Nutrient Intake and digestibility of Rabbit does fed varying levels of concentrate and lablab during pregnancy

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Abstract

Nulliparous crossbred does were used to study the effects of concentrate:lablab ratio (CL) and stage of pregnancy on nutrient intake and digestibility. Treatments consisted of four concentrate and lablab combinations on a gram:gram basis: 20:130, 40:110, 80:70 and 100:50 and two stages of pregnancy: second and fourth week of pregnancy. Concentrate intake increased as level increased up to 80g/day offered while lablab intake increased from 50 to 130g/day offered. Doe weight and metabolic size were similar for all treatments. Total feed intake was not affected by concentrate and lablab levels. Dry matter intake was lower for 100:50 CL than other treatments. Ether extract and crude fibre intakes decreased with increase in concentrate levels. Dry matter and nitrogen free extract digestibility were higher for 80:70 CL than other combinations. Crude fibre digestibility was higher for 80:70 than 40:110 and 100:50 CL. Crude protein retention was higher for 80:70 than 20:130 and 100:50 CL. Fetal growth requirement, total protein requirement and balance of protein were high at 80:70 and 100:50 CL. During pregnancy, dry matter and all nutrients intake were higher in the second than fourth week. Ether extract, crude protein and nitrogen free extract digestibilities were lower in the second than fourth week of pregnancy. Fetal growth requirement and balance of protein were higher in the second than fourth week of pregnancy. Relationship between feed intake (g DM/day) and nutrient digestibility was negative. The relationship between feed intake (g DM/kg body weight/day) and feed intake (g DM/kg LW^{0.75}/day) was however, positive for all the nutrients except crude protein. For the small scale rabbit producer in developing countries, it is feasible to maintain rabbits on combinations of concentrate and lablab during pregnancy.

Key words: Concentrate, digestibility, intake, lablab, stage of pregnancy, rabbits.

Introduction

Commercial feeds are expensive in most developing countries, and out of reach of farmers

who mainly raise rabbits in their backyards. The problem for most producers is the high cost of concentrate feed. This has necessitated the need

to seek for alternative protein sources in forages. Forage legumes are extensively used in rabbit production as supplements to concentrate meal, pellets or in complete diets. In addition to supply of proteins and energy, forages supply fibre to aid proper digestion. Rabbits can be raised on diets consisting entirely of forage and cereal by-products as main sources of protein and energy with high level of production (Cheeke, 1986). Some attribute of high fibre diets seem to favor improved reproduction (Varel and Yen, 1997, Johnson *et al.*, 2003). Reproductive performance and litter growth rate of rabbit does fed forage by-product diet was not reduced compared with the control group fed a 21% soybean meal diet (Raharjo *et al.*, 1986, Cheeke, 1986).

Although, fibrous feeds traditionally depress digestibility of feed, some types and sources have been shown not to exert such negative effects on nutrient digestibility (Johnson *et al.*, 2003). These show great potential for practical use during gestation, especially those that are readily fermented and have no adverse effects on reproductive performance (Pond *et al.* 1985, Danielson and Noonan, 1975). Though the causal link between caloric intake and fertility is well known, precisely how nutritive resources act on reproduction remains unclear (Boiti, 2004). Several hormones such as leptin work together in linking growth, metabolism, energy homeostasis, and reproduction (Hornick *et al.*, 2000 in Boiti, 2004). Two reasons adduced for positive reports are, feeding high fibre diets during early pregnancy results in consumption of less energy which improves embryo survival

in early pregnancy, and dietary non starch polysaccharides may elicit improved sensitivity of peripheral tissues to insulin and sustain postprandial secretion of insulin, which in turn improves ovulation rate and ultimately litter size at birth (Johnson *et al.*, 2003).

Lablab with an average crude protein of 17% and crude fibre of 28% is slightly above average when compared with other tropical legumes and has considerably more protein than tropical grasses (Murphy and Colucci 1999). Lablab forage has good potentials in reducing concentrate usage by rabbit raisers and could also elicit positive effect on nutrient digestion and reproduction of rabbit does. The study was conducted to study the effects of concentrate:lablab forage levels and stage of pregnancy on feed intake and nutrient digestibility of rabbit does during pregnancy.

