

# HIGH FAT DIETS FOR RABBIT BREEDING DOES HOUSED AT 30°C

FERNANDEZ-CARMONA J., CERVERA C., BLAS E.

Dept. Ciencia Animal, Universidad Politécnica, Apdo 22012, 46071-Valencia, Spain

**Abstract** - Thirty-seven rabbit does were maintained at a constant temperature of 30°C, and fed *ad libitum* on three diets with 11.0, 12.2 and 12.4 kJ digestible energy (DE) g<sup>-1</sup> DM, in which total fat was 2.6 (Diet C, fat from vegetable origin), 11.7 (Diet A, 8.5 % commercial tallow) and 9.9 % DM (Diet V, fat from vegetable origin). Data from 166 parturitions were examined. Litter weights at 21 days were 1.45, 1.72 and 1.66 kg (p<0.001), and at 35 days 3.36, 3.73 and 4.03 kg (p<0.001) for diets C, A and V respectively.

## INTRODUCTION

Addition of fat to the diets of rabbits has been tried with levels lower than 4% at normal ambient temperatures with different results, although a significant increase in energy intake has been found in most works resulting in a higher litter weight at weaning (MAERTENS and DE GROOTE, 1988; PARIGI-BINI and XICCATTO, 1993, BARRETO *et al.*, 1993, CERVERA *et al.*, 1993).

At high ambient temperatures, rabbit's food intake decreases, and the consequent energy restriction severely impairs the reproductive performance. This is probably the main problem for rabbit production in hot countries. Adding fat to diets increases their energy content and SIMPLICIO *et al.* (1991) found a small improvement in the performance of breeding does at high ambient temperatures when 3.5% fat was added to the diet. A high fat (i.e. 10%) diet could give a better response, but there are no references on its short or long term effect on the production parameters of females. In the present work the effect of the inclusion in diets of a relatively high level of fat has been examined in doe rabbits housed at 30°C.

## MATERIAL AND METHODS

### Animals and housing

44 crossbred New Zealand White nulliparous female rabbits were housed in a climatic chamber at a constant temperature of 30°C at about 4 months of age and two weeks before they were presented to the male for the first time. Feed intake, weight of does and weight of litters were recorded at 21 and 35 days of lactation when litters were weaned.

### Diets

The three diets used contained 2.5, 11.7 and 9.9 % of total fat (Diets C, A and V respectively). Diets C and V had only fat from vegetable sources but 8.5 % of tallow was included in Diet A. Digestible energy (DE) values were 11.0, 12.2 and 12.4 kJ/g on a dry matter (DM) basis (Table 1).

**Table 1 : Composition and chemical analysis of diets (g/100g fresh matter basis)**

<i>Ingredient<sup>1</sup></i>	C	A	V
Barley	35	20	20
Soya 44%	12	18	--
Soya full-fat	--	--	24
Lucerne hay	50	50	50
Soya oil	--	--	2.5
Commercial tallow	--	8.5	--
Calcium dihydrogen phosphate	2.3	2.8	2.8
Sodium chloride	0.4	0.4	0.4
Vitamin/mineral supplement <sup>2</sup>	0.2	0.2	0.2
DL-Metionine	0.1	0.1	0.1
<i>Chemical analysis</i>			
Dry matter (DM)	92.2	92.9	92.7
Ash	10.2	10.6	10.6
Ether extract (EE)	2.6	11.7	9.9
Crude fibre (CF)	16.6	16.6	17.0
Crude protein (CP)	18.0	19.0	19.8
Digestible protein (DP)	13.0	14.0	15.1
Gross energy (MJ/Kg)	17.8	19.8	19.4
DM (GE))			
Digestible energy (MJ/Kg DM (DE))	11.0	12.2	12.4
DE/DP (KJ/g)	84.6	87.1	82.1

<sup>1</sup> all diets contain 100 ppm antioxidant and 66 ppm robenidine  
<sup>2</sup> contains (gKg<sup>-1</sup>) : thiamin, 0.25 ; riboflavin, 1.5 ; calcium pantothenate, 5 ; pyridoxine, 0.1 ; nicotinic acid, 12.5 ; vitamin A, 2 ; vitamin D, 0.1 ; vitamin E, 15 ; vitamin K, 0.5 ; vitamin B<sub>12</sub>, 0.006 ; choline chloride, 100 ; MgSO<sub>4</sub>.H<sub>2</sub>O, 7.5 ; ZnO, 30 ; FeSO<sub>4</sub>.7H<sub>2</sub>O, 20 ; CuSO<sub>4</sub>.5H<sub>2</sub>O, 3 ; KI, 0.5 ; CoCl<sub>2</sub>.6H<sub>2</sub>O, 0.2 ; Na<sub>2</sub>SeO<sub>3</sub>, 0.03 ; BHT antioxidant, 0.2.

## Statistical analysis

14 does on Diet C, 11 does on Diet A and 12 does on Diet V with at least one parturition with Diet as the single variable and size of litter as a covariate were considered. Means were compared using the Scheffe test.

## RESULTS AND DISCUSSION

From 166 parturitions a total of 122 weaned litters were obtained, 42 with Diet C, 46 with Diet A and 34 with Diet V. Fat addition did not affect either number of parturitions or reason for discarding the does during the experiment, which was performed over one and a half years. Table 2 shows the main results of performance of does and litters.

