EFFECT OF A SPECIFIC FEEDING PROGRAM BASED ON HIGH ENERGY LACTATION AND PREGNANCY DIETS ON RABBIT DOES AND YOUNG RABBITS PERFORMANCES

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ABSTRACT

In order to find an unique nutritional response to does and young rabbits fed at the same time, a specific feeding program including two high energy diets (group B) was compared to a classical program based on an unique moderate energy diet (group A) during 3 cycles. Group B is composed by lactation feed given from 2 days before parturition up to 21 days after and by pregnancy-weaning feed given from 22 days after parturition up to 2 days before next one, while group A is composed by one control feed. The use of high energy diets shows some positive effects: does weight and young rabbits weight at 22 days old during cycle 2 and 3 are increased for group B (4637g for does in group A vs. 4711g in group B; 358g for young rabbits in group A vs. 379g in group B). There is less mortality of young rabbits between birth and weaning in group B (13.2% in group A vs. 11% in group B). The use of such energetic program leads to higher number of weaned rabbits per artificial insemination: 7.31 for group B vs. 6.99 in group A.

Key words: energy, feeding program, does, suckling rabbits.

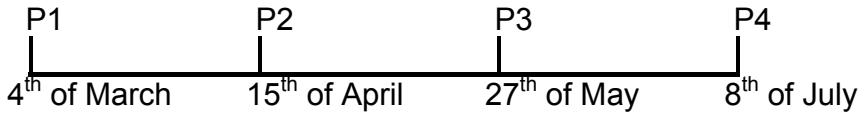
INTRODUCTION

Nutritional requirements of does and young rabbits are quite different. With the current rabbit farming, it is difficult to separate two different types of feeding, especially during the period from the 21 days old to the weaning of the young rabbit. Since 1996, the year when digestive consequences with enterocolite appeared in France, most of the feeding programs were practised to prevent from these disorders with giving earlier specific young animals feeds at 21 days old. Such feeds are characterised by low energy and high fiber levels and have got surely negative effect for the females. For this reason, two different diets were introduced in trial group. They are both formulated on high levels of energy but the source of energy is different, in order to answer to nutritional requirements of does and young rabbits reared together.

MATERIAL AND METHODS

Animals

Two groups of females were designed to measure the effect of a specific feeding program based on high energy diets in comparison with a classical one, during 3 cycles from 4th of March 2002 to 8th of July 2002 as shown below. This trial was made with 232 females (Hyplus line) with the same percentage of nulliparous, primiparous and multiparous does in each group.



P= parturition

Experimental diets and treatments

The pelleted feeds (3.25 mm diameter) were given *ad libitum*. The energy level is quite similar in the two feeds concerned by group B, but is mainly obtained by starch in the lactation diet and by crude fat in the pregnancy one. The characteristics of the 3 feeds are reminded in Table 1.

Table 1: Calculated characteristics of the experimental diets.

Feed	***CONT***	***LACT***	***PREG***
DE INRA (kcal/kg)	2440	2570	2530
Fat (%)	4.2	5.2	5.7
Starch (%)	14.0	17.5	13.0
Crude protein (%)	17.2	17.2	16.5
Crude fiber (%)	16.5	15.0	17.0

Feeding program (Table 2)

Group A: during all cycle, control feed was given (*CONT*)

Group B: from 2 days before parturition up to 21 days after, lactation feed was given (*LACT*)
from 22 days after parturition up to 2 days before next one, pregnancy-weaning feed was given (*PREG*)

Table 2: Feeding program.

Group	**A**	**B**
2 days before parturition up to 21 days after	*CONT*	*LACT*
From 22 days after parturition up to 2 days before next one		*PREG*

Recordings and analyses

Dietary crude protein and crude fiber were analysed in order to valid each batch of feed manufactured. Parturition rate, total newborn, weight at 22 days after parturition, mortality replacement of does was also recorded. In the case of the litters, the mortality at birth and during lactation, and the weight at 2, 22 days and at weaning was controlled.

Statistical treatment
The analyses were performed with SPSS. Parturition and mortality rates were analysed with the chi-square's method; while total newborn and weight of does and young rabbits have been subjected to the Student test (cycle by cycle).

RESULTS AND DISCUSSION

The analysed crude protein was in accordance with the expected values. The difference for dietary crude fibre level between calculated and analysed was -1.0 point for one sample of pregnancy feed.

The main results of the present work are presented in Table 4.

Parturition rate and weight of does at 22 days after parturition
Parturition rate was measured on P2, P3 and P4. There was not significant difference between the two groups on any cycle. Nevertheless, parturition rate seems more irregular in control group A (13.3 points difference between the maximum and minimum rate). The average value for all the cycles is 83.5% for group A versus 84.3% for group B.

