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

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Study of the milk production capacity of an Algerian local rabbit population raised in the Tizi-Ouzou area (Kabylia).

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Abstract:

In order to characterise rabbits of a Kabylian 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 207 parturitions. It was estimated by weighing each litter before and after the single daily suckling (15 - 20 mn between the 2 weighing operations). The various controlled parameters were the quantity of milk produced per day, per week and the total quantity produced in 21 days, as well as the consumption 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-8.0). During the 21 days of controlled lactation, the average litter size was 5.8 ± 2.2. The rabbit does of the Kabylian local population produced on average 107g of milk / day , that is 2249g in 21 days. The milk intake of young rabbits increased from 12.3 g/day and /animal during the 1st week, up to 26.9 g/day during the 3rd week of lactation. The number of young per litter influenced in a highly significant way the does' milk production : 64 g/d for 2 to 3 young per litter, up to in 125-130 g/day for more than 6 young. On the other hand the milk production was independent from the parturition's number

Keywords : 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, prolificity at parturition, average numeric productivity of theses 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). 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 parity on milk production.

MATERIAL AND METHODS

This study was done in the experimental rabbitry of Tizi-Ouzou University (100 km east from Algiers) between November 1998 and July 2001. Rabbit does used in this study were issued from male and female rabbits of the local population collected near of Tizi-Ouzou (Kabylia region) during 1997 and managed in a closed population with one generation per year. The 207 lactations used in the study were obtained from 82 does, corresponding to 3 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 generation received in the same conditions an other pelleted diet formulated in the laboratory and containing : crude protein 20.2% and crude fibre 13.5%. Lighting duration was natural for the 2 first generations and controlled at 16h/24h for the 3rd one. 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 at birth and then every day.

After parturition and controls, does had 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 parturition (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 (3 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.

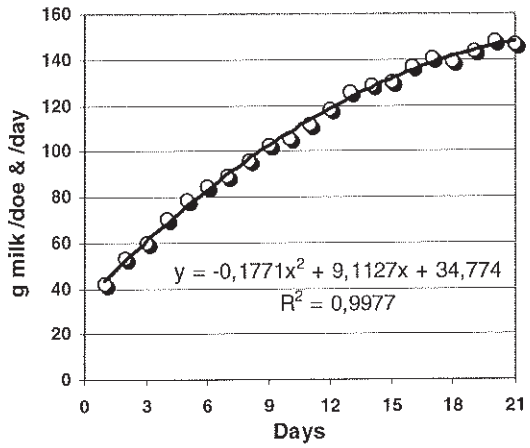
RESULTS AND DISCUSSION

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 total milk production obtained in 21 days was 2249 g , corresponding to an average daily production of 107 g/day. Milk production increased with weeks of lactation : 476 g the 1st week, 787 during the second and 985 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, 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 Kabylian population is a little bit higher than that described by Khalil (1988) in Egypt for the Baladi red (2150) 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 Szendrö (1992) for litters of 6 kits in a Californian line selected in Hungary. This relatively reduced milk production can be related to the relatively small adult weight (3.0 kg) of this local population (Zerrouki *et al.*, 1999) and partly to the hot climate which reduces feed intake and milk production as a consequence.

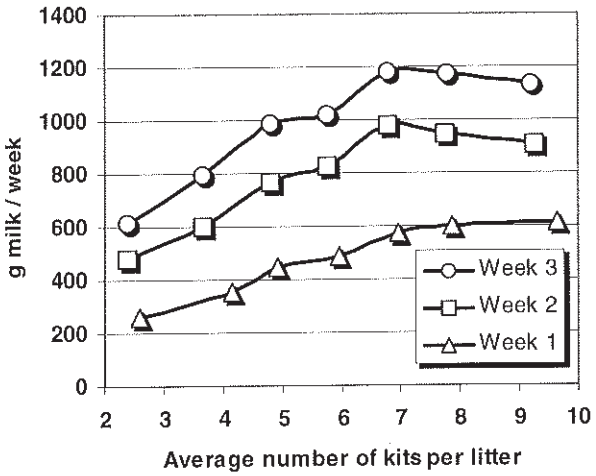
Table 1 : Average data observed during the suckling period with Kabilian rabbit does

	N	Mean	Standard deviation
Total milk production (g)			
- week 1	207	476.1	176.4
- week 2	207	787.7	253.2
- week 3	207	985.2	296.7
Production in 21 days	207	2249.0	683.9
Suckled young milk intake (g/day & /kit)			
- week 1	207	12.29	4.33
- week 2	207	21.34	6.91
- week 3	207	26.88	8.94
Average for the 21 days	207	20.17	6.08
Number of suckled young (kits/litter)			
- week 1	207	5.98	2.25
- week 2	207	5.74	2.25
- week 3	207	5.74	2.24
Average for the 21 days	207	5.81	2.22

