

PRODUCTIVITY OF TWO PHAN RANG SHEEP LINES: THE SECOND GENERATION

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ABSTRACT

Two experiments were conducted to determine the productivity of two Phan Rang sheep lines (fluff and braided wool sheep lines) at the second selected generation. The first experiment (Exp.1) evaluated the productivity of second generation fluff wool sheep and the second experiment (Exp.2) evaluated the productivity of second generation braided wool sheep. In Exp.1, total of 974 fluff wool lambs borned from 749 ewes resulted from breed 830 female lambs and 83 male lambs at 9 months of age. In Exp.2, total of 486 braided lambs borned from 413 ewes resulted from mating breed 413 female lambs and 41 male lambs at 9 months of age.

The results showed that in the Exp.1, lambs with the white color, fluffy and not sticky hair was 96,2%. The body weight of lambs at birth, 3, 6 and 9 months of age were 2.69; 14.83; 21.46; and 27.34 kg, respectively. The male body weight at all the months was significantly ($P<0.001$) higher than that of the females. The age at the first lambing was 443 days and the litter size was 1.31 heads. In Exp2, the body weight of lambs at birth, 3, 6 and 9 months was 2.50; 14.1; 20.25; and 24.16 kg respectively. The male body weight at all the months of age was also higher than that of the females ($p<0.001$). The age at the first lambing was 440 days and the litter size was 1.32 heads age.

Keywords: *Phan Rang sheep, body weight, weight gain, age at first lambing, litter size.*

INTRODUCTION

Although the current Phan Rang sheep herd adapts well to local conditions, its productivity is not high, the breeding herd is not well managed, the male and female sheep are not monitored following pedigree, and natural breeding is used without control. The free exchange and purchase for breeding, especially for male sheep are often used in the same herd for many generations, so the phenomenon of inbreeding appears widespreadly and popularly among livestock farmers, leading to the loss of productivity such as low meat yield and poor reproductive ability. In fact, in the Phan Rang sheep herd, the wool characteristics are clearly separated and expressed, and in which the characteristics of loose and braided wool are easily recognized in the same breeding herd, so selective separation is highly feasible. In Vietnam's conditions and even in the future, sheep with these wool types will react differently to the environment, leading to different adaptability and development, different breeding efficiency and adaptation to different breeding areas. The separation of the two groups of down and braided hair on Phan Rang sheep into two separate sheep lines also creates favorable conditions for more favorable breeding management, creating good scientific raw materials and a foundation for applying and exploiting hybrid advantages in sheep breeding.

To achieve the desired results, it is necessary to first investigate and re-evaluate the overall breeding methods as well as the breed characteristics and production capacity of Phan Rang sheep. Assess the current status of the sheep herd, track down Phan Rang sheep currently raised in facilities and households, and farms, collect individuals with outstanding characteristics, typical down and braided hair; have a beautiful appearance, large body mass, and good reproductive ability to use as raw materials to create two separate sheep lines based on the type of hair. This will help to have better solutions for the next steps of researching, selecting, creating lines and building a reasonable feeding regime. Next, select and breed to create two sheep lines with characteristics of loose and braided hair with the expectation of stability in

appearance and production capacity (growth and reproduction) higher than the population. After the breeding goal is achieved, the construction of a breeding process suitable for each sheep line to ensure the full development of the potential of the breed as well as the breeding conditions in some ecological regions will be implemented. Therefore, to overcome inbreeding and productivity decline, it is necessary to select and breed Phan Rang sheep into specialized and characteristic sheep lines to serve the preservation of gene sources and create a source of breeding materials to exploit the potential advantages in crossbreeding Phan Rang sheep

The objective of this study was to determine the productivity of two Phan Rang sheep lines (fluff and braided wool sheep) at the second generation.

MATERIALS AND METHOD

Research materials

In Exp.1, total of 974 second generation fluff wool lambs borned from 749 ewes resulted from breed 830 female lambs and 83 male lambs at 9 months of age.

In Exp.2, total of 486 second generation braised lambs borned from 413 ewes resulted from mating breed 41 female lambs and 83 male lambs at 9 months of age.

Location and time

The trial was conducted from January to December in 2023, at Ninh Thuan Goat and Sheep Breeding Station belonging to Sontay Goat and Rabbit Research Centre in Central Region of Viet Nam.

Research content

Experiment 1 (Exp.1): Productivity of the second generation fluff wool sheep line

Experiment 2 (Exp.2): Productivity of the second generation braided wool sheep line

Experimental design and methods

Select and build the first generation sheep flock for breeding:

Select the first generation woolly rams to be the breeding males for the second generation (83 first generation fluff wool rams and 41 first generation braided wool rams). Rams were selected according to the following criteria: Beautiful appearance, characteristics of the breed and body weight at 9 months of age ≥ 35 kg/head.

