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Growth Performance of Rabbit (Oryctolagus Cuniculus) Supplemented with Purslane (Portulaca Oleracea L)

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Abstract

The research was conducted from July to August 2023 at Bataan Peninsula State University Brgy. Bangkal Abucay, Bataan. The aims of the study were to determine and compare the effect of feeding Purslane in terms of the following parameters: Determine the growth in terms of initial weight, average gain in weight, final weight, feed conversion rate, and mortality rate. Determine and compare the interaction of two breeds and levels of purslane supplementation on the growth performance of rabbits. Along the process, it was observed that feeding purslane to rabbits on some of the Californian white rabbit breeds has greater effects on improving their growth performance. Californian white rabbit breeds were becoming the most promising traits concerning growth. Additionally, the supplementation of purslane to their daily roughage intake has demonstrated noteworthy results concerning growth performance.

Keywords: Purslane, supplementation, breeds, nutrition, potential growth

Introduction:

The African Swine Fever Disease (ASFD) outbreak in the nation has resulted in low productivity and a shortage of pork, which is harming the swine business. As a potential solution, rabbit could be one of the options. The production and use of rabbit have long been supported by the Food and Agricultural Organization (FAO), as it can be a great backyard and commercial venture with little initial investment, even in intensive farming systems (Odunaiya & Akinyemi, 2008 as cited by Odinawa, A. B *et al.* 2016).Rabbits are often fed a variety of feed products without considering the physiological effects these goods may have on the animals' health and to achieve the growth potential of rabbit was depends on the feed offered and the environment in which the animal is growing. Some previous studies have shown that different breeds or strains respond differently to dietary protein, implying that the feeding regime of these breeds must be considered separately for efficient utilization and optimum production. Mathika, Zenande 2023.

Objectives of the study

The general objective of the study was to determine the effect of supplementing different levels of purslane (*Portulaca oleracea L.*) on the growth of two upgraded breeds of rabbits.

Specifically, the study aimed:

1. To determine and compare the effect of breed and levels of Purslane supplementation in terms of the following parameters:

a. average daily gain in weight
b. final weight
c. feed conversion rate
d. feed consumption
e. mortality rate

2. Determine and compare performance of rabbits as influenced by breed and levels of purslane supplementation

Materials and Methods

Experimental Animals

A total of twenty-four (24) heads of apparently healthy weaned kits of upgraded New Zealand White and Californian White Rabbit (with an equal ratio of male and female i.e. twelve females and twelve males) weighing approximately 0.5 kg per head and 6 weeks old were used.

Experimental Design, Treatment, and Layout

The experimental study was conducted to determine the interaction of two factors i.e. breed (two upgraded breeds) and level of purslane supplementations (3 levels) which were laid out in a split-plot in Randomized Complete Block Design with 4 replications. The following are the factors:

Factor A –Breed
A1- New Zealand White Upgraded Rabbits
A2- Californian White Upgraded Rabbits
Factor B- Level of inclusion
P1- Common Farmers Practice (60% commercial feeds and 40% grasses)
P2- 25% air-dried purslane and 75% commercial rabbit feeds
P3- 50% air-dried purslane and 50% commercial rabbit feeds

Experimental Layout

Rep 1		**Rep 2**		**Rep 3**		**Rep 4**
A1P3		A2P2		A2P2		A1P1
A1P1		A2P3		A2P1		A1P2
A1P2		A2P1		A2P3		A1P3
A2P1		A1P3		A1P2		A2P3

A2P3		A1P1		A1P3		A2P1
A2P2		A1P2		A1P1		A2P2

Propagation and Preparation of Purslane

An area of one square meter was harvested with 2.5 kg of purslane which meant that for every 100 square meters, 250 kgs was produced per harvest.

One thousand (1,000) square meters' area was provided for the propagation of purslane. Matured purslane plants (leaves and stems) were harvested in the morning (9:00 AM) by cutting the base of the plant above the ground leaving around an inch. The harvested purslane was air-dried overnight before use.

Experimental allocation of weaners for grow-out trial

The experimental purslane plants were gradually introduced to the animals following the one-week pre-trial activity. The number of commercial feeds and purslane with the desired amount was given to the animals in equal amounts in the morning and the afternoon on a separate clay pot on 6% dry matter requirements of the animals computed based on their body weight.

