

EVALUATION OF MILK PRODUCTION OF AN ALGERIAN LOCAL RABBIT POPULATION RAISED IN THE TIZI-OUZOU AREA (KABYLIA)

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ABSTRACT

In order to characterise rabbits does of a Kabylia local population raised in Algeria, a study of their milk production was realised in the experimental rabbitry of the Tizi-Ouzou University. Milk production of does was measured every day during the 21 days following 299 parturitions. It was estimated by weighing each litter before and after the single daily suckling (10 - 15 min between the 2 weighing operations). The various calculated parameters were the quantity of milk produced per day, per week and the total quantity produced in 21 days, as well as the intake of milk by young rabbits. The analysis concerned the effects of the number of successive litters (4 classes : 1 to 4-and-more) and of the average number of young rabbits suckled per litter (7 classes: from 2-3 kits to more-than-8). During the 21 days of controlled lactation, the average litter size was 5.6 ± 2.3 . The rabbit does of the Kabylia local population produced on average 2180 ± 719 g in 21 days, that is 104g of milk/day. The milk intake of young rabbits increased from 12.6 g/day and /kit during the 1st week, up to 27.2 g/day during the 3rd week of lactation. The number of young per litter influenced in a highly significant way the does' milk production: 62.8 g/d for 2 to 3 young per litter, up to in 127-131 g/day for more than 6 young. Nevertheless, milk production available per kit and per day decreased linearly with kit's number in the litter for each of the 3 weeks considered. On the other hand the average milk production expressed as quantity available per kit and per day was not significantly affected by the parturition's number : 20-21 g /kit & /day on average for the 0-21 day period.

Key words : rabbit, Algeria, milk production, local population.

INTRODUCTION

Whatever the type of animal taken in consideration, characterisation of a local population must take in account all the different aspects involved in the average performance achievement: growth parameters, fertility, litter size at parturition, average numeric productivity of these animals per time unit, etc... Ability of females to produce milk is one of the main factors involved in after-birth growth rate of young (BASELGA *et al.*, 1982) and in determination of litter size at weaning.

The present study was a continuation of the work started some years ago for characterisation of the Kabilian local rabbit population (ZERROUKI *et al.*, 2001; 2002). The main objective of this study was the determination of the evolution of milk production during the 3 weeks following parturition, and of the effects of litter size and parturition order on milk production.

MATERIAL AND METHODS

This study was conducted in the experimental rabbitry of Tizi-Ouzou University (100 km east from Algiers) between November 1998 and July 2002. Rabbit does used in this study were issued from male and female of the local rabbit population collected near Tizi-Ouzou (Kabylia region) during 1997 and managed in a closed population with one generation per year. The 299 lactations used in the study were obtained from 116 does, corresponding to 5 generations: 20 to 32 does gave usable data for each generation.

General management

Housing capacity of the rabbitry was 46 does reared at the same time, in individual all wire mesh cages placed on one single level. All rabbits of 1st and 2nd generation received *ad libitum* the same commercial pelleted diet: 16.6% crude protein and 12.3% crude fibre. Water was always available from automatic drinkers. Rabbits of the 3rd, 4th and 5th generation received in the same conditions an other pelleted diet formulated in the laboratory and containing: crude protein 17.8% and crude fibre 14.4%. Lighting duration was natural for the 2 first generations and controlled at 16h/24h for the other generations (3rd to 5th). Females were presented to a male not earlier than 10 days after parturition, and then daily until effective mating. A nest box was placed in the cage 3-4 days before the expected day of parturition and maintained during all the 21 days of control following parturition. Litters were weighted and litter size determined immediately after birth and then every day.

After parturition and controls, does have access to the nest box only once a day in the morning during 10-15 minutes. Milk production was estimated as litter's weight increase between the 2 weight determinations made immediately before and after the daily suckling. Weaning age was 28 days.

Statistical analysis

Recorded data were analysed according to the factorial experimental design with the following 3 main effects: number of parturitions (4 classes: 1 to 4-and-more), average number of young rabbits suckled per litter (7 classes: from 2-3 young rabbits to more-than-8.0) and number of generation (5 classes).

All 2 x 2 interactions were included in the statistical model of analysis (GLM procedure proposed by SAS, 1988). When pertinent, correlations were calculated with the Excel 7.0 Microsoft® software. The generation, although not shown, was comprised in the model.

RESULTS AND DISCUSSION

The effects of the "generation" factor is not presented here because it includes too many non separable effects: true generation effect, year of observation (climatic variations), and management variations concerning the type of feeding or the rhythm of lighting. For this reason the apparent effect of the "generation" factor is impossible to interpret and more, impossible to reproduce. Nevertheless its inclusion in the statistical model was of great interest since it reduced the residual variance and makes easier the interpretation of the other controlled factors. None of the interactions were significant. Thus only the main effects *i.e.* parturition number and average number of suckled kits are presented thereafter.