Materials and Methods

Study site

The experiment was conducted in the rabbitry of the National Animal Production Research Institute, Shika, Nigeria (10°11' N and 7°8' E, 650m above sea level). The area receives an annual rainfall of 1100mm, spread between April and October (wet season). The mean minimum (night) and maximum (day) temperatures were 20°C and 34°C respectively during the study. Relative humidity during the study ranged between 75% and 50%. Day length was 12 hours.

Animals and housing

Nulliparous crossbred rabbit does were used for this study. The rabbits were progenies obtained from mating between New Zealand White and California breeds. The rabbits were individually housed in metal cages of dimensions 120 x 60 x 50 cm located in a well-ventilated house. The house is completely walled with wide, open windows covered with wire mesh and mosquito netting. The experimental animals were kept, maintained and treated in adherence to accepted standards for the humane treatment of animals.

Experimental procedure

Forty does were randomly allocated to four concentrate and lablab treatment combinations (CL). The treatments consisted the following concentrate and lablab combinations on a gram:gram basis: (1) 20:130, (2) 40:110, (3) 80:70 and 100:50 of a 150g air-dry/day total feed supply. This gives on percent basis: (1) 13:87, (2) 27:73, (3) 53:47 and (4) 67:33 respectively. Table 1 shows nutrient composition of the concentrate and lablab forage fed to the rabbit does. The concentrate meal consisted of 22% CP and 10.88MJ ME/kg which contained (%): maize 39.24, groundnut cake 42.26, maize offal 15.00, bone meal 3.0, salt 0.25 and vitamin/mineral premix 0.25. Lablab (*Lablab purpureus*) forage

was cut at harvest after seeds were removed and air-dried in a room to retain its green colour and quality. The forage was chopped before feeding. At 08.00 hours the various levels of concentrate and lablab were weighed and offered separately in earthen feeders. Leftovers and wastage were weighed daily before feeding. Water was supplied *ad libitum* daily in earthen waterers. After a one-week adjustment period, the does were mated to intact bucks. Pregnancy diagnosis was done by palpation and weight method. Does were weighed at start, and at weekly intervals during pregnancy. Earthen nesting pots were supplied to each doe on the 25th day of pregnancy. Twelve does found to be open were removed from the analysis of data.

Digestibility study

Digestibility study was conducted in the second and fourth weeks of pregnancy. Faecal and urine samples were collected daily for four days and stored at -20°C in a deep freezer immediately after collection. At the end of each collection period, faecal samples were bulked for each animal and used for proximate analysis according to Association of Official Analytical Chemists (AOAC, 1980) procedures. The urine samples were also bulked and used for nitrogen analysis.

Table 1: Nutrient composition of concentrate and lablab hay fed to does

	Dry matter	Ash	Ether extract	Crude fibre	Crude protein	Nitrogen free extract
Concentrate meal	94.11	7.96	13.44	12.11	22.84	43.65
Lablab	96.42	19.26	3.56	28.40	13.43	35.35

Feed and nutrient intake, digestibility coefficients and nitrogen retention were determined.

Analytical Procedures

Dry matter content of the concentrate diet, lablab and faeces was determined after pre-drying the samples at 60°C for 24h and then at 105°C in a vacuum oven. Ether extract was determined using Soxhlet Extraction Procedure. Crude fibre was determined as the fraction remaining after digestion with standard solutions of sulphuric acid and sodium hydroxide under controlled conditions. Ash content was determined by ashing at 550°C. Total nitrogen contents of the diets, urine and feces were determined by the macro-Kjeldahl method. Nitrogen content was converted to crude protein by multiplying with the factor 6.25. Proximate analysis was carried out according to AOAC (1980).