The weaners were allocated into individual cages following the experimental design. The initial weights of the animals were determined and subjected to statistical analysis. The grow-out trial commenced when the initial weights revealed non-statistically significant comparisons. The experimental period was terminated on their 60th days.

Experimental feeding based on dry matter requirement for grow-out trial

The amount of feed (either commercial feed or purslane) for the grow-out trial was based on the dry matter requirement and body weight. The dry matter intake of the animals was six percent (6%) of their body weight. Before experimentation, samples of commercial feed and purslane will be submitted to the DA-RFU 3 Feed Laboratory for proximate analysis The dry matter content of the samples was the basis for the computation of daily feed allocation to each treatment combination

Proximate Analysis of purslane and concentrate.					
Forages	**DM (%)**	**TDN (%)**	**CP (%)**	**C (%)**	**P (%)**
Purslane	90	60	9.3		
Concentrates	90	75	15	0.5	0.3

Sample diet allocation for 500-gram grow-out rabbit based on 6% DM requirement and 90% DM content of concentrate and purslane based on proximate analysis.

Treatments	**Computation**	**Diet allocation (g)**
Common Farmer's Practice		
60% Concentrated feeds	500 x 0.06 x 0.6 / 0.9	20.00
40% Napier grasses	500 x 0.06 x 0.4 / 0.9	13.33

75% Concentrate Feeds 25% Air Dried Purslane	500 x 0.06 x 0.75 / 0.9 500 x 0.06 x 0.25 / 0.9	25 8.33
50% Concentrated Feeds 50% Air Dried Purslane	500 x 0.06 x 0.50 / 0.9 500 x 0.06 x 0.50 / 0.9	16.66 16.66

Feeding was done twice a day: P1 is the common farmer's Practice which is 60% concentrated feeds and 40 % air-dried Napier grass, this was given 50% in the morning (8:00 AM) and 50% in the afternoon (5:00 PM), for P2, is 25% concentrated feeds and 75% air dried purslane was given 50% in the morning (8:00 AM) and (50%) in the afternoon (5:00 PM). For P3 50% concentrated feeds and 50% air-dried purslane were given 50% in the morning (8:00 AM) and 50% in the afternoon (5:00 PM).

Care and management practices

Housing

The housing premises have adequate shade of trees, a peaceful environment, and free from inclement weather, and are protected from predators like dogs, cats, snakes, bats, etc. It had good ventilation and natural light. Each cage was made up of gauge 14 GI wire mesh with a hard plastic rabbit floor mat fitted with an inverted bottle nipple drinker and feeder with bottom mesh, each weaner was placed in an individual cage with a dimension of 2ft x 4 ft x 16" LWH.

Determination of feed allocation and daily feed consumption

Feed was allocated first on all feeders based on the body weight of each animal before they were placed in the cage. Before feeding in the morning from the second day of the experiment and onwards, all feeders were withdrawn at the same time from each cage and placed on top of each cage. Thereafter, the leftover feed was obtained and weighed. After all, leftover feeds have been measured, feed allocation per animal was done to all feeders and then placed back in the cage at the same time.

Deworming

All experimental animals were dewormed before the actual experimentation. Albendazole was given at a rate of 10 mg/kg body weight through drinking water.

Sanitation for disease prevention

The individual cages were cleaned and disinfected before the conduct of the experiment. Daily cleaning of each cage was done. Animals that showed signs of infection were well-examined and treated immediately.

Data Collection

The data gathered are described below:

1. Average daily gain in weight (ADG) - the gain in weight from the start to end date of each actual experiment.

$$ADG = \frac{\text{Final Weight} - \text{initial weight}}{\text{Number of experimentation days}}$$

2. Final weight- Weight of the animals after experimentation.
3. Feed Conversion Ratio- total feed consumed over total gain in weight.

$$FCR = \frac{\text{Feed consumption}}{\text{Final weight} - \text{Initial weight}}$$

4. Daily Feed consumption- the amount of feed consumed per day.

$$DFC = \frac{\text{Feed offered} - \text{Feed left}}{\text{Number of experimentation days}}$$

5. Mortality rate- the percentage of the dead animal during the experimentation

$$MR = \frac{\text{Number of rabbits died}}{\text{Total number of rabbits}} X100$$

Statistical Analysis

The data gathered were expressed in means and analyzed by using a two-way analysis of variance in the Randomized Complete Block Designed (RCBD) that determined the interaction of breed and level of inclusion within breeds and level of inclusion for the identified data collected. Significant differences between means were compared using the Least Significant Different test.

