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EFFECT OF LACTATION PERIOD ON BODY PHYSICAL CHARACTERS OF GROWING RABBITS

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ABSTRACT

One hundred new born rabbits of New Zealand White (NZW) breed were divided into two groups. The first group was weaned at 35 days of age. The second group was weaned at 60 days of age. During lactation period and until marketing age both groups were subjected to measurements of body physical characters. These characters were length of ear loop, head, body, tail, fore legs, hind legs and in addition thoracic, abdomen circumference and marketing body weight at 10 weeks of age. The results showed that there were significant differences ($P < 0.05$) in marketing body weight, thoracic, abdomen circumference and body length between the two studied groups. While there were no significant differences in lengths of ear loop, head, body, tail, fore legs, hind legs between the two investigated groups. It could be concluded that it is better to prolong lactation period in growing rabbits to get better physical body characters and marketing weight.

Key words: growth, rabbits, lactation, body, physical, characters, weight, milk

INTRODUCTION

Rabbit puny growth is affected by many factors such as nutrition, management, mothering care and suckling period (Lebas et al., 1997). Rabbit milk is very rich in its protein content (Larson, 1995). This content can reach 10.40% which could reflect high growth rate during fattening period of growing rabbits. In addition, a protective role of milk *in vivo* in association with *in vitro* antibacterial activity has been found. These effects are independent of the presence of specific anti-Enteropathogenic *Escherichia coli* (EPEC) antibodies **(Gallois et al., 2007)**. In addition, milk proteins are very necessary to exert a key functional role via action on nutrient supply, as protective compounds against aggression or by a regulatory action on different physiological functions (Bos et al., 2000). Milk proteins are a complex mixture of various components with quantitative and qualitative differences according to mammalian species. The two major fractions include a micellar casein fraction and the soluble whey protein fraction. Bioactive components in the protein fraction of milk include enzymes, bactericides, hormones, mediators and growth factors (Britton and Kastin, 1991; Schanbacher et al., 1997). The purpose of this work was to find out the effect of prolongation suckling period on body physical characters in growing rabbit puny.

MATERIALS AND METHODS

A total of one hundred newborn New Zealand White rabbit pups were allocated into two groups. The first group was weaned at traditional weaning age of 35 days. The second group was weaned up to 60 days of age. Both groups were subjected to the following measurements: lengths of ear loop, head, body, tail, fore legs, hind legs and in addition thoracic, abdomen circumference and marketing body weight at 10 weeks of age - growth rate

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through weekly live weight (LW) and finally after 10 weeks of age at marketing weight. Mortality rate from birth until marketing age, blood metabolite levels – level of total protein, total lipids, blood sugar, blood creatine level and N-urea content during the experimental period were recorded for the two groups. All does were kept at Experimental Farm of Faculty of Agriculture, Ismailia, Egypt. 20 multipurpose New Zealand White rabbit does were reared in galvanized wire cages for reproduction. The cages were equipped with automatic drinkers and manual feeders and a photoperiod of about 12 h was provided to obtain 100 newborn rabbit pups at an average of 6 newborn kits per doe for each litter size. In first group (normal weaning, NW) does reared the young kids in the traditional manner until they were weaned at 35 days of age. While, in the second group, (delayed weaning, DW) does reared young kits until they were weaned at 60 days of age.

In both the groups the young rabbits and rabbit does used in the experiment were fed with pelleted rabbit feed (CP 16.80%, CFat 2.90%, CF 14.10%, 10.30 DE MJ/kg), without any kind of supplementation. The various pelleted feedstuffs provided were available in *ad libitum* quantities, and the rabbits also had free access to drinking water from automatic nipples.

Statistical analyses of the experimental data were performed by means of one-way analysis of variance (ANOVA) test, according to Steel and Torrie (1982) with SPSS 8.0 (1997) software for the effect of weaning age on physical body characters, marketing weight, mortality rate and blood metabolite levels. Duncan's multiple range test (1955) was used to test significant differences among different means of studied parameters.