Statistical analysis

Data collected were subjected to analysis of variance using General Linear Model procedure for a 4 X 2 factorial experiment in a completely randomized design consisting four concentrate and lablab forage combination treatments and two stages of pregnancy. Pair-wise difference method was used to separate significant means (SAS, 1987). Apparent digestibility coefficient of nutrients (ADC) was calculated as:

$$\text{ADC} = \frac{\text{nutrient intake} - \text{nutrient in faeces}}{\text{nutrient intake}}$$

Digestible energy intake (DE) was computed according to Schiemann *et al.* (1977)

$$\text{DE (kcal/kg DM)} = ((5.28 \times \text{DCP}) + (9.51 \times \text{DEE}) + (4.20 \times \text{DCF}) + (4.20 \times \text{DNFE})).$$

Where: DCP= Digestible crude protein (g/kg),

DEE= Digestible ether extract (g/kg)

DCF= Digestible crude fibre (g/kg) and DNFE=

Digestible nitrogen free extractives (g/kg).

Maintenance requirement was computed as 3.7 DCP kg LW^{0.75} and fetal growth requirement of does was computed as DCP intake multiplied by efficiency of utilization of DCP for fetal growth of 0.42 (Parigi Bini *et al.*, 1991; Xiccato *et al.*, 1992). Balance of protein was computed as total requirement (maintenance + fetal growth) subtracted from DCP intake. Regression procedure was used to compute the relationship between feed intake and digestibility rates of nutrients (SAS, 1987).

Results

Concentrate intake increased with increase in concentrate level up to 80g/day concentrate offered (Table 2). Additional concentrate offered above 80g to 100g/day did not increase concentrate intake above 67g. Lablab intake on the other hand, increased as lablab level increased from 50 to 130g/day offered. Total feed intake was not significantly (P=0.08) affected by levels of concentrate and lablab. Feed intake per kg body weight and metabolic size were significantly higher for 20:130 and 80:70 CL. Faecal output and water content was significantly lower for rabbits on 80:70 CL than the other treatments.

Dry matter intake (Table 3) was significantly (P<0.05) lower (8-10%) for 100:50 CL than the

Table 2: Effect of level of concentrate and lablab on feed and faecal production of rabbit does during pregnancy

Parameter	Concentrate:lablab level (g:g)			
	20:130	40:110	80:70	100:50
Feed intake (g/d):				
Concentrate	19.8±2.20 ^a	31.9±2.20 ^b	66.5±2.27 ^a	66.9±2.20 ^a
Lablab	101±1.67 ^a	86.7±1.67 ^b	53.4±1.72 ^c	43.5±1.67 ^d
Total feed intake	121±3.02	119±3.02	120±3.13	110±3.02
Total feed intake (g DM/kg b.w. d ⁻¹)	45.4±1.34 ^a	45.0±1.34 ^a	44.1±1.38 ^a	40.1±1.34 ^b
Total feed intake (g DM/kg I.W ^{0.75} d ⁻¹)	57.4±1.55 ^a	56.7±1.55 ^a	55.8±1.60 ^a	51.0±1.55 ^b
Faecal production:				
Output (g DM/d)	24.0±1.50 ^a	25.9±1.50 ^a	17.1±1.55 ^b	22.3±1.50 ^a
Water content (g/d)	42.9±2.94 ^a	41.1±2.94 ^{ab}	30.0±3.04 ^c	35.1±2.94 ^{bc}

Means with different superscript along rows are significantly different at (P<0.05). Total feed intake = concentrate + lablab.

Table 3: Effect of level of concentrate and lablab hay on nutrient intake and digestibility of rabbit does during pregnancy

