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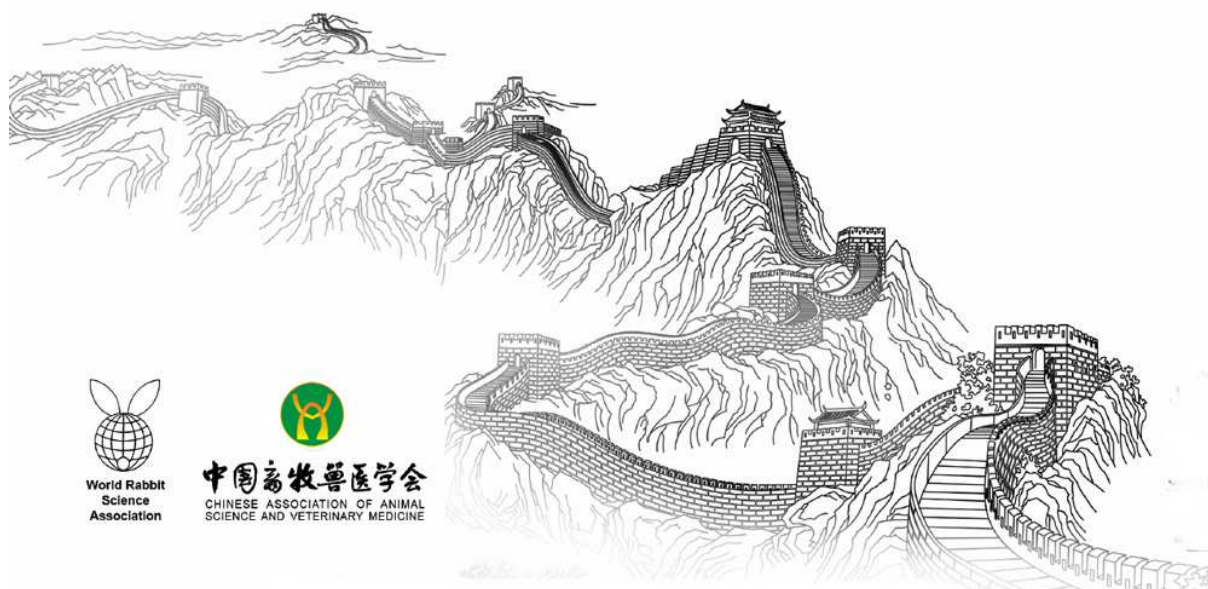
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CHARACTERISTICS AND PERFORMANCES OF THE FUJIAN WHITE RABBIT

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ABSTRACT

To evaluate the characteristics and performance of Fujian White Rabbit, its reproduction, growth, feed conversion ratio, and carcass were analyzed. The results showed that, the average number of newborn alive were 5.59 kits, the average litter weight at 3-weeks was 1209 g, the average litter size at weaning and survival rate at 4-weeks of age were 5.47 kits and 97.9%, respectively. The body weights of the male and female rabbits at 13-weeks were 1570 g and 1525 g, and the average daily weight gains from 4 to 13 weeks of age were 19.9 g and 19.0 g, respectively. The adult body weights of the male and female rabbits were 2131 g and 1957 g, with a significant sex effect ($P < 0.01$). The adult body length, chest girth differences between the male and female rabbits were significant ($P < 0.01$). The feed conversion ratio from 30 to 70-days of age was 3.28. The percentage of carcass yield of the rabbits at the age of 90 -days was 49.2%, and the contents of the crude protein, crude fat, and amino acid of the muscle were 20.5%、2.2% and 17.6%, respectively.

Key words: Fujian White Rabbit; characteristics; performance

INTRODUCTION

For a long time the local farmers in rural region in Fujian Province have selected and raised white, brown, black and gray fur rabbits for their consumption. According to the "Fujian Provincial Livestock and Poultry Breeds map" published in 1985, there were four breeds of Fujian local rabbits: Fujian brown rabbit, Minxinan black rabbit, Fujian White Rabbit, and Fujian gray rabbit with white, brown, black and gray fur, respectively. These breeds are raised mainly for meat production (You H., et al., 1985). Fujian brown rabbit and Minxinan black rabbit were preserved and certificated by the National Livestock and Poultry Genetic Resource Committee in China in the last few years (Xie X.P., et al., 2009, 2011). Fujian gray rabbits disappeared in the past decades.

