

Carryover effect on carcass characteristics of growing rabbits from does subjected to feed restriction during pregnancy with or without vitamin E inclusion

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Target Audience: Rabbit farmers, Extension Agents and Researchers

Abstract

Several studies have been carried out on quantitative feed restriction and its impact on carcass characteristics of growing rabbits and findings concluded that feed restriction helps in reducing carcass fat deposition in growing rabbits. Feed restriction during breeding periods have been carried out extensively in pregnant rabbit does, however, the carryover effect on the carcass characteristics of growing rabbits from does subjected to such feeding regimen have not been examined. A total of one hundred and eighty (180) weaned rabbits harvested from rabbit does subjected to maternal feed restriction (0% and 15% feed restriction) at three pregnancy periods (15-19 days, 20-24 days and 25-29 days) with or without (+/-) vitamin E were profiled for this study. Kits were randomly assigned to 12 treatments of 5 replicates, each consisting of 3 rabbits per replicate. Data obtained for carcass weight, dressed weight, chest, back, hindlimb, forelimbs, loin, back, kidney, liver, spleen, lungs and heart; these were arranged in a 2×3×2 factorial arrangement. Significantly ($p<0.05$) higher carcass weight and dressing percentage were obtained for growing rabbit from does fed ad libitum during pregnancy. However, significant influence recorded for carcass and dressing percentage cannot be attributed solely to the treatment during gestation since all results obtained were within acceptable or recommended ranges for healthy rabbits. Therefore, it can be concluded that maternal feed restriction during pregnancy positively influence carcass yield and dressing percentage of growing rabbits from does subjected to feed restriction between 20 – 24 days with or without Vitamin E was influenced ($p<0.05$).

Keywords: Carcass attributes; growing rabbit kits; maternal restriction.

Description of Problem

There has been an increase in rabbit production in recent years because rabbit is a mini livestock that can easily be managed and has a short generation interval with high prolificacy rate. Rabbit meat is a white meat, highly valued for its nutritional, medicinal and dietary properties. It is a lean meat with a low-fat content and less saturated fatty

acids and cholesterol compared to meats from other animals (1). The recent understanding of the advantages and usefulness of the rabbit meat for diabetics, hypertensive and middle-aged people has further raised awareness on the production of rabbits, thereby increasing the demand for rabbit meat in the world (2). Rabbit meat is termed healthier meat compared to beef,

sheep and pork. Moreover, it is highly digestible, tasty, low in calories, fats and cholesterol being frequently recommended by nutritionists (3). Several studies have been done on maternal feed restriction during pregnancy and its influence on offspring growth performance however, research on the effect of maternal feed restriction and its carryover effect on the offspring's carcass characteristics have not been studied. Thus, this study focuses on examining the carryover effect of maternal feed restriction with or without dietary vitamin E inclusion during pregnancy on carcass characteristics of growing rabbits in tropical environment.

Experimental site

The experiment was carried out at the Rabbitary Unit of the Directorate of University Farms, Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State. The site is located in the rain forest vegetation zone of South-Western Nigeria located on latitude 7° 13' 49.46' N, longitude 3° 26' 11.98' E and altitude 76m above sea level. The climate is humid with a mean annual rainfall, temperature and humidity of 1037mm, 34.7°C and 83%, respectively (4).

Experimental animals and management

A total of one hundred and eighty (180) weaned rabbit were used for this experiment. Experimental kits were sourced from rabbit does that have undergone maternal feed restriction. Fifteen (15) kits were selected from each group that has undergone maternal feed restriction (0%, 100g/rabbit/day and 15% 80g/rabbit/day) at different periods (15-19, 20-24, 25-29 days) of pregnancy with or without vitamin E inclusion. The kits were divided into 12 groups of 5 replicates of 3 rabbits each for each level (0 and 15%) and periods of restriction with or without vitamin

E inclusion. Kits were fed *ad libitum* throughout the experimental period. The composition of the concentrate diet fed consist of maize- 48.00%, fish meal- 2.00%, soybean meal- 3.00% , wheat offal -10.00% , groundnut cake -14.00% , rice husk -20.00%, bone meal-1.50% , oyster shell- 1.00%, salt- 0.25%, vitamin and mineral premix 0.25%.