Parameter	Concentrate:lablab level (g:g)			
	20:130	40:110	80:70	100:50
Nutrient intake (g DM/d):				
Dry matter	116±2.42 ^a	114±2.42 ^a	114±2.51 ^a	105±2.42 ^b
Ash	20.3±0.35 ^a	18.5±0.35 ^b	14.9±0.37 ^c	13.1±0.35 ^d
Ether extract	7.0±0.28 ^c	8.1±0.28 ^b	11.7±0.30 ^a	11.6±0.28 ^a
Crude fibre	29.9±0.56 ^a	27.4±0.56 ^b	22.2±0.58 ^c	19.5±0.56 ^d
Crude protein	17.9±0.61 ^b	18.9±0.61 ^b	22.9±0.63 ^a	21.9±0.61 ^a
Nitrogen free extract	41.0±1.07	41.1±1.07	42.4±1.09	38.9±1.07
Nutrient digestibility:				
Dry matter***	0.79±0.012 ^b	0.78±0.012 ^b	0.85±0.012 ^a	0.79±0.012 ^b
Ether extract***	0.39±0.03 ^c	0.42±0.03 ^c	0.77±0.03 ^a	0.65±0.03 ^b
Crude fibre**	0.69±0.031 ^{ab}	0.61±0.031 ^b	0.72±0.032 ^a	0.58±0.032 ^b
Crude protein**	0.80±0.012 ^b	0.82±0.012 ^b	0.87±0.012 ^a	0.86±0.012 ^a
Crude protein retention	0.73±0.023 ^b	0.77±0.023 ^{ab}	0.85±0.023 ^a	0.72±0.023 ^b
Nitrogen free extract**	0.90±0.01 ^b	0.91±0.01 ^{ab}	0.93±0.01 ^a	0.89±0.01 ^b
Digestible energy (kcal/kg DM)	3217±49.9 ^{bc}	3166±49.9 ^c	3546±51.6 ^a	3309±49.9 ^b

Means with different superscript along rows are significantly different at (P<0.05, **P<0.01, ***P<0.001).

other treatments. Ash, ether extract and crude fibre intakes decreased ($P<0.05$) with increase in concentrate and decrease in lablab levels. Crude protein intake was similar for 20:130 and 40:110 CL but significantly ($P<0.05$) lower than 80:70 and 100:50 CL while nitrogen free extract intake was similar for all the treatments. Dry matter digestibility (Table 3) was 7% higher ($P<0.001$) for 80:70 CL than the other treatments. Ether extract digestibility (EED) was 45-49% higher for 80:70 than 20:130, 40:110 CL, while 100:50 was 35-40% higher than 20:130 and 40:110 CL. Crude fibre digestibility was 15-19% higher ($P<0.01$) for 80:70 than 40:110 and 100:50 CL treatments. Crude protein digestibility was similar for 20:130 and 40:110 CL but 6-8% lower ($P<0.01$) than 80:70 and 100:50 CL. Crude protein digestibility however increased as level of concentrate increased and level of forage decreased up to 80:70 CL. Crude protein retention was 9-15% higher ($P<0.05$) for 80:70 than 20:130 and 100:50 CL treatments. Crude protein retention also increased as level of concentrate to lablab level increased up to 80:70.

Nitrogen free extract digestibility was 3-4% higher ($P<0.01$) for 80:70 CL than all the other treatments. Digestible energy intake was also significantly higher for 80:70 CL than other treatments. Doe weight, metabolic size and maintenance requirement were similar for all the treatments (Table 4). Digestible crude protein intake, fetal growth requirement, total protein requirement and balance of protein were higher at 80:70 and 100:50 CL.

Concentrate ($P<0.05$), lablab ($P<0.05$) and total feed ($P<0.01$) intakes were 9-10% higher in the second week than fourth week of pregnancy (Table 5). Feed intake per kg body weight or metabolic size was also higher in the second than fourth week of pregnancy. Faecal output and water content were higher in the second than fourth week of pregnancy. Dry matter, ash, ether extract, crude fibre, crude protein and nitrogen free extract intakes (Table 6) were 10% higher ($P<0.05$) in the second week than fourth week of pregnancy. Dry matter ($P<0.05$) and crude protein ($P=0.08$) digestibility was 2.5% while ether extract digestibility was

Table 4: Effect of level of concentrate and lablab hay on digestible protein intake and requirement of rabbit does during pregnancy

Parameter	Concentrate:lablab level (g:g)			
	20:130	40:110	80:70	100:50
Doe weight (kg)	2.57±0.05	2.52±0.05	2.61±0.05	2.61±0.05
Metabolic size (kg LW ^{0.75})	2.03±0.03	2.00±0.03	2.05±0.03	2.05±0.03
DCP intake (g/d)	14.34±0.57 ^b	15.48±0.57 ^b	19.93±0.59 ^a	18.78±0.57 ^a
DCP Requirement (g/d):				
Maintenance	7.52±0.11	7.41±0.11	7.59±0.12	7.60±0.11
Fetal growth	6.02±0.24 ^b	6.50±0.24 ^b	8.37±0.25 ^a	7.89±0.24 ^a
Total requirement	13.54±0.27 ^b	13.91±0.27 ^b	15.97±0.28 ^a	15.49±0.27 ^a
Balance of protein	0.80±0.34 ^b	1.57±0.34 ^b	3.97±0.36 ^a	3.29±0.34 ^a

Means with different superscript along rows are significantly different at ($P<0.001$).

