Conference on Conservation of Livestock Gene Funds 1990 - 2004, Hanoi, October 2004. p. 169 - 178.

Nguyen Duc Trong, Hoang Van Tieu, Ho Khac Oanh, Doan Van Xuan, Pham Van Chung and Luong Thi Bot .2009. Selecting PL2 Ducks. In Scientific Report - National Institute of Animal Husbandry, Hanoi, p. 396.

Nguyen Duc Trong, Ho Khac Oanh, Nguyen Thi Minh, Le Thi Phien, Ngo Van Vinh and Le Xuan Tho .2011. Results of keeping and preserving the gene of "Dom" ducks (Pat Lai) and "Bau Ben" ducks at Dai Xuyen Duck Breeding and Research Center. Collection of Research and Transfer of Technical Advances in Duck and Muscovy duck Breeding, Dai Xuyen Duck Research Center - National Institute of Animal Sciences. pp. 173 - 177.

Vu Dinh Trong, Nguyen Thi Thuy Nghia, Nguyen Van Duy and Le Thi Mai Hoa .2015. Conformation and production ability of "Ben Bau" ducks raised at Dai Xuyen Duck Breeding and Research Center. Scientific report 2015. Dai Xuyen Duck Breeding and Research Center. pp. 32-39.

Doan Van Xuan, Nguyen Duc Trong and Hoang Van Tieu. 2011. Research on the growth and reproduction ability of hybrid pairs between "Co" ducks and CV 2000 Layer ducks. Collection of research projects and transfer of technical advances in duck and muscovy duck farming. Dai Xuyen Duck Breeding and Research Center, National Institute of Animal Sciences. pp. 237 - 241.

General Statistics Office. 2024. Statistical Yearbook of Vietnam in 2023. Statistics Publishing House, Hanoi, April 2024.

Dai Xuyen Duck Breeding and Research Center. 2019. Duck - Muscovy duck farming process, Hanoi, January 2019.

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