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Growth Comparism of (Rabbits) *Oryctolagus Cuniculus* Linn Fed Selected Rations

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ABSTRACT

Research work on growth rate of rabbits was conducted to assess the contributions of selected rations to the weight gain of rabbits. Forty-eight growing rabbits of the same age and nearly the same size were acquired and grouped into four representing four treatments. Treatment A, Tridax procumbence; Treatment B, Aspilia sagitate; Treatment C, Leuceana leucocephala and Treatment D, Growers mash (Pellet form) as Control. The rabbits were housed in disinfected hutches. The research was set in completely randomized design with three replicates. The research work was carried-out at the Rabbitary section of Livestock Farm of Forestry Research Institute of Nigeria, Headquarters, Ibadan, Nigeria. Initial weights of the animals were taken before placing them on experimental rations. Group A was placed on Treatment A, Group B on Treatment B, Group C on Treatment C and Group D on Treatment D. Parameters measured were Feed Consumption Rate, Feed Preference and Body Weight Gain of the Animals. Weekly record was taken on the parameters set for eight weeks. Eighteen kilogram of feed was given to the animals across the treatments in the first week, 20 Kg in week 2, 22 Kg in week 3, 24 Kg in week 5, 26 Kg in week 6, 28 Kg in week 7 and 30 Kg in week 8. Data collected was subjected to statistical proof using SPSS package. Two Hypotheses were set; Hypothesis One: There is difference in feed consumption among the rabbits and Hypothesis Two: There is difference in average weight among the rabbits. The ANOVA showed that there was no significant difference at feed consumption at ($F = 1.034$, $p > 0.05$) and average weight of the rabbits at ($F = 0.551$, $p > 0.05$). Hence Null Hypotheses were taken for the two sets. The beta coefficient of feed consumption of rabbits is 0.019 and is statistically significant with implication that for each 1% increase in the feed consumption of rabbits, the weight of rabbits would increase by 1.9%. Treatment D was recorded the most consumed numerically and considered the feed preferred by the rabbits. It was concluded that all feeds are good for weight gain if proper and effective management practices are observed. And that both forages and compounded feed should be given to rabbits simultaneously for balanced physique and nutritional fitness.

Keywords: Treatment, Ration, Monogastric, Pseudo-ruminant

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INTRODUCTION

The domestic rabbit descended from wild rabbit found in the Mediterranean countries and was introduced into England in the late 11th and early 12th century. They belong to the Phylum – Chordate, Kingdom – Animalia, Class – Mammalia, Order – Legomorpha, Family – Leporidae, Genus – Oryctolagus, and Species – *Oryctolagus cuniculus*. Native to southern Europe and North Africa, the rabbit (*Oryctolagus cuniculus*) has been introduced to all continents, except Antarctica and Asia. In many countries, rabbits cause serious erosion of soils by overgrazing and burrowing, impacting on native species that depend on undamaged ecosystems (CABI, 2018).

The rabbit was originally confined to the Iberian Peninsula and was first transported around the Mediterranean by Phoenician traders. Rabbits were domesticated in French monasteries between AD 600 and 1000 and domestic rabbits probably reached Britain in the twelfth century (the young were considered a delicacy) and were later spread throughout the British Isles, and to other islands in the north-east Atlantic. Much later, rabbits were put ashore from ocean-going sailing ships in South Africa (from Holland) in 1654, Chile in the mid eighteenth century, the Falkland Is in 1764, New Zealand in 1777, and Australia in 1788 (Norbury and Reddiex, 2005). Rabbits have been introduced to over 800 islands so far for reasons ranging from a food source for shipwrecked sailors to a source of amusement for tourists. Introductions have varied in success from complete failure to populations so large that they destroy almost all vegetation on the island (Flux and Fullagar, 1992).

Rabbit is a monogastric herbivore with simple stomach that can survive on forage alone. It is as well lie within the border line of both ruminant and non-ruminant animals. Hence, they are referred to as pseudo-ruminant because they can feed on concentrate as well as fresh forages (Babayemi, *et al*, 2014). CABI, (2018) reported that rabbits eat grass and other herbaceous vegetation. They need a diet of less than 40% fibre, 10-20% protein for maintenance, and 14% protein for reproduction. They can be very selective in their choice of food, practice coprophagy, and ferment food in the hind gut.