RESULTS AND DISCUSSION

Data from this experiment showed that there were significant differences ($P< 0.05$) in regards to body girth (thoracic and abdominal circumferences) between two tested groups. Thoracic circumferences were 21, 23, 27 and 23.40, 25.80, 29.70 cm at the 7th, 8th and 10th weeks of age for NW and DW, respectively. Differences

Table 1: Physical body characters of WNZ growing rabbits during the weaning period from birth until weaning and during the growth period from weaning up to 10 weeks of age (n=50)

Index	Trial group	1st week $\bar{x}$±SE	3rd week $\bar{x}$±SE	5th week $\bar{x}$±SE	7th week $\bar{x}$±SE	8th week $\bar{x}$±SE	10th week $\bar{x}$±SE
Body weight (g)	1	87.1 ± 19.2	362 ± 25.3	551 ± 27.5	1090^{A} ± 32.4	1320^{A} ± 36.5	1710^{A} ± 38.2
	2	98.5 ± 16.4	392 ± 20.3	59 1± 25.1	1220^{B} ± 30.7	1488^{B} ± 32.6	1865^{B} ± 36.4
Growth of body dimensions in the rabbits of the groups followed (cm)							
Length of body	1	14.2 ± 1.9	19.1 ± 2.3	29.3 ± 2.5	35.2^{A} ± 3.6	38^{A} ± 4.3	42.4^{A} ± 4.7
	2	14.5 ± 1.7	19.2 ± 2.1	30.3 ± 2.4	37.7 ^{B}± 3.3	40.2^{B} ± 4.5	44.6^{B} ± 4.8
Length of head	1	5 ± 0.75	6.1 ± 0.69	10.2 ± 1.15	11.1 ± 0.92	12 ± 1.23	12.3 ± 1.68
	2	5.1 ± 0.82	6.3 ± 0.55	10.5 ± 0.96	11.3 ± 1.22	12.2 ± 1.68	12.4 ± 1.36
Length of fore leg	1	6.5 ± 1.75	10 ± 1.22	15 ± 2.3	16 ± 1.56	17 ± 1.46	19 ± 2.34
	2	6.7 ± 1.34	10.5 ± 1.45	15.3 ± 2.16	16.2 ± 1.89	17.1 ± 2.67	19.4 ± 1.6
Length of hind leg	1	8 ± 1.22	10 ± 1.5	17 ±1 .47	20 ± 2.1	22 ± 2.6	25 ± 2.43
	2	8.3 ± 1.13	10.1 ± 2.13	17.4 ± 1.16	20.5 ± 2.36	22.1 ± 1.69	25.6 ± 2.63
Length of ear loop	1	2.5 ± 0.89	6 ± 0.92	8 ± 0.72	9 ± 1.12	11 ± 0.56	12 ± 1.57
	2	2.7 ± 0.73	6.4 ± 0.87	8.3 ± 0.42	9.4 ± 1.1	11.3 ± 1.34	12.4 ± 1.87
Length of tail	1	3 ± 0.33	4 ± 0.21	8 ± 1.12	8.6 ± 1.64	9 ± 1.35	10 ± 1.34
	2	3.1 ± 0.34	4.3 ± 0.67	8.1 ± 1.67	8.9 ± 1.34	9.2 ± 1.58	10.3 ± 1.43
Circumference of chest	1	5 ± 0.21	12 ± 1.14	16 ± 1.89	21^{A} ± 2.56	23^{A} ± 2.98	27^{A} ± 2.76
	2	5.4 ± 0.33	12.4 ± 1.12	16.5 ± 1.33	23.4^{B} ± 2.16	25.8^{B} ± 2.80	19.7^{B} ± 2.91
Circumference of abdomen	1	7 ± 1.26	14 ± 1.24	18 ± 2.18	22^{A} ± 2.56	25^{A} ± 3.14	28^{A} ± 3.67
	2	7.3 ± 1.13	14.1 ± 1.24	18.6 ± 2.23	24.9^{B} ± 3.11	29.8^{B} ± 3.14	31^{B} ± 2.16
Mortality rate	1	2	4	5	7	10	15^{A}
	2	1.8	3.7	4.5	6	8	11^{B}