Table 5: Effect of stage of pregnancy on feed intake of rabbit does fed concentrate and lablab hay

Parameter	Stage of pregnancy	
	2 nd week	4 th week
Feed intake (g/d):		
Concentrate	48.6±1.56 ^a	43.3±1.58 ^b
Lablab	74.7±1.17 ^a	67.6±1.20 ^b
Total feed intake **	123±2.14 ^a	111±2.17 ^b
Feed intake (g DM/kg b.w.)	45.96±0.95 ^a	41.35±0.96 ^b
Feed intake (g DM/kg LW ^{0.75})	58.12±1.09 ^a	52.32±1.11 ^b
Faecal production:		
Output (g DM/d)	24.86±1.06 ^a	19.82±1.08 ^b
Water content (g/d)	41.49±2.08 ^a	33.01±2.12 ^b

Means with different superscript along rows are significantly different at (P<0.05, **P<0.01).

Table 6: Effect of stage of pregnancy on nutrient intake and digestibility of rabbit does fed concentrate and lablab hay

Parameter	Stage of pregnancy	
	2 nd week	4 th week
Nutrient intake (gDM/d):		
Dry matter	118±2.03 ^a	106±2.06 ^b
Ash	17.5±0.26 ^a	15.8±0.27 ^b
Ether extract	10.5±0.19 ^a	8.7±0.19 ^b
Crude fibre	26.0±0.40 ^a	23.5±0.40 ^b
Crude protein	21.5±0.49 ^a	19.4±0.44 ^b
Nitrogen free extract	42.6±0.68 ^a	38.6±0.69 ^b
Nutrient digestibility:		
Dry matter	0.79±0.008 ^b	0.81±0.008 ^a
Ether extract	0.52±0.02 ^b	0.60±0.02 ^a
Crude fibre	0.63±0.019	0.67±0.019
Crude protein	0.82±0.009	0.85±0.009
Crude protein retention	0.79±0.031	0.74±0.031
Nitrogen free extract	0.90±0.01	0.92±0.01
Digestible energy (kcal/kg DM)	2780±35.3 ^b	3838±35.9 ^a

Means with different superscript along rows are significantly different at (P<0.05).

13% lower (P<0.05) in the second week than fourth week of pregnancy. Nitrogen free extract digestibility was similar in the second and fourth week of pregnancy. However, crude fibre digestibility was 6% higher (P>0.05) in the fourth week than second week of pregnancy. Crude protein retention was 6% higher (P>0.05) in the second week than fourth week of pregnancy. Digestible energy intake was higher in the fourth

than second week of pregnancy. Stage of pregnancy however, did not significantly (P>0.05) affect doe weight and metabolic size (Table 7). Maintenance and total digestible crude protein requirement were similar while digestible crude protein intake, fetal growth requirement and balance of protein were higher in the second than fourth week of pregnancy.

Table 7: Effect of stage of pregnancy on digestible protein intake and requirement of rabbit does during pregnancy

Parameter	Stage of pregnancy	
	2 nd week	4 th week
Doe weight (kg)	2.57±0.04	2.59±0.04
Metabolic size (kg LW ^{0.75})	2.03±0.02	2.04±0.02
DCP intake (g/d)	17.78± 0.40 ^a	16.49 ±0.41 ^b
DCP Requirement (g/d):		
Maintenance	7.52 ±0.08	7.54± 0.08
Fetal growth	7.47 ±0.17 ^a	6.92 ±0.17 ^b
Total requirement	14.98± 0.19	14.47± 0.20
Balance of protein	2.79± 0.24 ^a	2.02± 0.25 ^b

Means with different superscript along rows are significantly different at (P<0.05).