On first cycle, does weight at 22 days was similar in group A and B. But on cycle 2 and 3, does from the test group B maintain their weight at 22 days, while does from control group are 70g lighter, without any significant difference. In this test, the body composition has not been measured but we can thought as LEBAS and FORTUN-LAMOTHE (1996) found that with the same weight in two different ways of feeding, the adipose tissues are higher for high energy (from starch or fat) feeding than for moderate energy feeding. XICCATO (1996) also exposed that fat usually leads to an increase in the digestibility of the other nutritional components in the diet and induces an increase in the overall energy intake, with positive effect on the does body conditions. Many results show that there was no effect of energy level on fertility rate and on weight of does (MAERTENS, 1988; LEBAS and FORTUN-LAMOTHE, 1996; PAPP *et al.*, 2000). Results of different experiments seem to indicate that under non-intensive reproductive rhythm (mating 10-14 days post-partum) fat inclusion has no influence on the conception rate of does (FERNANDEZ-CARMONA *et al*, 2000).

Total newborn
There was not any significant effect on average prolificacy for the 3 cycles but the values were always higher for group B. The average number of newborn on the 3 cycles is 11.16 for group A versus 11.85 for group B. This represents 0.7 rabbit more on trial group B. In the same way, MAERTENS and DE GROOTE (1988) showed a negative effect on prolificacy with low energy feeding.

Table 4. Effect of a specific feeding program based on high energy lactation and pregnancy diets on rabbit does and young rabbits performances.

	P1			P2			P3			P4		
Group	**A**	**B**		**A**	**B**		**A**	**B**		**A**	**B**	
Parturition rate (%)	X	X		88.3	87.9	NS	75.0	82.3	NS	86.8	82.2	NS
number of does	X	X		137	141		139	139		115	120	
Total newborn	X	X		11.3±3.0	11.9±2.9	NS	11.4±3.2	12.1±2.6	*	10.8±3.2	11.5± 3.4	NS
Weight of does at 22d after parturition (kg)	4.70±0.41	4.70±0.41	NS	4.64±0.48	4713±0.47	NS	4.64±0.40	4.71±0.40	NS	X	X	
Number of does	137	140		117	123		114	119				
Mortility at birth (%)	5.4a	7.3b	*	7.5a	9.4b	*	9.5b	7.6a	*	7.1	9.0	NS
Number of litters	119	119		121	124		93	107		99	97	
Mortality from 2d to weaning (%)	7.7a	10.5b	**	16.9b	10.7a	**	15.5b	12.1a	**	X	X	
Weight of rabbits (g)												
2 days old	75.6	75.6	NS	72.5	72.4	NS	68.3a	72.1b	**	72.6	72.7	NS
number of litters	116	116		116	120		93	104				
22 days old	387.3	395.4	NS	359.7a	378.3b	**	356.2a	378.9b	**	X	X	
number of litters	115	115		115	119		92	104				
Weaning[1]	935.4	929.7	NS	651.0a	672.3b	*	869.3	885.0	NS	X	X	
number of litters	115	112		115	119		92	104				

X: not measured, * = p<0.10 ** = p<0.05

[1]Weaning: 35 (P1 and P3) and 31 (P2) days old.

Mortality at birth
Mortality at birth was significantly lower (2 points) for control group A on cycles 1 and 2, and significantly higher (2 points) on cycle 3. This means no general tendency for this criterion. Mean value of mortality at birth on the 3 cycles was slightly higher for group B. This result reduce the possible positive effect obtained by group B on the total newborn, so that it remains no significant difference on total young rabbits born alive, even if average number was 10.27 in group A versus 10.83 in group B.

Birth-weaning mortality and weight at 2, 22 days and at weaning.
Average mortality rate between birth and weaning was significantly higher in group A than in group B: 13.2% versus 11.0% ($p<0.007$), and consequently a greater number of rabbits weaned per artificial insemination (AI) were observed for group B: 7.31 vs 6.99 in group A.

Average weight at 2 days of age was not significantly different between the two groups. At 22 days, in cycle 2 and in cycle 3, there is a significant difference in favour of group B: 15.7g more per rabbit at this age ($p<0.04$). There is no difference on weight at weaning between the two groups (average for group A: 824g and for group B: 826.7g). MAERTENS and DE GROOTE (1988) show the same tendency: higher litter weight at 21 days with high level of energy.

As FERNANDEZ-CARMONA *et al.* (2000) described in the review concerning the use of fat in rabbit diets, most of the studies reviewed found a small or a large improvement in the survival index of pups during lactation. The positive effect of dietary fat on the pup survival index seems to be mainly related to greater milk energy resources during the first days of lactation. And if we calculate the milk production according to FORTUN-LAMOTHE and SABATER (2003) which is related with the litter weight at 21 days, the milk production is higher for group B than for group A. Because there was no difference on weight at weaning between the two groups, we can suppose that litters on a control diet were able to compensate for lower milk energy ingestion with a higher intake of pelleted feed, resulting in similar litter growth rates at that stage (FERNANDEZ-CARMONA *et al.,* 2000).

CONCLUSION

The results confirm the positive effects of the high energetic program in terms of maintain of weight of does during the 3 cycles of the trial; less mortality between birth and weaning; a number of young rabbits weaned per artificial insemination significantly higher.

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