Data collection

At the end of the 8th week of the experiment, one hundred and eighty (180) rabbits were slaughtered to determine the carcass yield of the growing rabbit. Feed was withdrawn for 12 hours to empty their gastro intestinal tract (GIT) and to prevent variability in body weight due to intestinal content. Prior to slaughtering, the rabbits were weighed. The rabbits were stunned, bled, dressed by skinning, eviscerated and splitted. Cut parts, namely, head, fore limb, thoracic cage, loin and hind limb, were dissected according to (5). The weights of the internal organs such as liver, kidney, heart and lungs were weighed with a sensitive electronic scale (WH-B series Electronic scale WeiHeng® 7kg capacity) and expressed as percentage of live weight. The carcass weight and dressing percentage was determined and recorded.

Dressing percentage

$$= \frac{\text{Carcass weight}}{\text{Live weight}} \times 100$$

Statistical Analysis

The experimental layout was in a 2×3×2 factorial arrangement and data collected were subjected to completely randomized design using (6). Significantly (p<0.05) different means were separated using Duncan Multiple Range Test of same statistical package.

Table 1: Effect of restriction levels, periods of feed restriction and vitamin E inclusion during breeding on carcass characteristics of post-weaned rabbits

Parameters	Levels of feed restriction			Periods of feed restriction			Vitamin E inclusion		
	0%	15%	15-19days	2-24days	25-29days	-Vit. E	+Vit. E		
Fasted live weight (g/rabbit)	1445.83 ± 184.92	1406.94 ± 192.78	1387.50 ± 196.29	1504.16 ± 208.47	1387.50 ± 135.33	1429.16 ± 188.74	1423.61 ± 191.04		
Carcass weight (g/rabbit)	1288.88 ± 172.68	1240.00 ± 184.26	1241.25 ± 189.78 ^{ab}	1330.00 ± 188.47 ^a	1222.08 ± 143.04 ^b	1248.33 ± 179.13	1280.55 ± 179.95		
Dressing percentage (%)	51.25 ± 3.75	50.76 ± 3.66	49.87 ± 3.88 ^b	52.63 ± 3.90 ^a	50.51 ± 2.70 ^b	50.82 ± 3.84	51.19 ± 3.57		
Cut up parts (%)									
Kidney	0.67 ± 0.13	0.67 ± 0.12	0.69 ± 0.11	0.67 ± 0.13	0.65 ± 0.13	0.68 ± 0.12	0.66 ± 0.13		
Liver	2.89 ± 0.85	3.22 ± 0.78	3.34 ± 0.93 ^a	3.08 ± 0.71 ^{ab}	2.75 ± 0.76 ^b	2.90 ± 0.58	3.20 ± 1.01		
Heart	0.26 ± 0.04	0.25 ± 0.05	0.27 ± 0.05	0.26 ± 0.04	0.24 ± 0.04	0.24 ± 0.04	0.27 ± 0.04		
Spleen	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.03 ± 0.01	0.04 ± 0.00	0.04 ± 0.01		
Lungs	0.56 ± 0.20	0.61 ± 0.15	0.61 ± 0.14	0.59 ± 0.24	0.56 ± 0.13	0.58 ± 0.15	0.60 ± 0.20		
Forelimbs	7.34 ± 0.85	7.33 ± 0.61	7.42 ± 0.66	7.29 ± 0.93	7.28 ± 0.58	7.22 ± 0.77	7.45 ± 0.68		
Hindlimbs	12.45 ± 1.83	13.15 ± 1.17	12.68 ± 1.82	12.68 ± 1.80	13.03 ± 0.96	12.93 ± 1.41	12.66 ± 1.72		
Chest	7.68 ± 1.13	8.35 ± 1.04	8.21 ± 0.91	7.67 ± 1.35	8.18 ± 1.05	8.02 ± 1.27	8.02 ± 1.07		
Neck	1.87 ± 0.41	1.79 ± 0.40	1.88 ± 0.37	1.86 ± 0.48	1.76 ± 0.35	1.74 ± 0.38	1.93 ± 0.40		
Head	7.57 ± 0.82	7.89 ± 0.77	7.91 ± 0.78	7.54 ± 0.94	7.75 ± 0.65	7.71 ± 0.89	7.76 ± 0.72		
Loin	6.30 ± 0.90	6.56 ± 0.74	6.28 ± 0.94	6.50 ± 0.97	6.42 ± 0.50	6.55 ± 0.75	6.30 ± 0.90		
Back	9.81 ± 1.48	9.31 ± 1.43	9.33 ± 1.56	9.96 ± 1.75	9.40 ± 0.95	9.60 ± 1.35	9.52 ± 1.59		