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

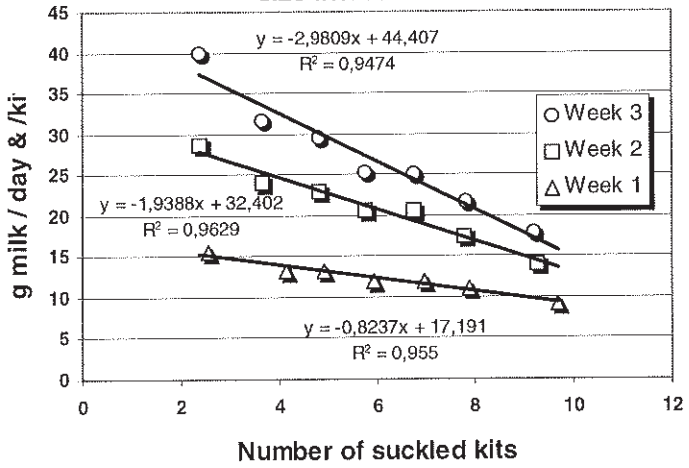
maximum studied of 11 kits per litter (Lebas, 1987). Thus, this limited ability to increase total milk production when litter size is higher than 7 should be considered as one of the characteristics of this local Kabilian population.

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							Proba. Effect of litter size
	2-3	3.1-4	4.1-5	5.1-6	6.1-7	7.1-8	8.1 &+	
Number of litters observed	*33*	*25*	*26*	*34*	*33*	*30*	*26*	
Average number of kits / litter	**2.46a** ±0.10	**3.81b** ±0.06	**4.85c** ±0.06	**5.83d** ±0.05	**6.84e** ±0.05	**7.82f** ±0.06	**9.37g** ±0.15	P<0.001
Doe's milk production in 21 days	**1353a** ±0.79	**1749b** ±0.77	**2199c** ±0.93	**2329c** ±0.87	**2733d** ±0.90	**2722d** ±0.82	**2653d** ±0.95	P<0.001
Daily milk production of doe (g)	**64.4a** ± 3.8	**83.3b** ± 3.7	**104.7c** ± 4.4	**110.9c** ± 4.2	**130.2d** ± 4.3	**129.6d** ± 3.9	**126.3d** ± 4.5	P<0.001
Daily milk intake of young (g/day/kit)	**27.1a** ±1.3	**22.9b** ±1.1	**21.9b** ±1.0	**19.2c** ±0.7	**19.2c** ±0.6	**16.7d** ±0.5	**13.7e** ±0.5	P<0.001
a, b, c, 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 time of lactation.

Figure 3 : Evolution of kits 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 young.

Effect of parity

In the conditions of this study, litter size and milk production were not affected by order of parturitions (table 3). It must be pointed out that primiparous does have obtained a productivity non significantly different from that observed with multiparous does. Since the size of the suckled litter was independent of parity, and because the milk production was not affected, the average milk production of 20,2 g per kit and per day (litter of 5.8 kits) may also be considered as one of the characteristics of this Kabilian population of rabbits. As a consequence it can be suggested that a selection effort made to increase milk productivity of this population or the study of the effect of any factor on milk production, could take in

account litters whatever the doe's parity. The relatively high milk production of primparous does compared with multiparous ones could be considered as an advantage of this population since most of the authors mentioned a reduced milk production in primiparous does (Abo Elezz et al, 1981) and/or an increase with the parity number up to 7 (McNitt and Lukefahr, 1990)

Table 3 : Litter size and milk production of Kabylian does in relation with parity (means ± mean standard error; none of the differences were significant at P = 0.05)

	Parity			
	1	**2**	**3**	**4 + 5**
Number of observations	*83*	*56*	*43*	*25*
Average number of kits / litter	**5.57** ± 0.24	**5.90** ± 0.29	**6.32** ± 0.37	**5.57** ± 0.42
Doe's milk production in 21 days (g)	**2143** ± 65	**2318** ± 91	**2336** ± 121	**2298** ± 152
Daily milk production of does (g/day)	**102.0** ± 3.1	**110.4** ± 4.3	**111.2** ± 5.8	**109.4** ± 7.3
Daily milk intake of young (g/day/kit)	**20.16** ± 0.64	**20.74** ± 0.92	**19.4** ± 0.92	**20.71** ± 1.07

Conclusion

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

- an average milk production of 2250 g in 21 days, *i.e.* 107 g per day
- an increase of milk production with litter size, until litters of 7 kits, *i.e.* a maximum milk production of 2730 g in 21 days.
- a milk production capacity independent of parity.

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 Kabilian population of rabbits.

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