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CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

DIGESTION OF MILK BY THE YOUNG RABBIT: FIRST RESULTS.

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Abstract: Este estudo tem como objetivo determinar a digestibilidade do leite de laparos, levando em consideração a acúmulação do conteúdo digestivo e a excreção de urina. Foram utilizadas 19 ninhadas de nove laparos de 21 a 25 dias cada uma: 12 ninhadas foram sobmetidas ao aleitamento restringido sem acesso ao comedouro da coelha (grupo CS) e 7 ninhadas com aleitamento a vontade (grupo controle). A digestibilidade fecal do leite foi medida entre 21 e 25 dias de idade, para as ninhadas CS alojadas em gaiolas de digestibilidade a partir dos 15 dias de idade. Entre 21 e 25 dias, o incremento médio do conteúdo digestivo foi de 77% o que corresponde a +1,73g de materia seca (MS)/laparo (foi considerado não digerido). Nenhuma excreção fecal foi recuperada entre 21 e 25 dias. A partir dos dados, a digestibilidade corrigida da matéria seca do leite foi de 78%. A excreção media diaria de urina foi de 1,2 g de MS / laparo. Portanto, o coeficiente corrigido de retenção de MS do leite foi de 63,4%. A quantidade de nitrogênio excretada na urina foi baixa (0,06 g/dia/laparo), resultando em um coeficiente de retenção de nitrogênio de 82%.

Keywords: digestion, methodology, milk, young rabbit

Introduction

Before weaning, the digestive capacity of the young rabbit, essential to determine the nutritional requirements and to further prevent digestive diseases, was poorly studied. Some studies look at the digestion before weaning when the young rabbit consume milk and solid pelleted feed (Gallois *et al.*, 2008). Only, the study of Parigi-

Bini *et al.* (1991) assessed the digestion for suckling rabbit; and they estimated, by comparative slaughter technique and multiple regression method, that the milk dry matter was totally digested. Besides, around weaning the digestive tract is sharply developing, and Gallois et al. (2008) found a 72% increase in digesta content between 21 and 28 d of age (+38.2g) for suckling rabbits also consuming solid feed. This increment in digesta content must be taken into account in the digestibility calculation. We thus aimed to determine the milk digestion, for young rabbit exclusively milk-fed, with a procedure to correct the digestibility coefficient by measuring the increment in digesta content during the digestibility period (21-25d old).

Material and methods

This study used 19 litters of nine rabbits each (Nzw X Cal). At 17d after birth, the litters were divided into two groups. Seven litters were assigned to the control group (C) and housed in the doe cage (free nursing and access to solid feed). Twelve litters were assigned to the "controlled suckling" group (CS), and housed in a separate metabolism cage without access to solid feed. The cages were equipped to collect the feces and urine. From 21 to 25d old (digestibility period), each morning, milk intake was measured by weighing the doe before and after milking. Then, potential hard feces excretion was checked, and the urine were quantitatively collected in a beaker. Milk was sampled from 3 does of the control group at the 18th day of lactation.

The measure the increment in digestive content, one kit of each litter of the CS group was sacrificed at 21d of age and at 25d. The mean variation in DCG between 25 and 21d was considered as an excreta to calculate the corrected digestibility coefficient of the milk. Since, we did not detected any fecal excretion between 21 and 25d, the formula to calculate the milk dry matter digestibility is : (DMim-DCG) /DMim, with DMim corresponding to the dry matter intake from milk only. The following chemical analyses were performed on milk, digesta content and urine according to ISO methods and considering the recommendations of the European Group on Rabbit

Nutrition (EGRAN, 2001): dry matter (DM), Nitrogen, crude fat. Data of live weight for litter and doe, and data of digestive segment weight of kits were compared for age effect, according to a mono-factorial variance analysis.

Results and discussion

In the control group, the live weight of the litters ranged within the classical values observed for this rabbit line (table 1). They were similar to that of CS group at trial starting (mean =240g / kit at 15d old), but were 10% heavier at 21d and 18% heavier at 25d (P<0.01). The growth rate was 33% higher for the control group during the 21-25d period (P<0.01), and was expected, since kits can access the solid feed in the feeder of their mother.