RoysFarm, (2019) reported that rabbits need small place for living and less food for surviving. Rabbit meat contains high ratio of protein, energy, calcium and vitamin than any other types of animal meat. The amount of cholesterol, fat and sodium is also less than other meat. Their meat is very testy, nutritious and easily digestible for all aged people. And there is no religious taboo for consuming rabbit meat. Rabbits grow very fast and the female rabbit produce 2 to 8 kids every time. They can consume very low quality food and turn this food to high quality meat, skin or fiber. Raising rabbit can be a great income source to the unemployed educated people and landless farmers. So, commercial rabbit farming business can be a great source to meet up the

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food or protein demand and a great source of employment.

Rabbit is found economical because its feed conversion ratio in terms of meat production is high and it has a short gestation period with high prolificacy. CABI, (2018) stated that rabbits have an endogenous reproductive cycle mainly modulated by day length and nutrition, and highly prolific giving 18-30 young per female adult per year. Females as young as 3 months can breed.

Due to the fact that rabbits are noiseless unlike goat, cow, poultry and other bigger animals, they can therefore be raised in sub-urban, villages, towns and cities without causing infringement on the health or peace in the neighbourhood.

The amount needed to acquire equipment, feeds and animals in rabbit farming is reasonable. And the management is not strenuous which makes it to be carried-out even by physically disabled people and is especially useful for occupational therapy.

Rabbits provide farmers and his family low cost and high quality proteins in alternative to poultry meat. Also, it serves as source of income.

Associated with the production of rabbits for meat and fur is the preparation of pharmaceutical products through medically utilization of rabbit's brains, blood and various internal organs (Abe, 1988).

In rabbitary production, exotic breeds like New Zealand, Chinchilla, Alaska, Angora, Harlequin, Flemish giant, California and cross bred among the listed and others are preferred to pure local breeds because the former are larger, meatier, heavier and more prolific when compared with the latter.

Rabbits enjoy feeding on concentrate which can be fed in either mash or pelleted forms. John *et al*, (1991) defined a ration as the amount of feed an animal receives in a 24-hour period and balanced ration as the amount of feed that will supply the proper amount and proportions of nutrients needed for an animal to perform a specific purpose such as growth, maintenance, lactation or gestation.

Mash can be given solely in the absence of forages or mix with the forages like *Tridax procumbence, Ipomea batata, Aspilia species, Centrosema spp, Calopogonium spp*, Guinea grass, Elephant grass, legumes, plantain and banana leaves, and varieties of safe forages. Legumes are better than grass because of the high nutritive value and acceptability over grass and tubers.

In reality that rabbit farming can be a source of income and mitigating the menace of insecurity by reducing unemployment among the school leavers and youths in general, focus needs to be made on nutritional requirement of the animals to enhancing growth for profitable returns. It is with this view that the research work was conducted to assess selected rations on rabbits consumption rate and relative body weight.

Test of hypothesis:

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Hypothesis one (H_{01}): There is difference in feed consumption of rabbits fed selected rations

Null Hypothesis: There is no difference in feed consumption of rabbits fed selected rations

Hypothesis two (H_{02}): There is difference in average weight of rabbits fed selected rations

Null Hypothesis: There is no difference in average weight of rabbits fed selected rations

MATERIALS AND METHODS

Experimental site

The research work was conducted at the Rabbitary Unit of Wildlife and Ecotourism Department of Forestry Research Institute of Nigeria, Headquarters, Ibadan. The area lies on Latitude 7º 23¹ N and Longitude 3º 51¹E. The climate condition of the area is tropically dominated by rainfall pattern from 1200mm-1250mm. The average temperature is about 32ºC, average relative humidity of 80-85% and the climate of the area experience rainfall with two distinct seasons, dry season usually from November-March and raining season usually from April – October.

Research animals and Experimental Design

Forty-eight growing healthy rabbits were acquired. The animals were of the same age and averagely the same size. The animals were grouped into 4 groups, Group A, Group B, Group C and Group D with 12 animals per group. Each group represents each treatment. The rabbits were raised in disinfected hutches with available watering and feeding troughs. The animals were of mixed breeds and the research was set in completely randomized design in three replicates. This implies 4 animals in 12 sub-groups making 48 rabbits. Initial weight of the animals was first taken before they were placed on rations.

Experimental diets

Four groups of rations were produced as Treatment A, *Tridax procumbence*; Treatment B, *Aspilia africana*; Treatment C, *Leuciena leucocephala* and Treatment D, Growers mash (Pellet form) as Control.