Fujian White Rabbit is a local breed of small rabbits, theirs ears are short and narrow, which are the main features different from other varieties of white rabbit. It was mainly located in the remote mountainous region of the western Fujian, such as Wuping, Shanghang, and Changting county, but in the past decades, it was crossed with the Giant breed. Now the pure rabbit herds are located only in Wuping county, with a population size of about 20000 animals, but data about theirs characteristics are scarce. The purpose of this study was to obtain data about characteristics and performance of this breed for preservation and further use.

MATERIALS AND METHODS

Animal management

Animals used in the study were fed in the three half-opening houses at Fujian White Rabbit preservation farm, in which there are 800 pure breeding rabbits.

Data came from 40 breeding bucks and 420 breeding does, selected from the pure preservation herds. They were distributed in 40 families, which were composed of 1 buck and 10-11 does; the buck and the does in each family were not closely related. Reproductive methods were natural oestrus, and natural mating. The kits were weaned at the 4 weeks of age. The stocking densities of the growing rabbits were 4-5, 3-4, and 2-3 animals per cage from 35 to 60 days of age, 60 to 90 days of age, and 90 to 120 days of age, respectively. Cage size was 70cm×40cm×35cm. The quantity of feed distributed was between 50 g and 75 g, 80 g and 100 g, and 100 g and 120 g, from 30 to 60 days of age, 60 to 90 days of age, and 90 to 120 days of age, respectively. The quantity distributed to the adult rabbits was 150 g. The feed was restricted and distributed two times each day, the water was not limited at any time. The food composition for kits and adults was DE10.5~10.8MJ/kg, CP16.5~17.0%, CF14.5~16.0%.

Reproduction traits

Gestation length, litter size, and litter weight were recorded at birth, 3 weeks, and 4 weeks after birth.

Growing traits

120 weaning rabbits (half male and half female) were identified and weighed at 10 weeks and at 13 weeks of age. Body length, chest girth, ear length, and ear width were also measured at 10 weeks, and 13 weeks of age. 60 adult rabbits (at 24 weeks of age, half male and half female) measured for the body length, chest girth, ear length, and ear width were sampled from the pure preservation herds.

Feed conversion ratio

30 rabbits (15 male and 15 female) were used to estimate the feed conversion ratio. The stocking density of the rabbits was one animal per cage. The rations were determined at the ages of 70, and 90 days, respectively.

The quantity of feed distributed for each animal was between 50 g and 80 g, 80 g and 100 g, from 30 to 60 days of age, and 60 to 90 days of age, respectively. The feed was restricted and distributed two times every day, the water was not limited at any time.

Carcass trait and meat quality

At 90 days of life, 24 rabbits (half male and female, chosen randomly from the 30 rabbits used to study feed efficiency) were killed to evaluate carcass and meat quality traits. Half of them (12) were chosen to estimate the chemical composition of the hind leg muscle.

After 12 hours of fasting, the rabbits were slaughtered. The carcasses were stored for one hour at environmental thermal conditions. Eviscerated carcass, heart, liver, kidney, and suet were weighted. The hind leg muscle was stored for 24 hours in the refrigerator at 4°C before chemical analysis.

The pH value was determined with the portable pH-Testing Instrument one hour after slaughter of the rabbits at killing house.

Statistical Analyses

All data were analyzed with Biology Statistical Software SPSS13.0, the results were showed by “mean ± standard deviation”, and tested by T-test.

RESULTS AND DISCUSSION

Reproduction

Table 1 showed the reproductive performance of the Fujian White Rabbit. The 120 litters were from the first three litters of each of 40 does.

Table 1 .Reproductive performance of the Fujian White Rabbit

Number of litters	Gestation length (d)	Litter size	Birth	Litter weight (g)	3 weeks		4 weeks		Survival rate 4 to 13 weeks (%)
			Alive litter size		Litter size	Litter weight (g)	Litter size	Litter weight (g)	
120	30.1	5.79	5.59	244.6	5.48	1209	5.47	1666	97.9
	± 0.35	±1.24	± 1.24	±49.8	±1.01	±153	±1.00	±216	1.37

Growth Performance

The adult body weights of the bucks and the does were 2131.02g and 1957.03g, with a significant difference between sexes ($P<0.01$, (Table 2).