**Table 2 : Dry matter intake (g/kg<sup>0.75</sup>) and reproductive performance**

	LSM diets			SE	p. signific.	
	C	A	V		Diet	Covar
<i>22-partum days</i>						
Doe feed intake <sup>1</sup>	35 <sup>a</sup>	30 <sup>b</sup>	29 <sup>b</sup>	0.6	.001	.600
<i>Birth</i>						
Doe weight (kg)	3.4 <sup>a</sup>	3.5 <sup>b</sup>	3.6 <sup>b</sup>	0.02	.04	
No alive	5.7 <sup>a</sup>	7.1 <sup>b</sup>	5.8 <sup>a</sup>	0.26	.05	
Litter weight (g)	320 <sup>a</sup>	370 <sup>b</sup>	340 <sup>ab</sup>	11	.09	
<i>1-21 days lactation</i>						
Mortality <sup>1</sup> (%)	37 <sup>a</sup>	26 <sup>ab</sup>	24 <sup>b</sup>	2.5	.09	.001
Litter weight <sup>2</sup> (kg)	1.45 <sup>a</sup>	1.72 <sup>b</sup>	1.66 <sup>b</sup>	0.02	.001	.001
Doe weight gain <sup>2</sup> (g)	162	194	151	18	.63	.018
Doe feed intake <sup>2</sup>	81 <sup>a</sup>	76 <sup>b</sup>	76 <sup>b</sup>	0.89	.03	.001
<i>22-35 days lactation</i>						
Mortality <sup>2</sup> (%)	15	6	11	2.1	.26	.71
Litter weight <sup>3</sup> (kg)	3.36 <sup>a</sup>	3.73 <sup>b</sup>	4.03 <sup>c</sup>	0.06	.001	.001
Doe weight gain <sup>3</sup> (g)	-97	-44	-49	14	.29	.018
Doe feed intake <sup>3</sup>	84 <sup>a</sup>	80 <sup>ab</sup>	78 <sup>b</sup>	1.09	.05	.001

LSM, Least-square mean ; SE, Standard error of means

Covariate : no of kittens, 1 alive at birth, 2 at 21 days, 3 at 35 days

Values with a row with different superscript differ at P < .05

Figures for mortality were very high, and at the end of lactation only 88 litters with 4 or more rabbits were recorded. Mortality of the litters in the first period of lactation (birth to 21 days) was significantly higher for Diet C. Although mortality is a fact related to the size of litters, litters on Diet A which were larger at birth continued to be the largest at weaning. When size of litter was not considered as a covariate, the difference between diets was even larger, being the number of pups recorded at weaning 3,1, 4.9 and 3.9 for Diets C, A and V.

Weight of litters at birth and liveweight gain throughout lactation were lower for Diet C. During the gestation as well the lactation period dry matter intake of Diet C was higher than the others. Even so does fed on this diet ingested in both periods of lactation less DE than those on Diets A or V determining their better performance (higher viability, size and weight of litters). In the work of SIMPLICIO *et al.* (1991) some differences in food intake were detected between diets, but their results cannot be exactly compared to ours, as they did not use litter size as a covariate in the statistical analysis. It seems that the low dry matter intake at high ambient temperatures should be further slightly restricted by a high energy or fat content of diets although in the work of FERNANDEZ *et al.* (1995) a similar dry matter intake was recorded at 30°C with different net energy diets.

These results as a whole suggest that the inclusion of fat of either animal or vegetable origin is advisable in high temperature conditions and does not adversely affect the long-term performance of the commercial breeding doe.

**Acknowledgements** - Financial support was provided by CICYT (AFG93-08-70-C02-02).

## REFERENCES

- BARRETO G., DE BLAS J.C., 1993. Effect of dietary fibre and fat content on the reproductive performance of rabbit does bred at two remating times during two seasons. *World Rabbit Sci.*, **1(2)**, 77-81.
- CERVERA C., FERNANDEZ CARMONA J., VIUDES P., BLAS E., 1993. Effect of remating interval and diet on the performance of female rabbits and their litters. *Anim. Prod.*, **56**, 399-405.
- FERNANDEZ CARMONA J., CERVERA C., SABATER C., BLAS E., 1995. Effect of diet composition on the production of rabbit breeding does housed in a traditional building and at 30°C. *Anim. Feeding Sci. Technol.*, **52**, 289-297.
- MAERTENS L., DE GROOTE G., 1988. The influence of the dietary energy content on the performance of post-partum breeding does. *Proc. 4th World Rabbit Congress, Budapest. Vol 3*, 42-52
- PARIGI-BINI R., XICCATTO G., 1993. Recherches sur l'interaction entre alimentation, reproduction et lactation chez le lapine, une revue. *World Rabbit Sci.*, **1(4)**, 155-161.
- SIMPLICIO J.B., FERNANDEZ CARMONA J., CERVERA C., BLAS E., 1991. Efecto del pienso sobre la producción de la coneja a una temperatura ambiente alta. *Invest. Agric. Prod. Sanid. Anim.*, **6**, 67-74.

---

**Piensos ricos en grasa para conejas reproductoras alojadas a 30°C** - Se controlaron 37 conejas, alojadas a 30°C de temperatura constante y alimentadas *ad libitum* con tres piensos de 11.0, 12.2 y 12.4 kJ de energía digestible (ED) por g de materia seca siendo la grasa total 2.6, 11.7 y 9.9 % MS (piensos C, A y V). Los pesos medios de las camadas a 21 días fueron 1.45, 1.72 y 1.66 kg ( $P<.001$ ), y a 35 días 3.36, 3.73 y 4.03 ( $P<.001$ ) para los piensos C, A y V respectivamente.

---