^{a, b}: Means the same row with different superscripts differ significantly ($p < 0.05$)

Table:2 Interactive effect between levels and Periods of feed restriction during breeding on carcass characteristics of post-weaned rabbits

Parameters	Levels of feed restriction					
	0%	15%	25-29days	15-19days	20-24days	25-29days
Fasted live weight (g/rabbit)	1179.16 ± 137.06 ^b	1612.50 ± 168.04	1416.66 ± 126.73	1466.66 ± 232.90	1395.83 ± 192.42	1358.33 ± 142.75
Carcass weight (g/rabbit)	49.70 ± 3.70 ^b	1430.83 ± 145.06 ^a	1256.66 ± 136.33 ^b	1303.33 ± 218.85 ^a	1229.16 ± 176.19 ^b	1187.50 ± 146.91 ^b
Dressing percentage (%)	49.70 ± 3.70 ^b	53.73 ± 3.26 ^a	50.31 ± 3.18 ^b	50.04 ± 4.22 ^b	51.53 ± 4.31 ^{ab}	50.72 ± 2.25 ^{ab}
Cut up parts (%)						
Kidney	0.64 ± 0.12 ^{ab}	0.69 ± 0.14 ^{ab}	0.67 ± 0.13 ^{ab}	0.74 ± 0.07 ^a	0.66 ± 0.13 ^{ab}	0.62 ± 0.14 ^b
Liver	2.97 ± 0.75 ^b	3.06 ± 0.86 ^{ab}	2.64 ± 0.95 ^b	3.72 ± 0.97 ^a	3.09 ± 0.56 ^{ab}	2.86 ± 0.52 ^b
Heart	0.26 ± 0.04	0.26 ± 0.05	0.24 ± 0.03	0.27 ± 0.06	0.25 ± 0.04	0.24 ± 0.05
Spleen	0.04 ± 0.01	0.05 ± 0.01	0.03 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
Lungs	0.55 ± 0.12	0.54 ± 0.29	0.59 ± 0.17	0.67 ± 0.15	0.64 ± 0.18	0.54 ± 0.07
Forelimbs	7.49 ± 0.76	7.25 ± 1.12	7.28 ± 0.64	7.36 ± 0.59	7.34 ± 0.73	7.28 ± 0.55
Hindlimbs	12.31 ± 2.11	12.15 ± 2.17	12.89 ± 1.08	13.06 ± 1.47	13.21 ± 1.22	13.17 ± 0.85
Chest	7.98 ± 0.97 ^{ab}	7.27 ± 1.27 ^b	7.81 ± 1.11 ^{ab}	8.44 ± 0.83 ^a	8.07 ± 1.36 ^{ab}	8.55 ± 0.88 ^a
Neck	1.88 ± 0.47	1.96 ± 0.44	1.79 ± 0.33	1.88 ± 0.27	1.77 ± 0.51	1.73 ± 0.38
Head	7.95 ± 0.77	7.22 ± 0.87	7.55 ± 0.69	7.87 ± 0.83	7.86 ± 0.93	7.94 ± 0.57
Loin	5.99 ± 1.07 ^b	6.37 ± 1.04 ^{ab}	6.53 ± 0.43 ^{ab}	6.57 ± 0.71 ^{ab}	6.81 ± 0.89 ^a	6.30 ± 0.56 ^{ab}
Back	9.38 ± 1.58	10.32 ± 1.84	9.75 ± 0.79	9.29 ± 1.62	9.60 ± 1.66	9.05 ± 1.00