Does milk production

The production obtained in 21 days was 2180 g, corresponding to an average daily production of 104 g/day. Milk production increased with weeks of lactation: 471 g the 1st week, 768 during the second and 940 g during the 3rd lactation week (table 1). The daily production increased continuously during the 21 days of observation from 42 g on day 1, up to 147 g on day 21 (figure 1). This form of evolution is identical to that classically described for the rabbit doe milk production during the first 3 weeks (LEBAS, 2000).

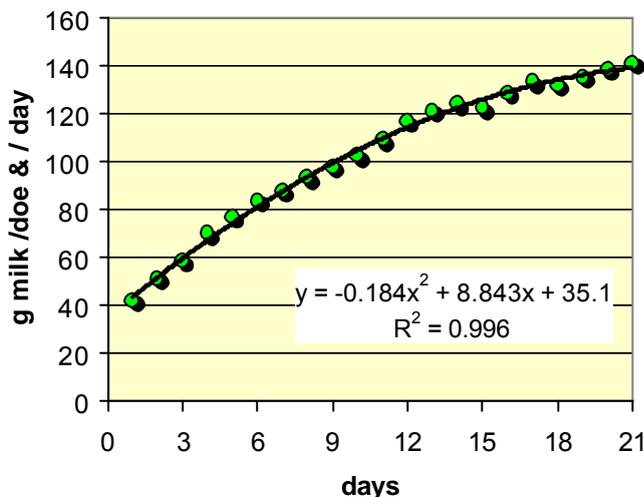


Figure 1 : Evolution of the daily milk production

The total milk production obtained in 21 days with does of this local Kabyle population was a little bit higher than that described by KHALIL (1998) in Egypt for the Baladi red (2150 g) and the Baladi black (2180 g). It was just lower than the 2640 g described by the same author for the Giza white, but clearly lower than the 3567 g observed by MOHAMED and SZENDRŐ (1992) for litters of 6 kits in a Californian line selected in Hungary. This relatively low milk production can be related to the relatively small adult weight (3.0 kg) of this local population ZERROUKI *et al.*, 2001) and partly to the hot

climate which reduces feed intake and milk production as a consequence (ACHOUR *et al.*, 2002).

Table 1. Average milk production observed during the suckling period with Kabylean rabbit does.

	N° obs	Mean	Standard deviation
Total milk production (g)			
- week 1	299	471	186
- week 2	299	768	264
- week 3	299	940	320
<i>Production in 21 days</i>	299	2180	719
Daily milk intake of kits (g/day/kits)			
- week 1	299	12.6	4.4
- week 2	299	21.8	7.4
- week 3	299	27.2	9.8
<i>Average for the 21 days</i>	299	20.5	6.6
Number of suckled young (kits/litter)			
- week 1	299	5.79	2.33
- week 2	299	5.52	2.31
- week 3	299	5.49	2.32
<i>Average for the 21 days</i>	299	5.60	2.90

Effect of the number of suckled young

Milk production increased with number of suckled kits (table 2) as it is generally observed in the rabbit (LEBAS, 2000). Nevertheless, it must be underlined that all the milk production capacity of does was operated by a litter of 7 kits. An increase of litter size above 7 is not able to stimulate a correlative milk production increase. During the 1st week milk production numerically increased up to 8 kits per litter, but during the 2 last weeks of the observation period, maximum milk production was clearly obtained with litters of 7 young (figure 2).

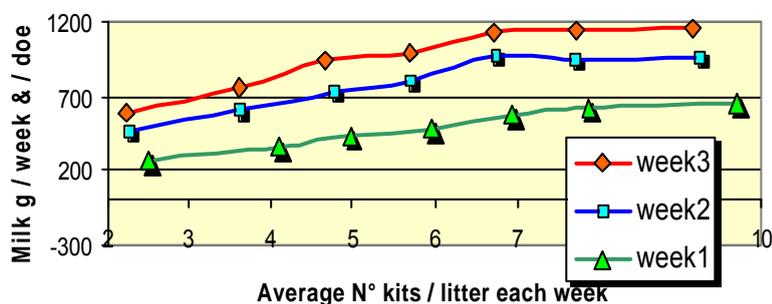


Figure 2. Weekly milk production of females, according to litter size

It must be pointed out that with the above mentioned selected Californian does, MOHAMED and SZENDRÖ (1992) observed a 1-21 days milk production increase up to the maximum litter size observed (10 kits/litter). The same observation was previously published for the 1-28 days milk production of an other line of selected Californian does, up to the maximum studied of 11 kits per litter (LEBAS, 1987). Thus, this limited ability to increase total milk production when litter size is higher than 7 should be considered as one of the characteristics of this local Kabyle population.