Table 2 Fujian White Rabbit growing performances

Item		Body weight at 4 weeks (g)	Body weight at 10 weeks (g)	Body weight at 13 weeks (g)	Body weight at adult (g)	Daily weight gains From 4 to 13weeks (g)
Sample number		60	60	60	30	60
sex	♂	315.4 ±36.68	1184.67 ±145.83	1570.91 ±186.34	2131.02* * ±196.19	19.92
	♀	325.76 ±30.36	1154.97 ±115.67	1525.38 ±161.02	1957.03 ±158.48	19.04

Notice:*significant at 0.05 level ($P<0.05$) ; * *significant at 0.01 level ($P<0.01$) among the same column.

The adult body length, chest girth differences between the males and females at 24 weeks were significant ($P<0.01$) , (Table 3).

Table 3 The body size of the Fujian White Rabbit at 10 , 13 and 24 weeks

Age(weeks)	Body length (cm)		Chest girth (cm)		Ear length (cm)		Ear width (cm)	
	♂	♀	♂	♀	♂	♀	♂	♀
10	33.77	34.34	21.28	21.07	9.36	9.35	5.12	5.05
	±1.78	±1.48	±1.32	±1.30	±0.49	±0.47	±0.27	±0.29
13	37.63	37.17	23.41	23.08	9.42	9.43	5.14	5.12
	±1.81	±1.90	±1.44	±1.85	±0.55	±0.42	±0.31	±0.29
24	39.60* *	38.51	26.33* *	25.57	9.60	9.57	5.22	5.21
	±1.74	±2.54	±1.42	±1.30	±0.44	±0.34	±0.25	±0.19

Notice:* ,* *: significant at 0.05 level ($P<0.05$) and significant at 0.01 level ($P<0.01$), among the same row.

Feed Conversion Ratio

Table 4 showed that the conversion ratios of the bucks and does from 30 to 70 days, and from 70 to 90 days.

Table 4 Conversion ratio of the Fujian White Rabbit from 30 to 70 days and from 70 to 90days

Sex	Number	Body weight at 30 days (g)	Body weight at 70 days (g)	Body weight at 90 days (g)	Age 30 to 70 days		Age 70 to 90 days	
					Feed intake per kit and day (g)	Conversion ratio	Feed intake per kit and day (g)	Conversion ratio
♂	15	315.4 ±36.7	1181.0 ±152.6	1485.9 ±159.5	69.59	3.22	120.63	7.91
♀	15	325.8 ±30.4	1139.5 ±72.0	1453.6 ±79.9	67.73	3.33	122.59	7.80
Mean	30	320.7 ±33.6	1157.9 ±115.	1467.5 ±119.6	68.66	3.28	121.61	7.86

4 Carcass Traits

Table 5 showed the carcass trait of the Fujian White Rabbit at 90-days

Table 5 Carcass trait of the Fujian White Rabbit at 90-days

Sex	Sample number	Live weight (g)	Eviscerated weight(g)	Percentage of eviscerated weight(%)	Eviscerated weight with gilet(g)	Percentage of eviscerated weight with gilet(%)
♂	12	1421.9 ±82.02	703.0 ±50.74	49.44	834.5 ±71.83	58.69
♀	12	1439.3 ±88.69	704.3 ±51.01	48.93	838.0 ±64.81	58.22
Mean	24	1430.6	703.65	49.19	836.25	58.46

Meat Quality

Table 6 showed the PH values and the components of the meat of the bucks and does at 90-days of age.

Table 6 Meat component of the Fujian White Rabbit at 90-days

Sex	Sample number	Live weight(g)	Components of the meat (%)					PH value
			Water	Crude protein	Crude fat	Crude ash	Total amino acid	
♂	6	1444.3 ±76.85	76.07 ±2.87	20.57 ±2.22	1.87 ±0.69	1.03 ±0.08	18.14 ±2.42	6.35 ±0.31
♀	6	1466.75 ±86.36	75.62 ±0.49	20.50 ±1.59	2.53 ±0.67	1.03 ±0.05	17.10 ±2.48	6.09 ±0.07
Mean	12	1455.53	75.85	20.54	2.20	1.03	17.62	6.22

DISCUSSION

The number and distribution of the Fujian White Rabbit raised played primary role in the rabbit industry in the Fujian region (YOU H., et al.,1985). Nevertheless they were crossed with the Giant rabbit breed from the 1980s to the 1990s. The experts of the National Livestock and Poultry Genetic Resource Committee in China had surveyed and identified the Fujian White Rabbit as a breed to preserve, but the number of pure herds is low. The preservation and utilization of Fujian White Rabbit is a starting stage and a long way to go for future.