^{a,b}: Means in the same row with different superscripts differ significantly (p<0.05)

Results and Discussion

Table 1 shows the effect of restriction levels, periods of feed restriction and vitamin E inclusion during breeding on carcass characteristics of post-weaned rabbits.

The periods of feed restriction of rabbit does during breeding significantly ($p < 0.05$) influenced carcass weight, dressing percentage and liver of growing rabbits. Growing rabbits from does restricted between 20-24 days of gestation had higher ($1330.00g \pm 188.47$) carcass weight compared to growing rabbits from does restricted between 25-29 days of gestation recording the lowest ($1222.08g \pm 143.04$)

mean value. The result obtained in this study on carcass weight is higher than what was reported by (7) in *ad libitum* fed rabbits. Dressing percentage was significantly ($p < 0.05$) higher ($52.63g \pm 3.90$) for growing rabbits from does restricted between 20-24 days of gestation while ($49.87g \pm 3.88$) was obtained for growing rabbits from does between 15-19 days of gestation. The result obtained on dressing percentage in this study though not significant is slightly lower than what was reported by (7) in *ad libitum* fed rabbits who reported that dressing percentage in *ad libitum* fed rabbits to be 60.47%.

Table 3: Interactive effect between levels of feed restriction with or without vitamin E inclusion during breeding on carcass characteristics of post-weaned rabbits

Parameters	L 0%		15%	
	+Vit. E	-Vit. E	+Vit. E	-Vit. E
Initial live weight (g/rabbit)	1461.11 ± 180.32	1430.55 ± 193.37	1386.11 ± 199.11	1427.77 ± 189.59
Carcass weight (g/rabbit)	1334.44 ± 149.12	1243.33 ± 186.45	1226.66 ± 195.65	1253.33 ± 176.76
Dressing percentage (%)	51.02 ± 3.79	51.47 ± 3.80	51.36 ± 3.43	50.17 ± 3.89
Cut up parts (%)				
Kidney	0.63 ± 0.16	0.70 ± 0.08	0.69 ± 0.10	0.66 ± 0.15
Liver	3.01 ± 1.11 ^{ab}	2.77 ± 0.48 ^b	3.39 ± 0.88 ^a	3.06 ± 0.65 ^{ab}
Heart	0.27 ± 0.04	0.24 ± 0.03	0.27 ± 0.47	0.24 ± 0.05
Spleen	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
Lungs	0.57 ± 0.26	0.55 ± 0.13	0.63 ± 0.13	0.60 ± 0.17
Forelimbs	7.38 ± 0.88	7.30 ± 0.83	7.51 ± 0.42	7.14 ± 0.72
Hindlimbs	12.08 ± 2.06	12.82 ± 1.54	13.25 ± 1.05	13.05 ± 1.30
Chest	7.63 ± 1.20	7.74 ± 1.09	8.41 ± 0.77	8.30 ± 1.28
Neck	1.98 ± 0.43	1.77 ± 0.38	1.88 ± 0.39	1.71 ± 0.40
Head	7.45 ± 0.65	7.70 ± 0.96	8.06 ± 0.67	7.72 ± 0.84
Loin	5.98 ± 0.99	6.62 ± 0.70	6.63 ± 0.67	6.49 ± 0.81
Back	9.88 ± 1.71	9.75 ± 1.26	9.17 ± 1.43	9.45 ± 1.46