Relationship between feed intake (g DM/day) and nutrient digestibility (Table 8) was negative except for digestible energy. The relationship between feed intake per body weight (g DM/kg body weight/day) and nutrient digestibility and feed intake per metabolic size (g DM/kg LW^{0.75}/day) and nutrient digestibility were however, positive for all the nutrients except crude protein. The adjusted R² values were however low except for digestible energy where R² values were moderately high.

Discussion

Total feed intake of rabbits was not affected by varying the level of concentrate and lablab forage, however when feed intake was expressed as a function of body weight or metabolic live weight there was significant drop in intake at the highest level of concentrate (100g) offered. Parigi Bini and Xiccato (1998) reported voluntary feed intake of rabbit does to be proportional to metabolic live weight. Feed intake was also affected by stage of pregnancy

with a drop in intake in the fourth week of pregnancy. This reduction in feed intake was likely as a result of reduction in stomach capacity of does with progression of pregnancy. Huller and Szabo (1988) also observed progressive decrease in feed intake of does as pregnancy advanced from the first (158g) to third trimester (92g). Iyeghe-Erakpotobor *et al.* (2006) reported differences in feed intake observed with physiological stage despite similar metabolic weight could be an attempt at moderating intake by does. Rabbit does moderate their nutrient intake to cater for their fetuses and for mammary glands development required during lactation. Higher dry matter digestion of rabbits on 80:70 CL could likely be as a result of slower transit of digesta through the alimentary canal occasioned by a lower level of fibre intake and low faecal production resulting in higher digestion efficiency. During pregnancy, however, increase in dry matter digestibility in the fourth week of pregnancy despite lower feed intake shows an increase in digestion efficiency. This indicates a

Table 8: Regression between feed intake and digestibility rates of rabbit does

Nutrient	Constant	Coefficient	n	Adjusted R ²	Prob.
Feed intake (g DM/d):					
Dry matter	149.6±24.33	-46.72±30.30	63	0.0217	0.128
Crude fibre	121.8± 8.28	-14.91±12.52	63	0.0067	0.238
Crude protein	156.7±23.93	-53.38±28.56	63	0.0387	0.066
Ether extract	139.6±24.91	-33.31±30.16	63	0.0035	0.274
Nitrogen free extract	120.4±20.91	-9.53±23.93	63	-0.0138	0.692
Digestible energy	27.74±7.72	0.2001±0.018	63	0.660	<0.0001
Feed intake (g DM/kg b.w./d):					
Dry matter	13.35±12.25	27.76±15.26	63	0.036	0.074
Crude fibre	27.72±4.12	12.12±6.23	63	0.043	0.057
Crude protein	43.57±12.44	-9.55±14.85	63	-0.0095	0.522
Ether extract	9.54±12.31	31.61±14.91	63	0.053	0.038
Nitrogen free extract	25.88±10.55	11.15±12.07	63	-0.0024	0.360
Digestible energy	-5.81±4.16	0.098±0.01	63	0.616	<0.0001
Feed intake (g DM/kg LW^{0.75}/d):					
Dry matter	17.81± 16.34	37.0 ±20.35	63	0.036	0.074
Crude fibre	36.98±5.50	16.15±8.31	63	0.043	0.057
Crude protein	58.10±16.68	-12.74±19.80	63	-0.0095	0.522
Ether extract	12.72±16.42	42.13±19.88	63	0.0533	0.038
Nitrogen free extract	36.51±14.06	14.85±16.10	63	-0.0024	0.360
Digestible energy	-7.75±5.55	0.131±0.013	63	0.616	<0.0001

n, sample size; b.w, body weight; prob., level of significance.

compensation for reduction in feed intake especially during the last stage of pregnancy, when the volume occupied by the digestive system decreases (Iyeghe-Erakpotobor *et al.*, 2006).