Treatment A was fed to rabbits in Group A, Treatment B was fed to rabbits in Group B, Treatment C to Group C and Treatment D to Group D twice daily. The feeds were weighed before giving the animals and the remnants also collected and weighed to quantify the actual amount of feed consumed by the rabbits. Eighteen kilogram of feed was given to the animals across the treatments in the first week, 20 Kg in week 2, 22 Kg in week 3, 24 Kg in week 5, 26 Kg in week 6, 28 Kg in week 7 and 30 Kg in week 8.

Weight gain

The research animals' initial weight was recorded and subsequent weights recorded at the end of each week throughout the research period.

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Data Collection

Data was collected on weight of the animals (g), quantity of feed (Kg) taken by the animals and feed conversion ratio.

Data analysis

Data were presented using SPSS package. ANOVA was used to test the significant difference among the treatments.

Post Hoc LSD was used to show the significance in trend of the parameters.

Statistical tools such as tables, bar charts and line graphs were used to show the trend of parameters assessed.

4.0 RESULT AND DISCUSSION

TABLE 4.1: ANALYSIS OF VARIANCE OF FEED CONSUMPTION AND AVERAGE WEIGHT OF RABBITS FED SELECTED RATIONS

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
FEED CONSUMPTION OF RABBITS	Between Groups	37.234	3	12.411	1.034	.393
	Within Groups	335.972	28	11.999		
	Total	373.206	31			
AVERAGE WEIGHT OF RABBITS	Between Groups	.009	3	.003	.551	.652
	Within Groups	.147	28	.005		
	Total	.155	31			

Test of Hypothesis

Hypothesis One

H_{01}: There is no significant difference in feed consumption of rabbits.

The table 4.1 above showed the Analysis of Variance of feed consumption of rabbits.

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The study tested the hypothesis for the significant difference in the feed consumption of rabbits sampled for the study. There was no significant difference in the feed consumption of rabbits. The result presented in the table showed that there was no significant difference ($F = 1.034$, $p > 0.05$) in feed consumption of rabbits. This implied that feed consumption of rabbits do not vary across their treatment groups.

Hypothesis Two

H_{02}: There is no significant difference in average weight of rabbits.

The table 4.1 above showed the Analysis of Variance of average weight of rabbits.

The study tested the hypothesis for the significant difference in the average weight of rabbits sampled for the study. There was no significant difference in the average weight of rabbits. The result presented in the table showed that there was no significant difference ($F = 0.551$, $p > 0.05$) in average weight of rabbits. This implied that average weight of rabbits do not vary across their treatment groups.

TABLE 4.2: POST HOC TESTS ON FEED CONSUMPTION AN AVERAGE WEIGHT OF RABBITS FED SELECTED RATION

Multiple Comparisons

Dependent Variable		(I) TREATMENT	(J) TREATMENT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
FEED CONSUMPTION OF	LSD	TRT A Kg	TRT B Kg	.50250	1.73198	.774	-3.0453	4.0503

RABBITS		TRT C Kg	1.94750	1.73198	.270	-1.6003	5.4953
		TRT D Kg	-1.04875	1.73198	.550	-4.5965	2.4990
	TRT B Kg	TRT A Kg	-.50250	1.73198	.774	-4.0503	3.0453
		TRT C Kg	1.44500	1.73198	.411	-2.1028	4.9928
		TRT D Kg	-1.55125	1.73198	.378	-5.0990	1.9965
	TRT C Kg	TRT A Kg	-1.94750	1.73198	.270	-5.4953	1.6003
		TRT B Kg	-1.44500	1.73198	.411	-4.9928	2.1028
		TRT D Kg	-2.99625	1.73198	.095	-6.5440	.5515
	TRT D Kg	TRT A Kg	1.04875	1.73198	.550	-2.4990	4.5965
		TRT B Kg	1.55125	1.73198	.378	-1.9965	5.0990
		TRT C Kg	2.99625	1.73198	.095	-.5515	6.5440
AVERAGE WEIGHT OF RABBITS	LSD TRT A Kg	TRT B Kg	.00000	.03619	1.000	-.0741	.0741
		TRT C Kg	-.00875	.03619	.811	-.0829	.0654
		TRT D Kg	-.04000	.03619	.278	-.1141	.0341
	TRT B Kg	TRT A Kg	.00000	.03619	1.000	-.0741	.0741