RESULTS AND DISCUSSIONS

A. Growth performance parameters- (Weaners)

The average initial, weight, average final weight, average daily increase, average feed intake, feed conversion ratio, and mortality rate of the two breeds of rabbit fed with various amounts of purslane are among the growth performance fed with different varying levels of purslane are the metrics.

Grow–out Trial

The average initial weight of the two kinds of rabbits indicated that there are no appreciable differences between means. However, as the table below illustrates, there is no interaction with the effect of the level of supplementation.

Table 1. Mean initial weight (grams) of rabbits in different treatment combinations.

Breed	**Level of Supplementation**			**Mean^{NS}**
	1	**2**	**3**	
New Zealand	919.25	874.50	779.50	857.75
California White	820.00	889.50	859.00	856.17
Mean^{NS}	869.62	882.00	819.25	
Factors	**P-value**			
A	0.9798			
B	0.6841			
A x B	0.5019			

CV=17.58% ns-No statistically significant difference (p>0.05).

Mean Average Final Weight

The mean average final weight was recorded and weighed by using a digital weighing scale, this was done when the herd reached their sixty days of experimentation as shown in the table below:

Table 2. Mean final weight (grams) of rabbits in different treatment combinations.

Breed (A)	**Level of Supplementation (B)**			**Mean**
	1	**2**	**3**	
New Zealand	1843.75	1919.50	1554.50	1772.58 ^{B}
California White	2003.00	2267.00	1774.50	2014.83^{A}
Mean	1923.38^{ab}	2093.25^{a}	1664.50^{b}	
Factors	**P-value**			
A	0.0283			
B	0.0107			
A x B	0.7389			

CV=12.91% * Means with different letter superscripts in the same row (small case) and column (upper case) are statistically significant ($p<0.05$).

Statistically proven that the Mean Average Final weight of rabbit in Table 2, treatment combinations were found significantly different. The Californian white rabbit breed shows an evident growth rate as compared to New Zealand breeds. Because of their excellent growth qualities and high meat-bone ratio, the Californian white rabbit breed is the most widely used for meat production worldwide, according to Mailu *et al.* 2013 (as quoted by Mailafia *et al.* 2010, Oseni, 2008). In addition, supplementation of purslane in their daily food has a substantial influence on their final weight.

Mean Average Daily Gain

The mean average daily gain of the experimental rabbits is presented in Table 3. The average daily gain was obtained by subtracting the initial weight from the final weight of the experimental rabbits divided by the number of experimentation days. It is the measure of the daily increase in the live weight of the animal. This was discussed below:

Table 3. Mean Average Daily in Gain (grams) of rabbits in different treatment combinations.

Breed (A)	**Level of Supplementation (B)**			**Mean**
	1	**2**	**3**	
New Zealand	15.41	17.42	12.92	15.25^{B}
California White	19.72	22.96	15.26	19.31^{A}
Mean	17.56^{a}	20.19^{a}	14.09^{b}	
Factors	**P-value**			
A	0.0029			
B	0.0021			
A x B	0.5303			

CV= 16.23% * Means with different letter superscripts in the same row (small case) and column (upper case) are statistically significant ($p<0.05$)

As reflected in Table 3, the mean average daily gain for weaners was significantly different in treatment combination. This means that the Californian white breed was heavier than the New Zealand white rabbit.