The study showed that the alive litter size, the litter weight of the rabbits at birth, at 3 weeks, and at 4 weeks were lower than that of Fujian brown rabbit(5.86kits, 299.85 g, 1267.15 g, 2023.15 g, respectively), and Minxinan black rabbit (6.03kits, 258.35 g, 1425.95 g, 2111.36 g, respectively). The body length and chest girth of the bucks and does at 13 weeks were higher than that of the Minxinan black rabbit (35.89cm, 34.95cm, 23.63cm, and 23.69cm, respectively), and lower than Fujian brown rabbit (43.6cm, 43.1cm, 23.3cm, and 23.5cm, respectively). The ear length and ear width of the rabbits were equal to that of Minxinan black rabbit (9.65cm, 5.08cm, respectively), and is smaller than Fujian brown rabbit(11.25cm, 6.89cm, respectively) (Lin H.G., et al., 1998; Xie X.P., et al., 2013).

The Percentages of eviscerated weight and eviscerated weight with gilet of the rabbits at 90 days were higher than that of Minxinan black rabbit and Fujian brown rabbit. (43.78%. 48.90%. 42.52%. 47.60%. respectively) (Chen Y.F., et al., 2010). The crude protein of the meat of the rabbits was lower than that of Minxinan black rabbit (21.74%), and equal to Fujian brown rabbit (20.28%)(Xie X.P., et al., 2013; Chen Y.F., et al., 2011).

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Characteristics and performances of the Fujian White Rabbit

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The Message

- What characteristic does Fujian White Rabbit have?
- It has its own characteristics different from other varieties.
- In the past decades, it was crossed with the Giant breed. Now the pure rabbit herds are about a population size of 20000 animals, and data about their characteristics are scarce.

Methods

1. Gestation length, litter size, and litter weight were recorded at birth, 3 weeks, and 4 weeks after birth.
2. Body weight, body length, chest girth, ear length, and ear width were measured at 10 weeks, 13 weeks, and 24 weeks of age.
3. The feed conversion ratio were estimated at the ages of 70, and 90 days. The stocking density of the rabbits was one animal per cage.
4. After 12 hours of fasting, 24 rabbits at the age of 90 days were slaughtered. The carcasses were stored for one hour at environmental thermal conditions. Eviscerated carcass, heart, liver, kidney, and suet were weighted. The hind leg muscle was stored for 24 hours in the refrigerator at 4°C before chemical analysis.
5. The pH value was determined with the portable pH-Testing Instrument one hour after slaughter of the rabbits at killing house.

Results

1. Reproduction traits were showed at table 1.

Table 1 Reproductive performance of the Fujian White Rabbit

Number of litters	Gestation length (d)	Birth		3 weeks		4 weeks		Survival rate From 4 to 13 weeks(%)
		Litter size	Albro also	Litter weight(g)	Litter size	Litter weight(g)	Litter size	
120	30.1 ±0.35	5.79 ±1.24	5.39 ±1.24	244.6 ±49.0	5.48 ±1.01	1209.0 ±153.3	5.47 ±1.00	1666.3 ±216.3

3. Feed conversion ratios were showed at table 4.

Table 4 Conversion ratio of the Fujian White Rabbit from 30 to 70 days and from 70 to 90days

Sex	Number	Body weight at 30 days (g)	Body weight at 70 days (g)	Body weight at 90 days (g)	Age 30 to 70 days		Age 70 to 90 days	
					Feed intake per kit and day (g)	Conversion ratio	Feed intake per kit and day (g)	Conversion ratio
♂	15	315.4 ±96.7	1181.0 ±182.6	1483.9 ±189.5	69.29	3.22	126.63	7.91
♀	15	325.0 ±98.4	1159.5 ±72.0	1436.6 ±71.9	67.73	3.33	122.59	7.90
Mean	30	320.7 ±93.6	1157.9 ±115.1	1467.5 ±119.6	68.66	3.28	121.61	7.96