^{a, b}: Means in the same row with different superscripts differ significantly ($p < 0.05$)

Table 2 shows the interactive effect between levels and periods of feed restriction during breeding on carcass characteristics of post-weaned rabbits. Carcass weight was statistically similar for growing rabbits from does on 0 and 15% restriction at 20-24 days

and 15-19 days of gestation which differ significantly from comparable mean values obtained for other dietary treatments. Dressing percentage was significantly ($p < 0.05$) higher for growing rabbits from does on 0% restriction between 20-24 days

of gestation compared to lower mean value obtained at the same level between 15-19 days of gestation. The mean values obtained in this study though significant is slightly lower than what was reported by (8) who reported that dressing percentage in *ad libitum* rabbits to be 60%. Growing rabbits from does on 15% restriction between 15-19 days of gestation had higher kidney and liver weight ($0.74g \pm 0.07$, $54.75g \pm 18.69$) while growing rabbits from does on 15% restriction between 25-29 days of gestation recorded $0.62g \pm 0.14$ for kidney though 0% restriction resulted in $36.91g \pm 12.66$ for liver weight. The result obtained on kidney and liver mean weight though significant is within the range of what was reported by (7) in rabbit fed *ad libitum* diet. Chest weight of

growing rabbits differed significantly ($p < 0.05$) with growing rabbits from does on 15% restriction between 15-19 days and 25-29 days of gestation having higher ($8.44g \pm 0.83$ and $8.55g \pm 0.88$) mean values compared against mean values ($7.27g \pm 1.27$) obtained for growing rabbits from does on 0% restriction between 20-24 days of gestation. Growing rabbits from does on 15% restriction between 20-24 days of gestation had the highest ($6.81g \pm 0.89$) mean value for loin while the least ($5.99g \pm 1.07$) was obtained for growing rabbits from does on 0% restriction between 15-19 days of gestation. The result obtained for chest and loin in this study though significant is lower than $10.30 \pm 0.30\%$ and $10.10 \pm 0.10\%$ reported by (7) in *ad libitum* fed rabbits.

Table 4: Interactive effect with or without vitamin E and periods of feed restriction during breeding on carcass characteristics of post-weaned rabbits

Vitamin E inclusion	+Vit. E			-Vit. E		
Periods of feed restriction	15-19days	20-24days	25-29days	15-19days	20-24days	25-29days
Fasted live weight (g/rabbit)	1420.83± 210.47	1441.66±211.95	1408.33± 162.13	1354.16±183.96	1556.66±193.45	1366.66 ± 105.16
Carcass weight (g/rabbit)	1302.50± 189.21 ^{ab}	1282.50±193.16 ^{ab}	1256.66± 169.61 ^{ab}	1180.00± 176.99 ^b	1377.50± 178.99 ^a	1187.50 ± 106.78 ^{ab}
Dressing percentage (%)	48.66 ± 3.60 ^b	52.71 ± 3.45 ^a	52.20 ± 2.24 ^a	51.08 ± 3.92 ^{ab}	52.54 ± 4.47 ^a	48.82 ± 2.01 ^b
Cut up parts (%)						
Kidney	0.67 ± 0.12	0.69 ± 0.15	0.63 ± 0.13	0.71 ± 0.09	0.69 ± 0.12	0.65 ± 0.14
Liver	3.49 ± 1.18 ^a	3.26 ± 0.90 ^{ab}	2.86 ± 0.90 ^{ab}	3.20 ± 0.61 ^{ab}	2.89 ± 0.42 ^{ab}	2.65 ± 0.61 ^{ab}
Heart	0.27 ± 0.04	0.28 ± 0.05	0.27 ± 0.04	0.26 ± 0.06	0.24 ± 0.03	0.22 ± 0.02
Spleen	0.04 ± 0.01	0.04 ± 0.01	0.03 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.03 ± 0.00
Lungs	0.57 ± 0.11	0.68 ± 0.29	0.55 ± 0.16	0.65 ± 0.17	0.50 ± 0.16	0.58 ± 0.09
Forelimbs	7.28 ± 0.67	7.58 ± 0.78	7.48 ± 0.61	7.58 ± 0.65	7.01 ± 1.00	7.08 ± 0.50
Hindlimbs	11.78 ± 1.93	12.91 ± 1.81	13.30 ± 1.02	13.59 ± 1.19	12.45 ± 1.85	12.76 ± 0.86
Chest	7.69 ± 0.78	7.88 ± 1.06	8.48 ± 1.24	8.73 ± 0.74	7.46 ± 1.62	7.88 ± 0.74
Neck	1.89 ± 0.35 ^{ab}	2.03 ± 0.51 ^a	1.87 ± 0.36 ^{ab}	1.86 ± 0.41 ^{ab}	1.70 ± 0.40 ^{ab}	1.65 ± 0.32 ^b
Head	7.61 ± 0.76 ^{ab}	7.88 ± 0.60 ^{ab}	7.78 ± 0.82 ^{ab}	8.21 ± 0.72 ^a	7.20 ± 1.11 ^b	7.72 ± 0.46 ^{ab}
Loin	5.87 ± 0.81	6.55 ± 1.16	6.49 ± 0.49	6.69 ± 0.90	6.63 ± 0.80	6.34 ± 0.52
Back	9.27 ± 1.71	9.69 ± 2.00	9.62 ± 1.03	9.39 ± 1.48	10.23 ± 1.51	9.19 ± 0.84