The results of the findings that purslane supplementation in the diet highly influenced their daily gain. Weight increase is mostly determined by nutrient balance and intake, as described by Gutierrez *et al.* (2003) and Bacab *et al.* (2013). Dietary energy density and fiber content directly affect the amount of dry matter an animal consumes, which in turn affects its productivity and performance. Cong Wang *et al.* (2021) also discovered a significant rise in weight and a decrease in the relative abundance of dangerous bacteria compared to the number of good bacteria. These outcomes are in line with other research that demonstrated purslane improves gut microbiota. The results demonstrated that the ordinary farmer's practice in supplementation is equivalent to the daily consumption of different treatment combinations of purslane supplementations. However, there was no discernible interaction effect on the breed or amount of purslane supplementation.

Mean Feed Conversion Ratio

The mean feed conversion ratio was determined by the total feed consumption divided by the final weight subtracted from the initial weight of the animals during the 60 days of the experimental period. The results of findings are shown below:

Table 4. Mean Feed Conversion Ratio (grams) of rabbits in different treatment combinations.

Breed (A)	**Level of Supplementation (B)**			**Mean**
	1	**2**	**3**	
New Zealand	7.98	6.90	9.30	8.07^{A}
California White	5.71	4.89	8.49	6.37^{B}
Mean	6.85^{b}	5.90^{b}	8.90^{a}	
Factors	**P-value**			
A	0.0462			
B	0.0203			
A x B	0.7238			

CV= 26.54% *Means with different letter superscripts in the same row (small case) and column (upper case) are statistically significant ($p<0.05$).

It is statistically revealed that the mean of feed conversion ratio was significantly different between New Zealand White rabbits as compared to Californian white rabbit breeds shown in Table 4. This means that the Californian white breed had a better feed conversion efficiency. The efficiency increases with a lower FCR. Animals with a low feed conversion ratio (FCR) are regarded as efficient feed users, according to Wikipedia. Comparing FCR between species, however, might not mean much unless the foods are appropriately comparable and similar in quality.

According to Momoh *et al.* (2015), breeds and genotypes range in how efficiently they utilize feed, which is reflected in the feed conversion ratio variations. For instance, the comparison of New Zealand white × California crossbred on 17% CP, the Chinchilla × Dutch belted crossbred rabbit had a lower feed conversion ratio (12% CP), indicating a lower kilogram of feed intake per kilogram of body weight gain. This could be an example of the genotype × protein level (environment) interaction.

The weight increase of body weight in chickens according to Kartikasari *et al.* (2014) trial did not differ between the control group and the group that received 6% purslane meal in their diet. Remarkably, they

found that the feed conversion ratio of hens given diets supplemented with 12% purslane meal was almost identical relative to using a basal diet. Despite that accordingly, Sadeghi *et al.* (2016) found that purslane considerably increased the antioxidant status and feed efficiency of broiler chickens. However, standard farmer practices were equivalent to the purslane supplementation in the treatment combinations.

Another finding from the study of Cong Wang *et al.* (2021), adding purslane to broiler chicken feed results in a large weight gain while having no discernible impact on feed intake. This improves growth performance and lowers the feed conversion rate. This demonstrates that the optimum effect of decreasing the FCR was acquired by feeding the birds at least 3 % purslane. Meanwhile, there was no interaction effect on the average feed conversion observed on the breeds and level of supplementation.

Table 5. Mean Average Feed Consumption of rabbits in different treatment combinations.

Breed	**Level of Supplementation**			**Meanings**
	1	**2**	**3**	
New Zealand	119.17	113.98	116.48	116.54
California White	112.34	112.13	127.34	117.27
Mean^{ns}	115.76	113.06	121.91	
Factors	**P-value**			
A	0.9274			
B	0.6451			
A x B	0.6423			

CV= 16.35% ^{ns} No statistically significant differences ($p>0.05$).

CONCLUSIONS, AND RECOMMENDATIONS

Conclusions

Based on the result of the study, the following are drawn.

1. Breed and Level of supplementation of Purslane had a significant influence on the growth performance.
2. Californian white rabbit breed were noted that has great significant growth performance as compared to New Zealand rabbit breed

Recommendations:

Based on the results obtained, the following suggestions are recommended:

1. Purslane is not only essential for medicinal use but it has a potential source that has a great influence on the growth performance in the supplementation for the diet of the breeds of rabbit.
2. It was suggested that a purslane study be conducted to learn more about the nutritional advantages for other animals.

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