

EFFECTS OF DIETARY ENERGY CONTENT ON REPRODUCTIVE PERFORMANCE OF LOCAL RABBIT DOES

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ABSTRACT

Thirteen rabbit does of local population were used to study the effect of dietary energy content during reproduction on reproductive performance at the second parturition. Three experimental groups were constituted by ten does that received different diets (T, A and B) during reproduction (first and second gestation and lactation). Diets differed in their digestible energy (DE) content (2300, 2450 and 2600 kcal DE for diets T, A and B, respectively) were supplied *ad libitum* between parturition and weaning.

The use of high energy diets shows positive effects in does weight at 3rd week post partum and at weaning (3221g for does in group B vs. 2859g for does in group T at weaning) with weight gain mating-weaning does higher in group B (199.5g for does in group B vs 56.1g for does in group A vs - 94.4g for does in group T). Feed intake a day is lower in group B (234.9g for does in group B vs. 245.4g for does in group A vs.262.5g for does in group T). There is less mortality at birth for litters in group B. (4.9% for does in group B vs. 16.6 for does in group A vs. 25.3% for does in group T) and there is more birth weaning-mortality for litters in group T.

Key words: Rabbit doe, diet, energy, reproductive performance

INTRODUCTION

Studies conducted by the Technical Institute of Animal husbandry from 1991 and in different universities let assume real possibilities of development of rabbit husbandry (Berchiche *et al.*, 1997; Berchiche *et al.*, 1996; ITELV, 1997-2005). In order to rationalize the animal husbandry of the local rabbit in Algeria, several research works were accomplished to know better zootechnics potentialities of this animal.

Research relating to the nutritional requirements of reproductive does advanced a lot during last years (Pascual *et al.*, 2003). In this domain, researches showed the very well brought up needs in digestible energy ED of rabbit does during reproduction (Parigi-Bini, Xiccato, 1993). Rabbit does are frequently lactating and gestating at the same time, these two functions are very costly in terms of energy and feed intake become the limiting factor in order to obtain enough nutrients, consequently a negative balance of energy occurs specially during lactation, that could affect body condition and reproductive performance of does. It has concurrent between lactation and pregnancy (Partridge *et al.*, 1986; Parigi Bini and Xiccato, 1998; Fernandez-Carmona *et al.*, 2000; Pascual *et al.*, 2000; Xiccato *et al.*, 2004; Xiccato, 1996).

The knowledge of the nutritional requirements of the local breeds of doe rabbits, during the periods of reproduction, raised in the Algerian conditions of animal husbandry, is needed to optimize the use of feed.

Therefore, the aim of the present work was to study the effect of the use of different dietary energy content of diets on reproductive performance of rabbit does and their litters.

MATERIALS AND METHODS

Animals and experimental design

The livestock is composed of females of local breeds from different litters, characterized by a diversification of the color of the dress, format and weight. Age of does is between 4.5 and 5.5 months.

Thirty does of this local population were individually weighed and subsequently were kept in individual cages made of galvanized wire. The remaining rabbits were divided into three homogenous groups of 10 animals each, and assigned to one of the 3 experimental groups (T, A and B), following different feeding program during first and second cycles of reproduction.

Rabbits were subjected to the same management and of animal husbandry conditions (temperature, hygrometry, treatments).

Mating was performed at 10 days post partum for all does and weaning of litters at 28 days.

The live weight of does and feed intake is controlled at mating, parturition, and weekly during lactation and at weaning (4weeks).

The traits recorded in litters were: live litter size and weight at birth and at weaning, mortality at birth and birth weaning-mortality.

Distribution of the experimental feed started 7 days before the first mating for adaptation, until second weaning. The weekly feed intake of every animal is recorded (weighed weekly of the distributed and refused quantity of feed).

In this paper, only the results of second litters were taken in consideration because there were not significant differences in the first litter. Therefore, it was not taken in consideration. On other breeds, lower reproductive performance (size and weight of the litter, milk production) is observed in primiparous females compared with nulliparous ones (Fortun Lamothe, 1998; Pascual et al., 1998).

Experimental diets

Three experimental pelleted diets increasing in their digestible energy content were used in this trial, which ingredients and chemical composition are summarized in Table 1. All groups received diets *ad libitum* from parturition until weaning of second litters.

Table 1: Nutritional characteristics estimated of the experimental diets

	Diet T	Diet A	Diet B
<i>Ingredients (%)</i> :			
Maize, 9% CP	-	12.4	32.0
Alfalfa meal, 17% CP	35.4	39.7	43.2
Barley	20.6	18.6	7.0
Soybean meal, 44% CP	8.0	11.0	13.0
Wheat bran	32.5	15.0	2.0
Limestone	1.0	0.5	0.2
Dicalcium phosphate	1.5	1.8	1.6
Minerals and vitamins premix ¹	1.0	1.0	1.0
<i>Calculated chemical composition</i>			
Digestible energy (kcal/kg)	2300	2450	2600
Crude fiber (%)	14	14	13.87
Crude fiber indigestible (%)	11.72	11.84	11.86
Crude protein (%)	15.14	15.17	15
Methionine-cystine (%)	0.51	0.50	0.49
Lysine (%)	0.71	0.73	0.73
Calcium (%)	1.48	1.42	1.32
Total phosphorus (%)	0.8	0.75	0.61

¹Premix provided : vitamin B₆, 100 mg;acide folique :200mg, vitamin D₁ : 200mg ; biotin :4mg ; choline clorure :18mg ; Co :40 mg ; ; Fe : 4000 mg ; Cu: 1000 mg ; Mn, 2000 mg; I, 80 mg; Zn, 6000 mg; Se, 8 mg; Mg,26000mg; S, 6800mg; methionine,8000mg; lysine,30000mg.