		TRT C Kg	-.00875	.03619	.811	-.0829	.0654
		TRT D Kg	-.04000	.03619	.278	-.1141	.0341
	TRT C Kg	TRT A Kg	.00875	.03619	.811	-.0654	.0829
		TRT B Kg	.00875	.03619	.811	-.0654	.0829
		TRT D Kg	-.03125	.03619	.395	-.1054	.0429
	TRT D Kg	TRT A Kg	.04000	.03619	.278	-.0341	.1141
		TRT B Kg	.04000	.03619	.278	-.0341	.1141
		TRT C Kg	.03125	.03619	.395	-.0429	.1054

In addition, from Table 4.2 above, considering Hypothesis One, Post-Hoc (LSD) multiple comparison of feed consumption of rabbits using the Least Significant Difference method showed the mean difference, standard error and the level of significance across the treatment groups of rabbits. The implication of this result is that feed consumption of rabbits is all the same for all the four sampled treatment groups of rabbits. This may be as a result of observed farm Biosecurity and healthy conditions of the rabbits.

In addition, from Table 4.2 above, considering Hypothesis Two, Post-Hoc (LSD) multiple comparison of average weight of rabbits using the Least Significant Difference method showed the mean difference, standard error and the level of significance across the treatment groups of

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rabbits. The implication of this result is that average weight of rabbits is all the same for all the four sampled treatment groups of rabbits. This may be due to care and effective proper management, and breeds of the rabbits under research.

TABLE 4.3: COEFFICIENT OF FEED CONSUMPTION OF AND AVERAGE WEIGHT OF RABBITS FED SELECTED RATIONS

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.124	.027		41.557	.000
	FEED CONSUMPTION OF RABBITS	.019	.001	.927	13.585	.000

a. Dependent Variable: AVERAGE WEIGHT OF RABBITS

From Table 4.3 above, the beta coefficient of feed consumption of rabbits is 0.019 and is statistically significant.

However, the implication is that for each 1% increase in the feed consumption of rabbits, the weight of rabbits will increase by 1.9%. This may be as a result of feed management and other management practices in the farm during the research. This support the argument of RoysFarm (2019) that good rabbit feed management is very important for rabbit farming. After constructing rabbit house and buying equipment, feed management is the single largest operating expenses.

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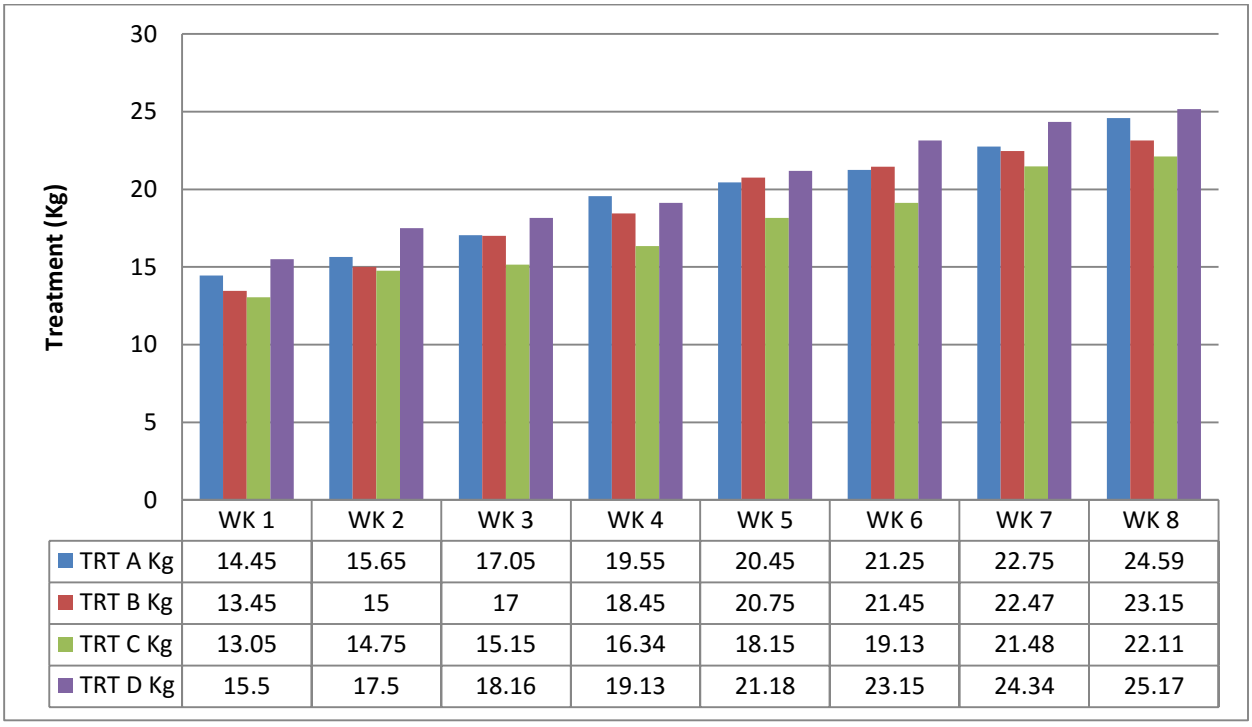