^{a, b}: Means in the same row with different superscripts differ significantly ($p < 0.05$)

Interactive effect between levels of feed restriction with or without vitamin E inclusion during breeding on carcass characteristics of post-weaned rabbits is shown on Table 3. Liver weight of growing rabbits from does restricted during breeding was ($p < 0.05$) influenced. Growing rabbits

from does on 15% restriction with vitamin E inclusion had higher ($p < 0.05$) values ($3.39g \pm 0.88$) values for liver compared to liver weight of rabbits from rabbit does on 0% restriction without vitamin E inclusion that recorded the lowest ($p < 0.05$) mean value ($2.77g \pm 0.48$).

Table 5: Interactive effect between levels and periods of feed restriction with or without vitamin E inclusion during breeding on Carcass characteristics of Post-weaned Rabbits

Parameters	Levels of feed restriction											
	0%						15%					
	15-19days		20-24days		25-29days		15-19days		20-24days		25-29days	
Fasted live weight (g/rabbit)	1350.00±122.47	1550.00±219.08	1483.33±150.55	1266.66±83.09	1675.00±44.72	1350.00±44.72	1491.66±265.36	1333.33±150.55	1333.33±147.19	1441.66±217.75	1456.33±222.29	1383.33±147.19
Carcass weight (g/rabbit)	1266.00±108.00 ^{abcd}	386.66±192.00 ^{ab}	1350.00±134.16 ^{abc}	1091.66±108.52 ^d	1475.00±68.92 ^a	1163.33±44.57 ^{bc}	1338.33±156.01 ^{abc}	1178.33±138.47 ^{abcd}	1163.33±156.16 ^{bc}	1288.33±196.00 ^{cd}	1280.00±207.77 ^{abcd}	1211.66±147.27 ^{abcd}
Dressing percentage (%)	48.59 ± 4.24 ^c	51.97 ± 3.52 ^{abc}	52.52 ± 2.76 ^{abc}	50.82 ± 3.02 ^{bc}	55.49 ± 1.88 ^a	48.10 ± 1.72 ^c	48.73 ± 3.52 ^c	53.45 ± 3.52 ^{ab}	51.88 ± 1.79 ^{abc}	51.35 ± 4.96 ^{abc}	49.60 ± 4.43 ^{bc}	49.55 ± 2.27 ^{bc}
Cut up parts (%)												
Kidney	0.61 ± 0.13	0.66 ± 0.20	0.64 ± 0.16	0.68 ± 0.10	0.71 ± 0.05	0.71 ± 0.09	0.73 ± 0.07	0.71 ± 0.10	0.63 ± 0.11	0.75 ± 0.08	0.62 ± 0.15	0.61 ± 0.18
