Trop. J. Anim. Sci. 5 (1): 117 - 122 (2002)
ISSN: 1119 - 4308

EFFECT OF PROTEIN FLUSHING ON REPRODUCTIVE PERFORMANCE OF NULLIPAROUS DOES.

G. T. IYEGHE-ERAKPOTOBOR; M. NDOLY[1]; E.O. OYEDIPE; L.O. EDUVIE AND D. OGWU[2].

National Animal Production Research Institute,
Ahmadu Bello University, Zaria.
[1]Animal Science Department, Ahmadu Bello University, Zaria.
[2]Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria.

Target Audience: Reproductive physiologists, rabbit producers

ABSTRACT

This study was conducted to evaluate the effect of flushing using protein on reproductive performance of nulliparous rabbits. Twenty-eight (28) nulliparous does were fed four protein (18, 20, 22 and 24% CP) diets one week before and after mating. All the does were placed on the 18% CP diet during pregnancy and lactation. Litter size and weights at birth and at weekly intervals were measured. Results obtained showed non significant effect (P>0.05) of protein level on litter parameters except kit mortality rate. Does fed 18% CP diet had the largest litter size at parturition while does fed 24% diet had larger litter size alive at birth, 21 and 42 days. Total litter birth weight and litter birth weight of kits alive at birth decreased with increase in protein level except for does fed 24% diet. Kits kindled by does fed 20 and 24% CP diets were heavier (P>0.05) than the other kits. Nulliparous does flushed with the 24% CP diet had larger litter weights at one to six weeks of age. Kit mortality was higher in the period 0-21 days than the period 21-42 days postpartum. Does on the 22% CP diet, however, lost all their kits in the first week of lactation.

Keywords: Protein, flushing, performance

DESCRIPTION OF PROBLEM

Litter size is one of the most important factors affecting productivity of does. The larger the young the doe kindles and weans, the greater the profitability of the enterprise (1). Nutrition is an important factor affecting litter size of does. Higher energy intakes have been reported to increase ovulation when given for a short period (3). Sheep fed high protein supplements 6-10 days before estrous, indicated that high protein intakes may enhance ovulation rates (5, 13,12).However (11) reported minimal effects of specific protein on ovulation rates similar to conventional flushing diets of short duration. Source and level of protein, was also reported to have little effect on the ovulation rate of pigs (2). It was notice by (9)that slightly higher litter size as protein levels increased

from 17.5 to 20.5%. This increase was however, associated with greater number of still births. There is however very little work done on flushing and the effect of this on rabbit productivity. This study was conducted to investigate the effect of flushing using different protein levels on reproductive performance of nulliparous ('virgin') does.

MATERIALS AND METHODS

This study was conducted to investigate the effect of flushing using different crude protein levels on the reproductive performance of nulliparous does. Twenty-eight nulliparous does were randomly assigned to four treatment diets with 18, 20, 22 or 24% CP (Table 1) one week before and after mating.

Table 1. Composition of experimental diets fed to nulliparous does.

	Treatment (% CP)			
Ingredient	18	20	22	24
Maize	48.00	45.73	39.24	32.76
Groundnut cake	33.70	35.77	42.26	48.74
Rice offal	15.00	0.00	0.00	0.00
Maize offal	0.00	15.00	15.00	15.00
Bone meal	2.80	3.00	3.00	3.00
Salt	0.30	0.25	0.25	0.25
Vit./mineral premix	0.30	0.25	0.25	0.25
Calculated Nutrient Content:				
Energy (Kcal ME/Kg)	2638.9	2687.74	2627.43	2567.19
Crude protein (%)	18	20	22	24
Crude fibre	3.07	4.17	4.24	4.31
Ash	5.34	2.68	2.96	3.23
Cost/kg	40.59	37.09	39.30	41.52

Vit/mineral premix supplied per kilogram ration: Vit. A 1251 IU, Vit. D3 2750 IU, Vit. E 151 IU, Vit. K 0.002g, Vit. B_2 0.006g, Nicotinic acid 0.035, Calcium D-Pantothenate 0.01mg, Vit. B_6 0.0035g, Vit. B_{12} 0.02g, Folic acid 0.001g, Biotin 0.0005g, Vit. C 0.025g, Cholin chloride 0.39g, Zinc bacitracin 0.02g, Methionine 0.2g, Avatec (Lasolocid) 0.09g, Manganese 0.1g, Iron 0.05g, Zinc 0.04g, Copper 0.002g, Iodine 0.00153g, Cobalt 0.000225g, Selenium 0.0001g.