	WK 1	WK 2	WK 3	WK 4	WK 5	WK 6	WK 7	WK 8
TRT A Kg	14.45	15.65	17.05	19.55	20.45	21.25	22.75	24.59
TRT B Kg	13.45	15	17	18.45	20.75	21.45	22.47	23.15
TRT C Kg	13.05	14.75	15.15	16.34	18.15	19.13	21.48	22.11
TRT D Kg	15.5	17.5	18.16	19.13	21.18	23.15	24.34	25.17

FIGURE 4.4: FEED CONSUMPTION OF RABBITS PER TREATMENT PER WEEK

Wk = Week, TRT = Treatment

Source: Field work, 2018

From Figure 4.4 above, the feed consumption of rabbits for the treatments used were shown weekly for the period of eight weeks of the research. In week 1, animals placed on Treatment D consumed most to the tune of 15.50Kg followed by Treatment A with 14.45Kg while the least consumption of 13.05Kg was recorded against Treatment C **(***Leuciena leucocephala*). At the end of the research in week 8, the trend repeated in favour of Treatment D with the most consumed feed of 25.17Kg followed by Treatment A with 24.59Kg with Treatment C having the least consumed record of 22.11Kg. The least consumption of Treatment C may be as a result of available toxins present in the forage which may be harmful if consumed more. Reason for Treatment D (Growers mash) being the most consumed may be as a result of balanced diet in the concentrate.

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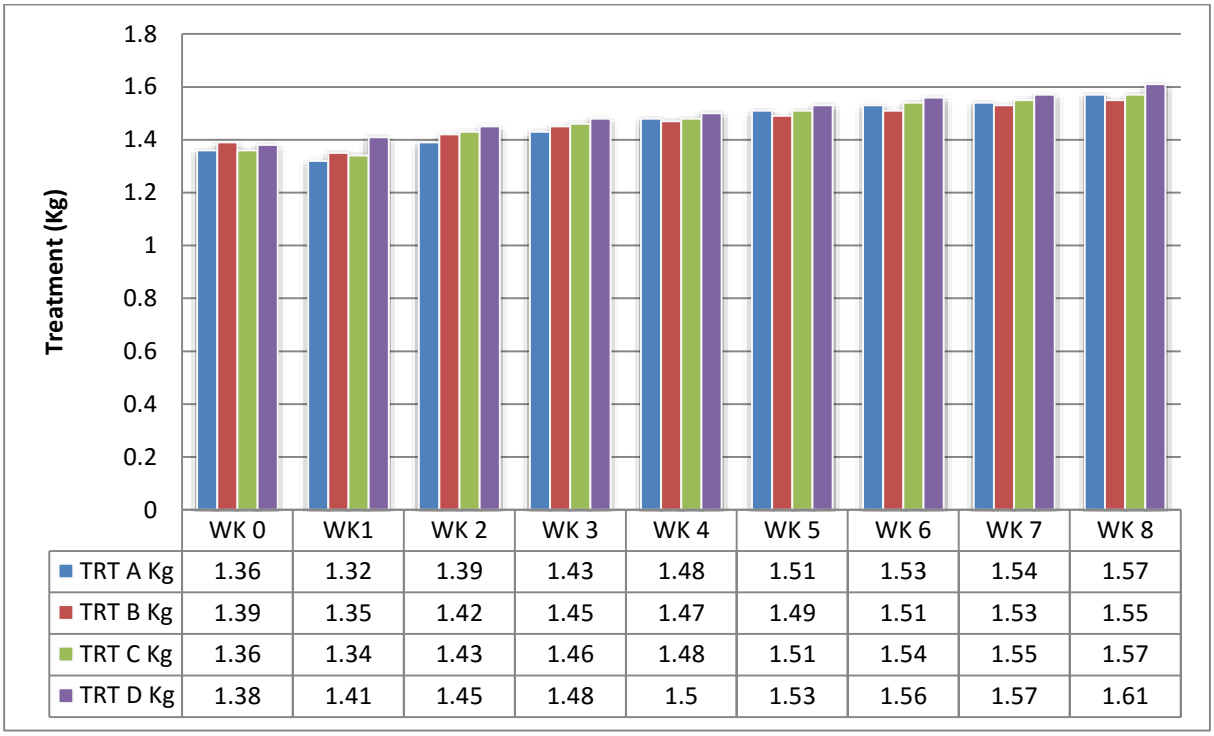