Liver	3.19 ± 1.02 ^{ab}	3.03 ± 1.19 ^{ab}	2.82 ± 1.29 ^{ab}	2.75 ± 0.26 ^{ab}	3.09 ± 0.46 ^{ab}	2.47 ± 0.51 ^c	3.79 ± 1.34 ^d	3.49 ± 0.50 ^{ab}	2.89 ± 0.34 ^{ab}	3.62 ± 0.52 ^a	2.69 ± 0.27 ^{ab}	2.83 ± 0.69 ^{ab}
Heart	0.27 ± 0.02 ^{ab}	0.29 ± 0.06 ^a	0.27 ± 0.02 ^{ab}	0.26 ± 0.06 ^{ab}	0.23 ± 0.01 ^{ab}	0.22 ± 0.01 ^b	0.23 ± 0.60 ^{ab}	0.27 ± 0.02 ^{ab}	0.26 ± 0.05 ^{ab}	0.25 ± 0.07 ^{ab}	0.24 ± 0.05 ^{ab}	0.23 ± 0.04 ^{ab}
Spleen	0.04 ± 0.01 ^{ab}	0.05 ± 0.01 ^a	0.03 ± 0.01 ^a	0.04 ± 0.01 ^{ab}	0.05 ± 0.00 ^{ab}	0.04 ± 0.00 ^{ab}	0.04 ± 0.01 ^{ab}	0.04 ± 0.01 ^{ab}	0.04 ± 0.00 ^{ab}	0.04 ± 0.01 ^{ab}	0.04 ± 0.01 ^{ab}	0.03 ± 0.00 ^{bc}
Lungs	0.50 ± 0.07 ^{ab}	0.67 ± 0.38 ^a	0.55 ± 0.24 ^{ab}	0.61 ± 0.13 ^{ab}	0.41 ± 0.07 ^b	0.64 ± 0.06 ^{bc}	0.65 ± 0.09 ^{bc}	0.70 ± 0.19 ^a	0.55 ± 0.06 ^{ab}	0.68 ± 0.20 ^a	0.59 ± 0.18 ^{ab}	0.52 ± 0.09 ^{ab}
Forelimbs	7.07 ± 0.79 ^{ab}	7.64 ± 1.08 ^{ab}	7.44 ± 0.81 ^{ab}	7.91 ± 0.46 ^a	6.85 ± 1.10 ^b	7.13 ± 0.44 ^{ab}	7.48 ± 0.51 ^{ab}	7.52 ± 0.41 ^{ab}	7.53 ± 0.40 ^{ab}	7.24 ± 0.68 ^{ab}	7.16 ± 0.36 ^{ab}	7.02 ± 0.60 ^{ab}
Hindlimbs	10.84 ± 2.04 ^b	12.13 ± 2.22 ^{ab}	13.27 ± 1.35 ^a	13.76 ± 0.69 ^a	12.16 ± 2.33 ^{ab}	12.51 ± 0.64 ^{ab}	12.71 ± 1.38 ^{ab}	13.69 ± 0.90 ^a	13.33 ± 0.68 ^a	13.40 ± 1.68 ^a	12.73 ± 1.37 ^{ab}	13.01 ± 1.04 ^a
Chest	7.21 ± 0.57	7.62 ± 1.32	8.05 ± 1.55	8.75 ± 0.55	6.91 ± 1.23	7.57 ± 0.41	8.18 ± 0.67	8.13 ± 0.74	8.91 ± 0.75	8.71 ± 0.95	8.01 ± 1.87	8.19 ± 0.91
Neck	1.92 ± 0.44	2.08 ± 0.49	1.95 ± 0.41	1.84 ± 0.53	1.84 ± 0.38	1.62 ± 0.11	1.87 ± 0.26	1.98 ± 0.56	1.80 ± 0.32	1.89 ± 0.30	1.56 ± 0.40	1.67 ± 0.46
Head	7.39 ± 0.56	7.63 ± 0.58	7.33 ± 0.84	8.50 ± 0.51	6.81 ± 0.97	7.78 ± 0.48	7.82 ± 0.92	8.13 ± 0.54	8.23 ± 0.53	7.92 ± 0.82	7.58 ± 1.19	7.66 ± 0.47
Loin	5.37 ± 0.65 ^c	5.99 ± 1.35 ^f	6.59 ± 0.45 ^{ab}	6.61 ± 1.09 ^{ab}	6.76 ± 0.49 ^{ab}	6.48 ± 0.44 ^{ab}	6.37 ± 0.65 ^{ab}	7.11 ± 0.62 ^a	6.40 ± 0.56 ^{ab}	6.77 ± 0.77 ^{ab}	6.50 ± 1.06 ^{ab}	6.21 ± 0.59 ^{ab}
Back	8.84 ± 1.73	10.55 ± 2.05	10.24 ± 0.85	9.91 ± 1.34	10.08 ± 1.75	9.26 ± 0.28	9.70 ± 1.72	8.82 ± 1.67	9.00 ± 0.85	8.80 ± 1.55	10.38 ± 1.36	9.11 ± 1.21