4. Carcass traits were showed at table 5.

Table 5 Carcass trait of the Fujian White Rabbit at 90-days

Sex	Sample number	Live weight (g)	Eviscerated weight(g)	Percentage of eviscerated weight(%)	Eviscerated weight with giblet(g)	Percentage of eviscerated weight with giblet(%)
♂	12	1421.9 ±82.02	783.6 ±30.74	49.44	834.5 ±71.83	58.69
♀	12	1439.3 ±88.69	784.3 ±51.01	48.93	838.0 ±64.81	58.22
Mean	24	1430.6	783.65	49.19	836.25	58.46

Introduction

1. Fujian White Rabbit is a local breed of small rabbits, their ears are short and narrow, which are the main features different from other varieties of white rabbit.
2. It was mainly located in the remote mountainous region of the western Fujian, such as Wuping, Shanghang, and Changting county, but in the past decades, it was crossed with the Giant breed.
3. Now the pure rabbit herds are located only in Wuping county.

2. Growing traits were showed at table 2 and table 3.

Table 2 Fujian White Rabbit growing performances

Item	Body weight at 4 weeks (g)	Body weight at 10 weeks (g)	Body weight at 13 weeks (g)	Body weight at 24 weeks (g)	Daily weight gain From 4 to 13weeks (g)
Sample number	60	60	60	30	60
♂	315.4 ±36.68	1184.67 ±145.83	1570.91 ±186.34	2131.83* ±196.19	19.92
♀	325.76 ±36.36	1154.97 ±115.67	1525.58 ±161.82	1957.83 ±158.48	19.04

Table 3 The body size of the Fujian White Rabbit at 10, 13, and 24 weeks

Age(weeks)	Body length (cm)		Chest girth (cm)		Ear length (cm)		Ear width (cm)	
	♂	♀	♂	♀	♂	♀	♂	♀
10	33.77 ±1.78	34.34 ±1.48	21.28 ±1.32	21.07 ±1.30	9.36 ±0.49	9.35 ±0.47	5.12 ±0.27	5.05 ±0.29
13	37.63 ±1.81	37.17 ±1.90	23.41 ±1.44	23.08 ±1.85	9.42 ±0.55	9.43 ±0.42	5.14 ±0.31	5.12 ±0.29
24	39.68* ±1.74	38.81 ±2.54	26.33* ±1.42	25.57 ±1.30	9.60 ±0.44	9.57 ±0.34	5.23 ±0.25	5.21 ±0.19

5. Meat qualities were showed at table 6.

Table 6 Meat component of the Fujian White Rabbit at 90-days

Sex	Sample number	Live weight(g)	Components of the meat (%)					pH value
			Water	Crude protein	Crude fat	Crude ash	Total amino acid	
♂	6	1444.3 ±76.85	76.07 ±2.87	20.57 ±2.22	1.87 ±0.69	1.03 ±0.08	18.14 ±2.42	6.35 ±0.51
♀	6	1466.75 ±86.36	75.62 ±0.49	20.50 ±1.59	2.53 ±0.67	1.03 ±0.05	17.10 ±2.48	6.09 ±0.07
Mean	12	1455.53	75.85	20.54	2.20	1.03	17.62	6.22

Conclusions

1. The results showed that, the average number of newborn alive were 5.59 kits, the average litter weight at 3-weeks was 1209 g, the average litter size at weaning and survival rate at 4-weeks of age were 5.47 kits and 97.9%, respectively.
2. The body weights of the male and female rabbits at 13-weeks were 1570 g and 1525 g, and the average daily weight gains from 4 to 13 weeks of age were 19.9 g and 19.0 g, respectively.
3. The adult body weights (at 24-weeks) of the male and female rabbits were 2131 g and 1957 g, with a significant sex effect ($P<0.01$). The adult body length, chest girth differences between the male and female rabbits were significant ($P<0.01$).
4. The feed conversion ratio from 30 to 70-days of age was 3.28.
5. The percentage of carcass yield of the rabbits at the age of 90 -days was 49.2%, and the contents of the crude protein, crude fat, and amino acid of the muscle were 20.5%, 2.2% and 17.6%, respectively.