Means with two different letters are significant different at ($P\leq 0.05$);
1 - Normal weaning on the 35th day of age; 2 - Delayed weaning on the 60th day of age

were also recorded for body girth at abdominal region. Abdominal circumferences were 22, 27, 28 and 24.90, 29.80, 31 cm at 7th, 8th and 10th weeks of age for NW and DW group, respectively. These results can be attributed to the significant differences in body weight between two groups at the same age as shown in Table 1. The higher body weight as regards to DW group is due to beneficial effects of rabbit doe milk as pointed out by Bednarz and Frindt, 1978. In addition, milk has a high protein content and nutritional quality. Also, milk proteins demonstrate a high metabolic utilization by the organism compared with other protein sources. On the other hand, there were no significant differences between two groups as for other physical body characters like head, fore leg, hind leg, ear loop and tail length as shown in Table 1. These results showed that both body weight and girth can be considered as determinant characters for growth and development. These results could also be confirmed by high correlation coefficient between body weight and girth as presented in Table 2. These correlations were 0.92 and 0.89 between body weight and thoracic and body weight and abdominal circumferences, respectively. These data are in accordance with those of Fraga et al. (1978), who found that body weight correlated with body composition.

Mortality rate reduced with prolongation of lactation period which can be one of the effects of delaying weaning. It was reported that delayed weaning may improve a number of characters such as live-weight and food consumption (Adam, 1986). Whereas Petersen

Table 2: Correlation coefficients between thoracic circumference and physical body measurements of growing NZW rabbit does

Trait	TC	AC	BW	BL	HL	FLL	HLL	ELL	TL
Thoracic Circumference (TC)		0.90	0.92	0.87	0.65	0.72	0.74	0.68	0.68
Abdominal Circumference (AC)			0.89	0.85	0.61	0.73	0.71	064	0.65
Body weight (BW)				0.84	0.75	0.76	0.73	0.62	0.58
Body length (BL)					0.75	0.66	0.64	0.75	0.51
Head length (HL)						0.73	0.76	0.79	0.54
Fore-leg length (FLL)							0.77	0.74	0.63
Hind-leg length (HLL)								0.78	0.55
Ear loop length (ELL)									0.65

All correlation coefficients were highly significant (P≤ 0.05)

Table 3: Means ±SE of blood serum metabolites of growing White New Zealand rabbits during lactation period and up to marketing age (10- weeks)

Blood metabolites		Trial group	3rd week $\bar{x}$±SE	5thweek $\bar{x}$±SE	7thweek $\bar{x}$±SE	8thweek $\bar{x}$±SE	10thweek $\bar{x}$±SE
Total protein	(g. 100 -1ml)	1	4.15± 0.43	4.3±0.28	4.4±0.11	5.2 A ±0.26	5.3 A ±0.33
		2	4.2±0.15	4.5±0.28	4.6±0.19	6.2 B ±0.47	6.7 B ±0.52
Total lipids	(mg. 100 -1ml)	1	341±6.42	336±5.12	326±5.53	325±7.39	320±7.56
		2	350±5.59	310±6.48	318±5.36	319±4.38	311±6.76
Creatinine	(mg. 100 -1ml)	1	1.2±0.02	1.3±0.03	1.5±0.05	1.3±0.06	1.5±0.07
		2	1.3±0.07	1.4±0.02	1.5±0.03	1.6±0.05	1.6±0.07
Urea-N	(mg. 100 -1ml)	1	12.5±0.26	14.2±0.73	15.46±0.46	16.2 A ±0.93	18.3 A ±0.76
		2	13.42±0.56	14.8±0.28	15.76±0.56	18.9 B ±0.28	20.66 B ±0.85
Glucose	(mg. 100 -1ml)	1	250±4.22	256±7.31	2.67±5.64	272±5.50	279.5±6.43
		2	249±7.26	259±5.61	272±5.39	281±8.64	286±6.84

Means with two different letters are significant different at (P≤ 0.05)
1 - Normal weaning on the 35th day of age; 2 - Delayed weaning on the 60th day of age

et al. (1992) found no effect of delayed weaning on live-weight of growing rabbits.

Blood metabolites did not differ significantly between the two groups in most of studied criteria except for total protein content and urea-N level as pointed out in Table3. The nutritional value of dietary proteins is usually related to their ability to achieve N- and amino acid requirements for tissue growth and maintenance (Rennie et al., 1994; Young and Pellett, 1989). Physiological properties of milk proteins also include acute regulatory effects. The compounds responsible for these activities include enzymes, immunoglobulins, mediators and hormone-like substances. These actions are linked to native proteins or to peptides cleaved from protein during digestion (Bos et al., 2000).

It could be concluded that delay in weaning of growing rabbits up to 60 days of age encourages rabbit growth and also related physical body characters especially body girth which leads to high marketing weight and low mortality rate.

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