	WK 0	WK1	WK 2	WK 3	WK 4	WK 5	WK 6	WK 7	WK 8
TRT A Kg	1.36	1.32	1.39	1.43	1.48	1.51	1.53	1.54	1.57
TRT B Kg	1.39	1.35	1.42	1.45	1.47	1.49	1.51	1.53	1.55
TRT C Kg	1.36	1.34	1.43	1.46	1.48	1.51	1.54	1.55	1.57
TRT D Kg	1.38	1.41	1.45	1.48	1.5	1.53	1.56	1.57	1.61

FIGURE 4.5: AVERAGE WEIGHT OF RABBITS PER TREATMENT PER WEEK

Wk = Week, TRT = Treatment

Source: Field work, 2018

From Figure 4.5 above, the average weight of rabbits on each treatment was shown. Initial weight of the rabbits was recorded as week 0 with animals placed on Treatment B had the highest initial weight of 1.39Kg followed by Treatment D with 1.38Kg as against the least of 1.36Kg recorded for Treatments A and C. At week 1, Treatment D increased from initial weight of 1.38Kg to 1.41Kg while others got reduction compared to initial weight. This may be due to change of feed that is not more preferred to former feed given to the rabbits before the research. But in the case of Treatment D, it may be as a result of complete balanced diet found in the growers mash in term of crude protein and energy content which in support of Lianne (2019) that pellets do have a place in rabbit nutrition, as they are rich and balanced in nutrients.

At the end of the research work in week 8, rabbits placed on Treatment D had the average weight of 1.61Kg followed by Treatments A and C with 1.55Kg appease while the least average weight of 1.55Kg was recorded against Treatment B.

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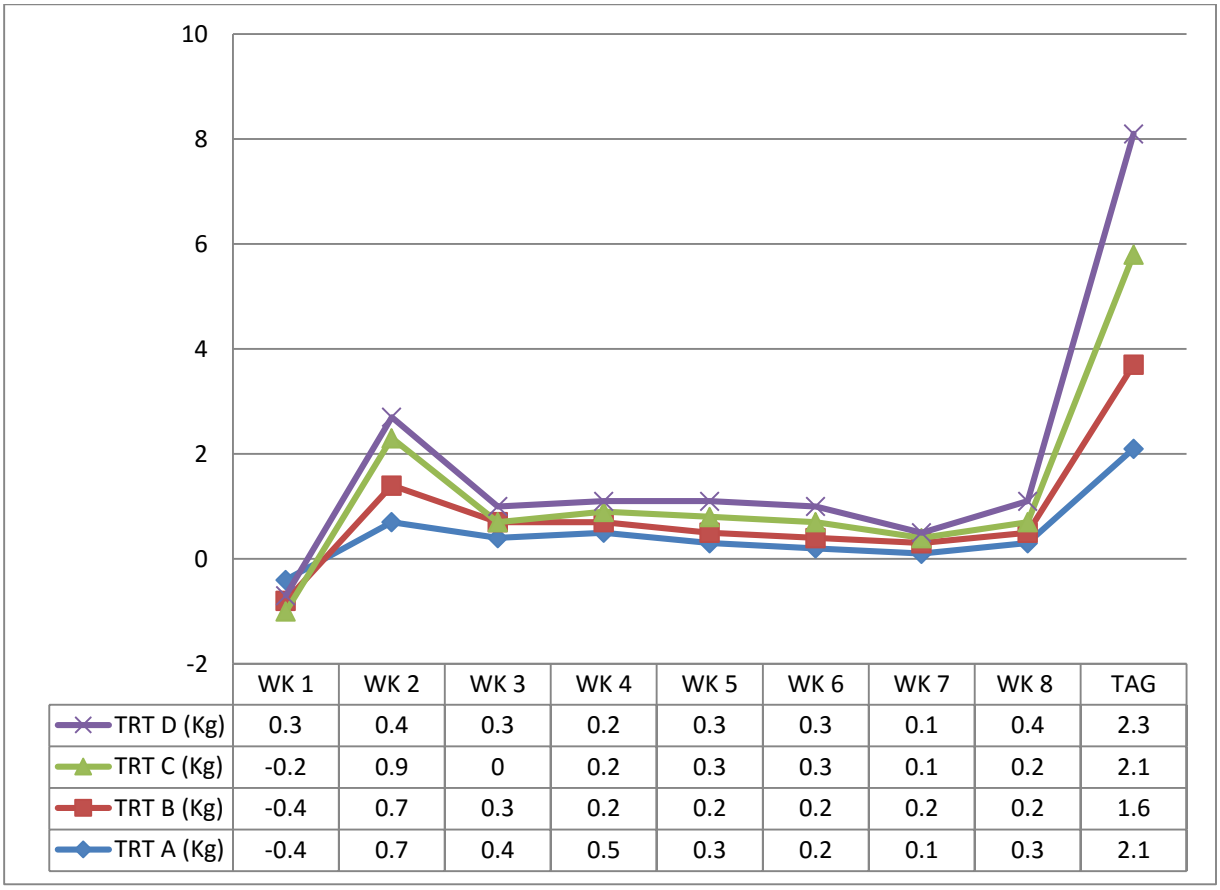