Statistical analysis

Different results are represented by means and standard error (SE is calculated from SEM to distance expression: $SE = SEM / n^{0.5}$; n being the size of the sample). These results subjected to are variance analysis with one factor (ANOVA 1) to determined the effect of the energy content diet on different considered parameters. The chosen threshold of signification is 5% ($p < 0.05$). Statistical analysis was performed with the aid of Statview program (Abacus concepts, 1996). All data were treated by PLSD Fisher test.

RESULTS AND DISCUSSION

Table 2 shows the results obtained with each assayed diet to rabbits does. No significant differences between three diets were detected in live weight of does at mating, parturition and at 2 weeks post partum. On the other hand, the use of a high energy diet induces a significantly higher live weight of rabbits does at 3rd week of lactation and at weaning.

Table 2: Effect of diet during reproduction on performance of rabbit does (mean \pm error standard; n=10)

	DE content of diets (Kcal/kg)			Prob.
	2300	2450	2600	
Rabbits does, no.	10	10	10	
Live weight at mating (g)	2954 \pm 117	2889 \pm 107	2951 \pm 83	NS
Live weight at parturition (g)	2756 \pm 77	2802 \pm 71	2931 \pm 80	NS
Live weight during lactation				
1 st week (g)	2821 \pm 62	2871 \pm 109	3092 \pm 103	NS
2 nd week (g)	2861 \pm 62	2939 \pm 116	3141 \pm 113	NS
3 rd week (g)	2855 \pm 63 ^a	2892 \pm 107 ^a	3164 \pm 98 ^b	<0.05
Live weight at weaning (g)	2859 \pm 78 ^a	2945 \pm 96 ^a	3221 \pm 93 ^b	<0.05
Weight gain mating-weaning (g)	-68.5 \pm 91.3 ^a	88.0 \pm 76.8 ^{ac}	199.5 \pm 84.0 ^{bc}	<0.05
Feed intake 1 st week (g)	1345 \pm 44	1387 \pm 83	1241 \pm 77	NS
Feed intake 2 nd week (g)	1766 \pm 104	1675 \pm 79	1600 \pm 188	NS
Feed intake 3 rd week (g)	1987 \pm 78	1821 \pm 77	1740 \pm 47	<0.05
Feed intake 4 th week (g)	2250 \pm 76 ^a	1987 \pm 60 ^b	1997 \pm 50 ^b	<0.05

a,b,c, Means with different letters on the same row differ significantly ($P < 0.05$); NS = not significant (PLSD Fischer test).

This variation of the weight of female agreed with the variation of the feed intake. Doe rabbits fed the high energy diet, ingested less quantity of feed, what gives a total feed intake of does for the T diet, between parturition and weaning superior that A and B diet. These results confirm bibliography (Fortun Lamothe, Lebas, 1994, Jarrin *et al.*, 1994, Maertens *et al.*, 1988, Fernández-Carmona J., Pascual J.J., Cervera C., 2000 and Pascual *et al.*, 2000). Results show us that the females who use the diet T lose more weight than the females ingesting the diet A or B ($p < 0.05$).

Table 3: Effect of feeding program during reproduction on performance of second litters of rabbit does (mean \pm error standard; n=10)

	DE content of diets (Kcal/kg)			Prob.
	2300	2450	2600	
Second litters, no.	10	10	10	
Alive litter size at birth	5.78 \pm 1.04	7.00 \pm 0.59	6.70 \pm 0.66	NS
Alive litter weight at birth (g)	312.2 \pm 54.2	362.8 \pm 30.5	366.0 \pm 29.8	NS
Birth mortality (%)	25.3 \pm 8.7 ^a	16.6 \pm 6.9 ^{ac}	4.9 \pm 2.9 ^{bc}	<0.05
Alive litter size at weaning	3.89 \pm 0.86	4.11 \pm 0.74	5.50 \pm 0.54	NS
Alive litter weight at weaning (g)	1723 \pm 354	1671 \pm 310	2435 \pm 223	NS
Birth weaning-mortality (%)	26.8 \pm 8.8 ^{ab}	41.9 \pm 8.8 ^a	16.7 \pm 3.8 ^b	<0.05

a,b,c, Means with different letters on the same row differ significantly ($P < 0.05$); NS = Not significant (PLSD Fischer test).

For litters, in this work, there is not significant effect on weight litter size at birth and at weaning (Table 3), this result coincides with that of Montessuy *et al.*, (2005), but the incidence of mortality at birth and at birth-weaning mortality are very weak for the B group. These results are similar to those by the same author (2004).

The females having received the T diet had a mortality rate at birth significantly increase those having accepted the B diet (25.3 % vs. 4.9 %). According to Parigi Bini and Xiccato (1993), the reproductive performances of does lactating and gestating at the same time are negatively appointed by the energy deficit with a decrease of the viability of young rabbits at birth.

CONCLUSION

This results show that an increase of digestible energy in diet allows to ameliorate some performance of local rabbit does. Results confirm the effect of the energy content diet on the weight gain of the local does between mating and weaning, in spite of a reduction of feed intake by the 3rd post partum week until weaning. The increase of the energy content in diet does improve the performances of litter (weight at birth and at weaning). On the contrary, its reduction increased the rate of incidence of mortality at birth and birth-weaning mortality.

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