Select the first generation woolly ewes to be the breeding females for the second generation (830 first generation fluff wool ewes and 41 first generation braided wool ewes). Ewes were selected according to the following criteria: Beautiful appearance, characteristics of the breed and body weight at 9 months of age ≥ 23 kg/head.

Mating the selected woolly rams and woolly ewes according to wool line to build the second generation sheep.

Data collection

Monitor the appearance and growth performance of second generation fluffy and braided wool lambs

Appearance: Observe and evaluate wool color.

Growth monitoring: Body weight at birth, 3 months, 6 months, 9 months of age.

Coat characteristics: Fluffy wool type, observed and evaluated at 9 months of age

Reproduction monitoring (mating, pregnancy, birth)

Monitoring indicators include: Age at first mating; age at first lambing; gestation period and litter size.

Statistical analysis

The data from the experiments were analyzed by analysis of basic statistic for all parameters and by analysis of variance using the ANOVA of General Linear Model to compare the means of body weight of two genders of Minitab Release 16.2 (Minitab, 2010).

RESULTS AND DISCUSSION

Exp.1. Productivity of the second generation fluff wool sheep line

Body weight changes of second generation fluff wool lambs by months of age

The body weight changes of the second generation of fluff wool lambs born at different ages are presented in Table 1. The results show that lambs had weights at birth, 3, 6 and 9 months of age of 2.69; 14.83; 21.46; and 27.34 kg/head, respectively. The body weight of the rams was significantly ($P < 0.001$) higher than that of the ewes at all monitored times.

Table 1. Body weight changes of second generation fluff wool lambs (kg/head) by months of age

Parameters	Gender	n (head)	Mean	SE	CV (%)	Min	Max
Birth weight	Female	979	2.62	0.007	8.62	2.00	3.30
	Male	492	2.55	0.009	8.20	2.00	3.20
	Average two genders	487	2.69	0.010	8.25	2.10	3.30
Weaning weight at 3 months of age	Female	950	14.37	0.019	4.05	13.20	15.90
	Male	476	13.92	0.012	1.93	13.20	14.70
	Average two genders	474	14.83	0.012	2.92	13.60	15.90
Weight at 6 months of age Birth weight	Female	918	20.19	0,043	6.47	18.00	22.10
	Male	460	18.92	0,016	1.81	18.00	19.90
	Average two genders	458	21.46	0.012	1.23	20.50	22.10
Weaning weight at 9 months of age	Female	877	25.99	0.048	5.41	23.40	28.30
	Male	439	24.64	0.019	1.64	23.40	26.00
	Average two genders	438	27.34	0.017	1.32	26.20	28.30

Similar to first generation fluffy wool sheep, the weight results of second generation wool sheep at all monitoring times were relatively high compared to the survey results on mass flocks raised

in 4 districts of Ninh Thuan province in the study of Do Chien Thang et al. (2020) at the time points of newborn (2.1kg compared to 2.62kg), 3 months (11.3kg compared to 14.37kg), 6 months (16.1kg compared to 20.19kg) and 9 months of age (20.5kg compared to 25.99kg). This result is also significantly higher than the survey results of Nguyen Huu Van et al. (2023) on the mass flock of Phan Rang sheep of males at the time of birth (2.44kg vs. 2.69kg), 3 months (13.88kg vs. 14.82kg), and 9 months of age (27.3kg vs. 27.4kg) and of females at the time of birth (2.25kg vs. 2.5kg), 3 months (12.56kg vs. 14.1kg), and 9 months of age (22.81kg vs. 25.65kg) in Ninh Thuan province. The higher results in this study may be due to the fact that the sheep were selected and raised according to better technical processes than in the surveyed households.

The second generation Phan Rang fluffy wool sheep in this study had a higher birth weight than the Menz and Horro sheep (Ethiopia) male and female at 2.38 and 2.22 kg (Awgichew, 2000); the West African dwarf sheep (Djallonke sheep) at 1.67-2.70 kg (Adjibode et al., 2017); and equivalent to the Abou-Delik sheep (Egypt) at 2.29-2.81 kg (Farrag, 2022). This result is also higher than the publication of Ngo Thanh Vinh (2014) when studying Phan Rang sheep raised in Ninh Thuan and Ba Vi, ranging from 2.3 kg (female) to 2.4 (male). However, this result is lower than the Karayaka sheep breed (Uluta et al., 2010); Balouchi-New Zealand (Norouzian, 2015); Awassi in Jordan (Al-Momani et al., 2020) were all >3kg.

At 3 and 6 months of age, the weight of sheep in this survey was also within the range of data published by Ngo Thanh Vinh (2014) and Bui Van Loi (2014) when raised in Ninh Thuan, Ba Vi and Thua Thien Hue (10.9-14.6 kg at 3 months of age and 15.3-20.8 kg at 6 months of age). Also according to Ngo Thanh Vinh (2014), Phan Rang sheep raised in Ninh Thuan and Ba Vi at 9 and 12 months of age had a weight of 21.02-23.34 kg and 24.74-29.53 kg, respectively.