After flushing, all the does were placed on the 18% CP diet through pregnancy and lactation. All does were fed 100g concentrate feed daily during flushing. After flushing, all does were fed *ad* libitum during pregnancy and lactation. Water was supplied daily. Does were housed individually in metal cages and weighed at onset of flushing, mating, end of flushing and at kindling. Litter sizes and weights were monitored at birth and at weekly intervals up to six weeks of age. The study lasted four months (January to April). Data collected was subjected to analysis of variance test and least significant difference method (SAS, 1987).

RESULTS AND DISCUSSION

Analysis of variance results obtained, indicated non-significant effect ($P>0.05$) of protein flushing on all parameters measured except kit mortality. This agrees with the report of (4) that variations in nutrient intake had very minor or no effect on ovulation rate in the rabbit. Does fed 18% CP diet had the largest litter size at parturition while does fed 24% diet had larger litter size alive at birth, 21 and 42 days compared with the other treatments (Table 2).

Table 2. Effect of protein flushing on litter size of nulliparous does

	Crude Protein (%)				
Parameter	18	20	22	24	SEM
Litter size at parturition	6.33	4.66	4.25	5.40	0.91
Litter size alive at birth	6.16	4.50	5.00	6.50	0.94
Litter size at 21 days	5.60	3.66	Nil	6.25	1.34
Litter size at 42 days	5.20	3.33	Nil	6.25	1.47
Cost/kit alive at birth (₦)	27.95	34.03	31.64	27.24	
Cost/kit at 21 days (₦)	69.64	80.34	Nil	62.12	

SEM Standard error of mean

This result agrees with the report of (9) who observed no differences in litter size of New Zealand White does fed diets containing 17.5, 19 or 20.5% CP. The fact that nulliparous does fed 24% CP level had larger litter sizes at weeks one to six postpartum would suggest that flushing with 24% CP might have improved mothering ability of does probably by increasing milk production, significantly higher milk output for does suckling eight kits, as the CP intake increased was reported by (8). Though milk production was not measured in this study, litter size and weight at 21 days have been reported to be a very good evaluation of the does maternal ability as the young depend solely on the dams milk up to that age (4). Does flushed with the 24% CP diet produced cheaper kits at birth and at 21 days postpartum. This is because of their larger litter size which resulted in a reduction in the cost of producing the kits. This increase, though slight would translate into higher savings for farmers in the long run.

Total litter weight at birth was higher for does fed 18% CP diet (Table 3) and decreased with increase in protein level. Kits kindled by does fed 20 and 24% CP diets were heavier ($P>0.05$) than other kits.

The trend for litter weight alive at birth also shows a reduction in weight with increase in protein level except for does fed 24% diet. Does fed the 22% CP diet had kits with low birth weight compared with the other does. Low kit weights at birth with moderate (19%) and high (20.5%) crude protein levels

Table 3. Effect of protein flushing on kit performance of nulliparous does.

Parameter	Crude Protein (%) 18	20	22	24	SEM
Litter birth weight (g)	266.66	218.33	172.50	236.00	39.35
Kit birth weight (g)	42.10	46.78	40.58	45.70	2.46
Litter birth weight alive at birth (g)	258.33	201.66	206.66	282.50	39.55
Kit birth weight alive at birth (g)	41.89	46.53	39.75	43.46	3.24
0-21 days weight gain:					
Litter weight gain	169.33	200.70	Nil	153.93	23.83
Daily kit weight gain (g)	8.06	9.55	-	7.32	1.13
21-42 days weight gain:					
Litter weight gain (g)	385.83	437.08	-	365.25	36.99
Daily kit weight gain (g)	18.37	20.81	-	17.39	1.76
0-42 days weight gain:					
Litter weight gain (g)	553.50	655.55	-	519.18	70.93
Daily kit weight gain (g)	26.35	31.21	-	24.72	3.37

SEM Standard error of mean.

was reported by (9). Kits born to does flushed with 20% CP diet had higher weight gain in the periods 0-21, 21-42 and 0-42 days postpartum. This could be attributed to their lower litter size compared with the other does.

Does fed 18 and 20% CP diets had lower percent still birth (Table 4) compared with 22 and 24% CP diets.