a, b, c, d, . Means in the same row with different superscripts differ significantly (p<0.05)

Table 4 shows the interactive effect of vitamin E inclusion (+/-) and periods of feed restriction during production on carcass characteristics of post-weaned rabbits. Growing rabbits from does restricted at 20-24 days of gestation with 0% vitamin E inclusion recorded the highest (1377.50g \pm 178.99) carcass weight while growing rabbits whose does were restricted between 15-19 days without vitamin E inclusion had the least (1180.00g \pm 176.99) carcass weight. Growing rabbits whose does were restricted between 20-24 days and 25-29 days of gestation with or without vitamin E inclusion had statistically similar dressing percentage which differed significantly ($p < 0.05$) for values obtained for growing rabbits whose does were restricted between 15-19 days and 25-19 days of gestation with or without vitamin E inclusion. The result obtained on dressing percentage in this study though significant is lower than what was reported by (9) who reported dressing percentage to be 60% in *ad libitum* fed rabbits fed different fibrous diet.

Interactive effect between levels and periods of feed restriction with or without vitamin E inclusion during breeding on carcass characteristics of post-weaned rabbits is shown in Table 5. Carcass weight of growing rabbits whose does were restricted during breeding varied significantly ($p < 0.05$). Growing rabbits from does on 0% restriction between 20-24 days of gestation without vitamin E inclusion had higher carcass weight while the least was obtained from growing rabbits from does on 0% restriction between 15-19 days of gestation without vitamin E inclusion. The result obtained in this study though significant is higher than 1082.73 \pm 6.17g that was reported by (8) in rabbits fed sole concentrate feeds. Dressing percentage of growing rabbits was higher (55.49g \pm 1.88) from rabbit does on

0% restriction between 20-24 days of gestation without vitamin E inclusion while the least (48.10g \pm 1.72) was obtained for growing rabbits from does on 0% restriction between 25-29 days of gestation without vitamin E inclusion. The result obtained on dressing percentage though significant is lower than 64.21 \pm 0.51 % reported by (8) in rabbits fed sole concentrate.

Higher (7.11g \pm 0.62) loin weight was obtained for growing rabbits from does on 15% restriction between 20-24 days of gestation supplied vitamin E inclusion while, the least (5.37g \pm 0.65) was obtained for growing rabbits from does on 0% restriction between 15-19 days of gestation with vitamin E inclusion.

Conclusion and Application

This study revealed that:

1. Feed restriction during pregnancy with or without vitamin E inclusion positively influence dressing percentage of growing rabbits.

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