Factors that affect the capacity of rabbits to digest feed are endogenous enzyme activities, digestion by microbial population in the caecum, and the rate of passage of the feed (Carabano and Piquer, 1998). This indicates a relationship between crude fibre level, rate of passage of feed and crude fibre digestibility. High crude fibre digestibility of rabbits on all the treatments in this study could be because legume forages are less resistant to digestion than grass (Fraga, 1998). Similar crude fibre digestibility observed in this study in the second and fourth weeks of pregnancy agrees with an earlier study by Iyeghe-

Erakpotobor *et al.* (2006). High fibre intake of rabbits in this study could have resulted in faster feed passage rate and therefore explain crude fibre digestibility obtained during pregnancy.

Increased crude protein digestibility (CPD) in this study could be related to crude protein intake across the treatments. Fraga (1998) reported an increase in crude protein content of feedstuff increases its crude protein digestibility by decreasing the proportional contribution of endogenous nitrogen to total faecal nitrogen content. It could also be because of the structure of legume forage proteins, which is generally less resistant to digestion because a major portion of leaf proteins are separated from the cell wall by a membrane (Fraga, 1998). Increase in crude protein digestibility from first to fourth week of pregnancy suggests higher protein requirement

as pregnancy progresses (Iyeghe-Erakpotobor *et al.*, 2006). However, ability of does to meet requirement for maintenance and fetal growth depends on the digestible crude protein intake. Partridge and Allan (1982) reported a build up of protein in maternal body tissues during the later half of pregnancy, which is used for fat development and as extra-uterine protein deposits. Partridge *et al.* (1986) also reported high increase in nitrogen accretion in late pregnancy in pregnant and concurrently pregnant/lactating does. Crude protein digestibility coefficient of 0.82 and 0.85 obtained for the second and fourth weeks of pregnancy are similar to 83.8 for first and 87.5 for fourth week of pregnancy reported by Iyeghe-Erakpotobor *et al.* (2006).

Increase in nitrogen free extract digestibility as concentrate increased and lablab forage decreased up to 80:70 could be as a result of increase in starch intake of the rabbits. Faecal digestibility of starch tends to decrease in diets with lower starch content in comparison with those having higher starch content, even with the same source of starch (Blas and Gidenne 1998). A lower dietary starch level corresponds frequently to a higher fibre level, and thus it could be hypothesized that it leads to a faster rate of passage and thus to a lower efficiency in starch degradation (Blas and Gidenne, 1998). Generally higher digestion efficiency observed for rabbits on 80:70 concentrate:lablab combination could be as a result of lower faecal dry matter voided by this group. Similar nitrogen free extract digestibility observed in the second and fourth

week of pregnancy in this study agrees with an earlier study by Iyeghe-Erakpotobor *et al.* (2006) who reported similar nitrogen free extract digestibility for open, 1st week and 4th week pregnant does.

Though crude protein and other nutrient intake were higher in the second than fourth week of pregnancy, nutrient digestibility was higher in the fourth than second week of pregnancy. Higher digestion of nutrients in the fourth week of pregnancy despite lower feed intake could be as a result of lower transit time of the feed in the gastrointestinal tract. Decreased dry matter intake is associated with lower transit time of digesta and hence results in increased digestion efficiency (Xiccato, 1998). Digestion coefficients of nutrients observed in this study are similar to those reported by Iyeghe-Erakpotobor *et al.* (2006) for rabbit does in the fourth week of pregnancy. However, Lebas (1979) and Hullar and Szabo (1988) reported decreased nutrient digestion of does in the fourth week than second week of pregnancy. There appears therefore, to be a relationship between intake level and digestion of nutrients. The higher the digestion of nutrients the more nutrients would be available to the does to meet their requirement for body maintenance and requirement for fetal growth during pregnancy and still have a balance of nutrients for mammary gland development and body tissue accretion in preparation for lactation. It is concluded from this study that nutrient digestibility was higher for does on 80:70 CL combination and in the fourth week of pregnancy. The implication of this study is the possibility of

maintaining rabbits on combinations of concentrate and lablab without adverse effect on reproduction. For the small scale rabbit producer in developing countries, it is feasible to produce rabbits by utilizing combinations of concentrate and lablab.

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