Table 4. Effect of protein flushing on kit mortality of nulliparous does.

Parameter	Crude Protein (%) 18	20	22	24	SEM
Still birth (%)	2.38	5.15	31.25	20.00	13.47
Kit mortality: 0-21 days (%)	25.99^{b}	13.33^{b}	100.00^{a}	2.77^{b}	44.02
21-42 days (%)	5.55	8.33	0.00	0.00	1.96
0-42 days (%)	31.54^{b}	21.66^{b}	100.00^{a}	2.77^{b}	42.58

Means bearing different superscript along rows are significantly different ($P<0.001$).
SEM Standard error of mean.

This result agrees with (9) who reported increase in number of stillbirths as protein level increased from 17.5 to 20.5%. Kit mortality was higher in the period 0-21 days than the period 21-42 days. Does fed the 18% CP diet lost more kits after kindling and there was a non-significant ($P>0.05$) decrease in

the mortality rate with increase in protein level except for does fed 22% CP diet who significantly ($P<0.01$) lost all their kits in the period 0-21 days postpartum. The kits were all lost within one week of birth. This loss could be as a result of their low birth weight compared with that of the other kits. Does flushed with the 24% CP diet had the lowest mortality rate in all the periods monitored. An increase in still birth and mortality rate with lower protein levels than with 18% or higher crude protein levels was reported by (6). It may be concluded from this study, that though flushing does with different crude protein levels did not significantly affect litter size and weight, nulliparous does flushed with 24% CP had slightly larger and heavier litters during lactation and produced cheaper kits than 18, 20 and 22% CP levels.

REFERENCES

1. **Afifi, E.A. and Emera, E.E. (1987.)** Litter size in purebred and crossbreed rabbits. *J. Appl. Rabbit Res.* 10(1): 133-136.
2. **Aherne, F.X. and Kirkwood, R.N. (1985.)** Nutrition and sow prolificacy. *J. Reprod. Fert. Suppl.* 33: 169-183.
3. **Anderson L. L. and Melampey, P.M. (1971.)** Pig Production. DJA Cole Ed. *Butterworths, London.* Pg. 329.
4. **Ferraz, J. S. B., Johnson, R. K. and Eler, J. P. (1991.)** Breed and environmental effects on reproductive traits of Californian and New Zealand White rabbits. *J. Appl. Rabbit Res.* 14: 172-179.
5. **Oldham, C.M. and Lindsay, D.R. (1984.)** The minimum period of intake of lupine grain required by ewes to increase their ovulation rate when grazing dry summer pasture. In: Reproduction in sheep. D.R. Lindsay and *D.T. Pearce, Eds., Australian Academy of Science, Canberra.* Pp. 274-276.
6. **Omole, T. A. (1982.)** The effect of level of dietary protein on growth and reproductive performance in rabbits. *J. Appl. Rabbit Res.* 5: 83-88.
7. **Partridge, G. G. (1989.)** Nutrition of farmed rabbits. Proceedings of the Nutrition Society. 48: 93-101.
8. **Partridge, G. G and Allan, S. J. (1982.)** The effects of different intakes of crude protein on nitrogen utilization in the pregnant and lactating rabbit. Anim. Prod. 35:145-155.
9. **Sanchez, W. K.; Cheeke, P. R. And Patton, N. M. (1985.)** Effect of dietary crude protein level on the reproductive performance and growth of New Zealand White rabbits. Nutr. Abstr. Rev. Series B. 55(11): 675.
10. **SAS. 1987. Institute Inc. (1987.)** SAS/STAST. GUIDE FOR PERSONAL COMPUTERS. Version 6. ed. pp. 697-978.
11. **Smith, J.F. (1988.)** Influence of nutrition on ovulation rate in the ewe. *Aust. J. Bio. Sci.* 41:27-36.

12. **Smith, O.B. and Somade, B. (1994.)** Interactions between nutrition and reproduction in farm animals. In: Animal Reproduction. Proceedings of a regional Seminar held by the Int. Found. Science IFS, Niamey, Niger, Jan., 17-21, 1994. Pp. 7-26.
13. **Teleni, E., Rowe, J.B. and Croker, K.P. (1984.)** Increased ovulation rates in ewes infusion of energy-yielding substrates. *Proc. Nutr. Soc. Aust.* 9:158.