Table 2. Effect of the average number of suckled kits on milk production and kits milk intake. (means ± mean standard error)

	Classes of average number of kits per litter							Prob. Effect of litter size
	[2-3]	[3-4]	[4-5]	[5-6]	[6-7]	[7-8]	[8 &+]	
<i>Number of litters observed</i>	58	34	39	45	49	40	34	
Average number of kits / litter	2.33a ±0.09	3.77b ±0.06	4.80c ±0.06	5.80d ±0.04	6.80e ±0.05	7.78f ±0.06	9.36g ±0.14	P<0.00 1
Doe's milk production in 21 days (g)	1319 a ±64	1725 b ±66	2105c ±80	2276c ±71	2667d ±73	2689d ±79	2758d ±95	P<0.00 1
Daily milk production of doe (g)	62.8a ± 3.0	82.1b ± 3.2	100.2c ± 3.8	108.4c ± 3.4	127.0d ± 3.5	128.0d ± 3.8	131.3d ± 4.5	P<0.00 1
Daily milk intake of young (g / day & /kit)	27.9a ±1.0	22.7b ±0.9	21.2b ±0.8	18.9c ±0.6	18.8c ±0.5	16.6d ±0.5	14.2e ±0.5	P<0.00 1

a...e on the same line data with different letters are significantly different at P = 0.05

Despite the doe's milk production increase with litter size (from litters of 2-3, to litters of 7 kits), the quantity of milk available for each young decrease quite linearly with litter size increase (table 2). This highly significant decrease was observed for each of the 3 weeks of observation (figure 3), and it could be noticed that the regression slope increases with the week of lactation.

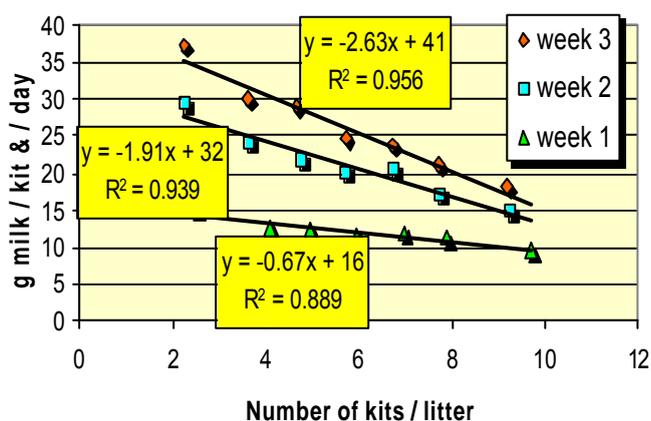


Figure 3. Evolution of kit's daily milk intake with litter size increase

In their work, MOHAMED and SZENDRÖ (1992) observed no variation of milk production with litter size during the first week, but the studied litter range was only 6 to 10 youngs.

Effect of successive litters

In the conditions of this study, litter size was not significantly affected by order of parturition (table 3). On the contrary, milk production increased with the partition number. Such a variation of milk production with parturition number was previously described e.g. for primiparous does compared with multiparous ones (ABOU ELEZZ *et al*, 1981) and/or as an increase with the parturition number up to 7 by McNITT and LUKEFAHR (1990).

In the present study, the effect was mainly a consequence of the increase of milk production during the first week of lactation (production of old does 30% higher than that of primiparous does). Nevertheless, because of slight numerical differences in litter size with parturition number in favour of multiparous does, the average milk quantity available per kit and per day was not significantly affected by parturition number, despite the total milk production increase. For this reason, an average milk production of 20.5 g per day and per kit between the 1st and 21st day of lactation may be considered as a characteristic of the Kabylean rabbit population under study, whatever the parturition number taken in consideration.

Table 3. Litter size and milk production of Kabylean does in relation with parturition order (means ± mean standard error)

	Parturition order				Prob.
	1	2	3	4 & +	
<i>Number of observations</i>	126	81	58	34	
Average number of kits / litter	5.39	5.60	5.99	5.69	NS
	± 0.19	± 0.25	± 0.34	± 0.43	
Doe's milk production in 21 days (g)	2069 a	2214 ab	2268 ab	2356 b	P<0.05
	± 56	± 77	± 106	± 153	
Daily milk intake of young (g/day/kit)	20.0	21.3	20.3	20.9	NS
	± 0.51	± 0.78	± 1.07	± 0.85	
Doe's milk production (g) during each week					
Week 1	416 a	479 ab	535 bc	548 c	P<0.01
	± 13	± 19	± 28	± 42	
Week 2	732 a	779 ab	789 ab	833 c	P<0.05
	± 21	± 28	± 37	± 56	
Week 3	922	955	944	969	NS
	± 27	± 36	± 45	± 61	

a, b, c : on a line, means with the same letter are not different at P=0.05 ; NS = not significant

CONCLUSION

As a conclusion it can be considered that characteristics of the local Kabylean rabbit population in relation with milk production are :

- an average milk production of 2180g in 21 days, *i.e.* 105g per day

- an increase of milk production with litter size, up to litters of 7 kits, *i.e.* a maximum milk production of about 2700 g in 21 days.
- a milk production capacity independent of parturition order when expressed in quantity available per kit and per day.

Nevertheless the sensitivity of milk production of these does to climatic or nutritional conditions, the consequences on milk composition were not estimated in the present study and may be the objective of future experiments conducted to better describe the milk production ability of this local Kabylia population of rabbits.

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