Table 1 : Live weight and growth of the young rabbits, from 15 to 25 d old, and according to the suckling procedure.

Group	CS	Control		
	Controlled Suckling	Free suckling	rVC, %*	Pr>F
Live weight, g / kit				
15 d old	238	243	9.1	NS
21 d old	296	325	9.1	0.057
25 d old	370	436	8.9	<0.01
Weight gain, g / d				
15-21 d old	9.8	13.6	27.4	0.024
21-25 d old	18.4	27.7	28.7	<0.01
15-25 d old	13.2	19.3	14.6	<0.001

* : rVC: residual variation coefficient, calculated as (root mean square error)/mean, and expressed in %.

At 21d old the whole fresh content of the gut (11,0 g) corresponded to 3.7% of the live weight, and 5.3% at 25d old (19,5 g). Accordingly between 21 and 25d, the

whole digesta content rose by 77% (+8.5 g), although the rabbits were fed only with milk. The total dry content of the gut averaged 2.1 g per kit at 21d old and reached 3.8g at 25d. Thus, the mean increase for the dry content of the gut (DCGi) from 21 to 25d old (g DM / kit) was 1.73g, and was considered as non digested (as feces).

The chemical composition of the milk was as classically reported (Maertens et al., 2006) with a dry matter level of 260 g/kg, a ash content of 85 g/kg, a nitrogen concentration of 66.2 g N/kg DM corresponding to 422 g/kg DM of crude protein (using a conversion coefficient of 6.38), and a crude fat content of 424 g/kg DM. The daily milk intake averaged 7.9 g DM / kit, table 2. This ranged within the value reported in the literature for European commercial lines of doe (Maertens et al., 2006; Savietto et al., 2014). From the dry matter milk intake and increment in digesta content we calculated that the corrected digestibility of the milk reached 78% (table 2), with a minimum value of 72.1% and a maximum at 82.5%.

Table 2 : Milk intake and digestion[$].

Period 21 to 25d old	Mean*	VC, %	Min	Max
Milk intake, g DM / d / kit	7.9	12.8	6.2	9.9
Urine excretion, g DM / d / kit	1.2	11	1.0	1.4
DM digestibility, corrected for DCGi[µ], %	78.4	2.6	72.1	82.5
DM retention, corrected for DCGi[µ], %	63.4	3.5	59.5	69.6
Nitrogen intake from the milk, g / d/ kit*	0.53	10.4	0.49	0.65
Nitrogen excretion from urine, g / d / kit*	0.06	33.5	0.04	0.10
Corrected digestibility of nitrogen*, %	94.1	0.6	93.5	95.2
Nitrogen retention coefficient, %	87.8	5.5	79.2	93.0
Corrected nitrogen retention coefficient, % *	81.9	5.5	72.7	88.1

µ: Mean increase for the dry content of the gut (DCGi) from 21 to 25d old (g DM/kit)= 1.73g; * Mean calculated on 9 litters of 8 kits (group CS) ; $: no faecal excretion was detected for the 9 litters between 21 and 25d.

In contrast, for young rabbits (between 21 and 26d old) fed milk and solid feed, Parigi-Bini et al. (1991) estimated (multiple regression) that milk was totally digested

(100.2%) while the solid feed was digested to 64.4%. The DM urine excretion averaged 1.2 g DM/d/kit, and the corrected DM retention coefficient of the milk was 63.4%. Since the quantity of nitrogen excreted in urine was low (0.06 g/ d/ kits), the corrected nitrogen digestibility of the milk reached 94%. The corrected nitrogen retention coefficient for milk was much lower (82%) and the nitrogen retained (corrected) reached 44 g/d/kit. In comparison, Parigi-Bini et al. (1991) calculated higher coefficients, with a nitrogen digestion of 98.6%, and a nitrogen retention of 94%. We calculated that the content in metabolisable protein for the milk was 90 g/kg (fresh) with a variation coefficient of 7%.

Conclusion

Our study presented original results about milk digestion by the 3 weeks old rabbit. Initially recognized as fully digested, we found that the milk dry matter digestion reached only 78% and dry matter retention was 63%, after correction for digesta increment. However, the milk nitrogen retention was higher (82%%) corresponding to a metabolisable protein concentration of 90g/kg.

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