	WK 1	WK 2	WK 3	WK 4	WK 5	WK 6	WK 7	WK 8	TAG
TRT D (Kg)	0.3	0.4	0.3	0.2	0.3	0.3	0.1	0.4	2.3
TRT C (Kg)	-0.2	0.9	0	0.2	0.3	0.3	0.1	0.2	2.1
TRT B (Kg)	-0.4	0.7	0.3	0.2	0.2	0.2	0.2	0.2	1.6
TRT A (Kg)	-0.4	0.7	0.4	0.5	0.3	0.2	0.1	0.3	2.1

FIGURE 4.6: AVERAGE WEIGHT GAIN OF RABBITS PLACED ON SELECTED FEED

Wk = Week, TRT = Treatment, TAG = Total Average Weight Gain

Source: Field work, 2018

From Figure 4.6 above showing the average weight gain of rabbits placed on the selected treatments, there was a sharp reduction in week 1 across Treatments A, B and C with -0.4Kg, -0.4Kg and -0.2Kg respectively with only Treatment D having positive increment of 0.3Kg. The reduction in weight gain across Treatments A, B and C may be as a result of sudden change of feed to the rabbits, that is the rabbits might not be wholly familiar with the treatments of recent. This was in line with Hubbard Life (2017) report that rabbit should be changed slowly from one feed program to another over a 5 to 7 day period. The new feed should be mixed with the old feed to allow the rabbit to adjust smoothly to the new feed.

The issue of Treatment D, Growers mash having positive increment may be as result of nutritive ingredients available in the feed in term of crude protein and energy content that are needed for organs build-up of the animals. This support the work of Lianne (2019) that the addition of some pellets does add some balance to the diet.

At week 2, the weight gain trend moved higher with Treatment C had the highest weight gain of 0.9Kg while Treatment D having the least weight gain of 0.4Kg. At the end of the research, Treatment D had the highest total average weight gain of 2.3Kg followed by Treatments A and C with 2.1Kg appease while Treatment B had the least. This may be as a result of bulky growth ingredients in Treatment D. This also showed that Treatment D is the feed preferred most by the rabbits among the feeds fed the rabbits with.

CONCLUSION

Statistically, it was concluded there was no significant difference in feed consumption and average weight among rabbits fed selected rations. But numerically, Treatment D proved to be preferred feed in consumption by the rabbits and weight gain of the rabbits.

It was concluded by coefficient analysis that each 1% increase in the feed consumption of rabbits will cause the weight of rabbits to increase by 1.9%.

However, based on the statistical analysis, it was concluded in recommendation mode that all treatments (rations) are good to be given to rabbits amidst proper and effective general management of animals for efficient feed conversion and good animal physique.

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