Reproductive performance of second generation fluff wool ewes

The reproductive results of second generation braided ewes are presented in Table 2. The results show that the age at first mating and age at first lambing of second fluff ewes were 290.0 and 439.9 days, respectively. The average gestation period was 149.90 days; the litter size to 1.32 lambs/litter.

Table 2. Reproductivity of second generation fluff wool ewes (n=336)

Parameters	Mean	SE	CV (%)	Min	Max
Age at first mating (day)	293.3	0.21	1.29	275.0	305.0
Age at first lambing (day)	443.1	0.21	0.87	426.0	455.0
Gestation time (day)	149.8	0.05	0.67	148.0	152.0
Litter size at birth (head/litter)	1.31	0.03	35.36	1.0	2.0

The age at first mating of second generation fluffy wool ewe are lower than that of studies in India on Pattanam adu sheep (Sundaramoorthy et al., 2021) at 12-13 months; of Harini et al. (2019) on Nellore Palla sheep at 361.5±1.09 days. Dinh Van Binh and Ngo Thanh Vinh (2010) reported that Phan Rang sheep raised in Son Tay had the first gestation age of 299 days.

In this study, the gestation time of TH1 fluffy wool sheep was 149.76 days, similar to the published results of Nguyen Huu Van et al. (2023) of 150 days, but higher than the published

results of Dinh Van Binh and Ngo Thanh Vinh (2010) of 148.9 days. According to Rusyad (1977), the gestation period was 148-150 days in Priangan sheep, 150 days in fat-tail sheep and 149 days in their crossbreds.

In this study, the age at first lambing of second generation fluffy wool sheep was 443.1 days and the sheep gave birth to 1.31 lambs/litter, higher than the published 1.25 lambs/litter by Dinh Van Binh and Ngo Thanh Vinh (2010).

Exp.2. Productivity of the second generation braided wool sheep line

Body weight changes of second generation braided wool lambs by months of age

The results of body weight changes of second generation wool sheep born at different ages are presented in Table 3. The results of Table 3 show that second generation braided wool lambs have weights at birth, 3, 6 and 9 months of age of 2.48; 13.98; 19.48; and 24.90 kg/head, respectively. The body weight of male lamb is always higher than that of female lamb at all monitoring times.

Table 3. Body weight changes of second generation braided wool lambs (kg/head) by months of age

Parameters	Gender	n (head)	Mean	SE	CV (%)	Min	Max
Birth weight	Female	247	2.45	0.011	7.07	1.90	2.80
	Male	245	2.50	0.010	6.44	2.10	2.80
	Average two genders	492	2.48	0.01	6.82	1.90	2.80
Weaning weight at 3 months of age	Female	241	13.76	0.037	4.11	12.30	14.90
	Male	238	14.10	0.011	1.20	13.60	14.50
	Average two genders	479	13.98	0.02	3.24	12.30	14.90
Weight at 6 months of age Birth weight	Female	229	18.70	0.100	7.89	12.70	20.30
	Male	229	20.25	0.013	0.96	19.80	20.70
	Average two genders	458	19.48	0.06	6.72	12.70	20.70
Weaning weight at 9 months of age	Female	219	24.16	0.101	6.21	18.20	25.60
	Male	218	25.65	0.012	0.66	25.30	26.10
	Average two genders	437	24.90	0.06	5.22	18.20	26.10

Similar to second generation fluffy wool sheep, the body weight at different months of age of second generation braided wool lambs were higher higher than the survey results of Nguyen

Huu Van et al. (2023) and within the ranges reported by Ngo Thanh Vinh (2014) and Bui Van Loi (2014).

The reproductive performance of second generation braided wool ewes

The age at first mating and age at first lambing of second generation braided wool ewes are 290 and 440 days, respectively. The average gestation period is 149.9 days; litter size is 1.30 lambs/litter.

Table 4. Reproductivity of braided wool sheep (n=167)

Parameters	Mean	SE	CV (%)	Min	Max
Age at first mating (day)	290.0	0.16	0.70	287.0	293.0
Age at first lambing (ngày)	439.9	0.17	0.50	435.0	445.0
Gestation time (ngày)	149.9	0.09	0.78	148.0	152.0
Litter size at birth (head/litter)	1.32	0.04	35.44	1.0	2.0

CONCLUSION

It was concluded that the body weight of fluff wool sheep line at birth, 3, 6 and 9 months of age were 2.69; 14.83; 21.46; and 27.34 kg, respectively. The body weight of males at every months of age were higher than that of females. The age at first lambing was 443 days and litter size was 1.31 heads.

The body weight of braided hair sheep at birth, 3, 6 and 9 months of age were 2.50; 14.1; 20.25; and 24.16 kg respectly. The body weight of males at every months of age were significantly higher than that of females. The age at first lambing was 440 days and the litter size was 1.32 heads.

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