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Effect of integration of *Avena sativa* L. and *Trifolium alexandrinum* L. in the ration on milk production performance of rabbit Does

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Abstract

The ration inclusion of green roughages avena sativa l. and Trifolium alexandrinum l. has been studied at forty "New Zealander x Californian" rabbit does in 3rd and 4th lactation, distributed on five groups, received five diets: four experimental diets (A_1, A_2, B_1 and B_2) were based on the distribution at will of green roughages complemented daily with 120 or 180g of concentrate. Control group received only concentrate. The B_2 diets compound of 180 g concentrate and Trifolium alexandrinum L. *ad libitum.* Milk production was not significantly different that given by the control group (P>0.05). Milk production estimated from rabbits (PLL) and those estimated from mothers (PLM) start with low production levels respectively 83.9 and 134.1 g/day peak production (PLL) and (PLM) is reached between the 15th and 20th days of lactation.

Keywords: Lactation Curves, Breeding Rabbit, Green Roughages

Introduction

Rabbits, monogastric herbivore, have a digestive system adapted to the degradation of fibers (Gidenne, 2001). Rabbits promote good green fodder, food and native on the market that can replace concentrate feed. Forage maintains or even improves the performance of animals (Hedhly et al., 2010). Thus, the durability of rabbit breeding and integration of domestic rabbits involves the mastery of power which provides for the incorporation of greens strategically placed in the die at the end of rabbit food security value to local agricultural resources available on the farm.

Materials and Methods

The study evaluated a cross forty adult females (Californian x New Zealander) in five homogeneous lots including 4 experimental groups (green + concentrate) and a control group (concentrate only) depending on the age of females (in 3rd and 4th lactation) and the physiological stage. Each female was followed over three reproductive cycles. The animals were kept in cages each equipped with a front feeder for concentrate with a mesh side feeder to the green, a nest box and a drinker. Cages were installed in a closed building with vaulted roof. Ventilation was the dynamic type and packaging of the atmosphere was done through a pad-cooling. The projection was the natural mother visits the nest only once a day, very early in the morning (the nest box is closed between 8 and 18hour) to ensure the feeding of rabbits and to the different weights of mothers rabbits and rabbits before and after feeding.

After the adjustment period, the green berseem and oats were distributed at will throughout the test. Five batches of females were randomly assigned to five diets with a supply of water at will. CC: 100% concentrate, A1: 120 g concentrate + ad libitum green oats, A2: 180 g concentrate + *ad libitum* green oats, B1: 120 g concentrate + green of berseem at will and B2: 180g concentrate + green of berseem at will. The chemical composition of different forages depending on the vegetative stage and the cutting order consecutively for oats and berseem is presented in Table 1.

The checks are made daily milk production during the first 21 days of each lactation. Milk production (PLM) was estimated from the difference in weight of mothers before and after feeding and milk production (PLL) was estimated from the difference in weight of young rabbits before and after feeding, according to methods described by Lebas (1968).

Statistical analysais and curve fitting of lactation

To plot the lactation curves based schemes studied, we used the mathematical model Beta function (BF) as proposed by Casado et al. (2004):

$$L = k \times (D / 30)^{a} \times (1 - (D / 30))^{b}$$

Table 1: Chemical composition and energy value of oat and green Berseem and concentrate

Green roughages		DM (%)	DE (kcal/kg)	CF (% DM)	OM (% DM)	MM (% DM)	CP (% DM)	Ca (g/kg DM)	P (g/kg DM)
Oat	Tillering	28	4233	19.7	91.4	8.6	11.3	8.5	2.3
	Elongating	30	4275	21.4	92.6	7.4	11.2	6.4	2.2
	Beginning-épaison	33	4350	28.5	91.5	8,5	9.8	5.5	2.1
Berseem	2ème coupe	28	4097	15.3	84.3	15.7	29.3	19.7	2.99
	3ème coupe	30	4176	16.6	85.7	14.3	30.9	20.4	1.86
	4ème coupe	32	4086	21.7	86.2	13.8	30.3	18.6	1.51
Concentrate		92	2450	16.5	89	11	15.5	10	6

MS: dry matter, ED:Digestible energy, CF: Crude fiber, MO: organique matter, MM: miniral matter, CP: crude protein, Ca: calcium and P: phosphore et Cc : concentré.

L: Milk production, k: correction factor level lactation curve,
D: Days of lactation, a and b coefficients of adjustment of the trend curve
k, a and b are calculated by the SAS PROC NLIN (non-linear regression procedure).

Our choice has focused on the mathematical model BF. In fact, according to Casado et al. (2004), this model has the best biological explanation in rabbits with a coefficient of determination (R^2) of 0,986.

Results and discussion

Milk production (PLL) is characterized by an initial production of 117.12 g / d and a peak production of 129.03 g / d by day 15 of lactation. Milk production (PLM) is characterized by an initial production of 125.23 g / d and a peak production of 145.04 g / d in 18th day of lactation. Thas, mathematical models for both estimation methods are as follows :

$PLL = 52.2545875*(D/30)^{0.059}*(1-D/30)^{0,079}$

$PLM = 62.4139118*(D/30)^{-0.075}*(1-D/30)^{0,11}$

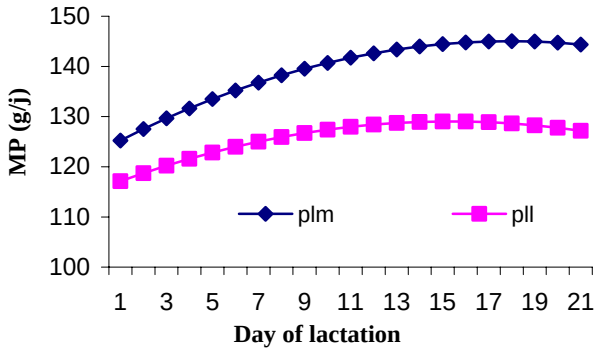

Fig. 1: Courbes lactation average overall rabbits; PLM: Milk production estimated from the difference in weight of mothers before and after feeding; PLL: Milk production estimated from the difference in weight of young rabbits before and after feeding.

The estimate of milk production (PLM) is always more accurate and more (PLL). In fact, according Lebas (1968), the discrepancy can be explained by non-voiding Controllable rabbits (0 to 5 g), for losses due to respiration (2g) and stirring of rabbits.

Milk production (PLL) is characterized by an initial production of 146.27 g / d and a peak production of 167.55 g / d by day 15 of lactation (Figure 2). Milk production (PLM) is characterized by an initial production of 154.95 g / d and a peak production of 187.89 g / d in 18th day of lactation.

Thas, mathematical models for both estimation methods are as follows:

$PLL = 101,7107524*(D/30)^{-0.24}*(1-D/30)^{-0.256}$

$PLM = 108,0087412*(D/30)^{-0.31} * (1-D/30)^{-0.1}$

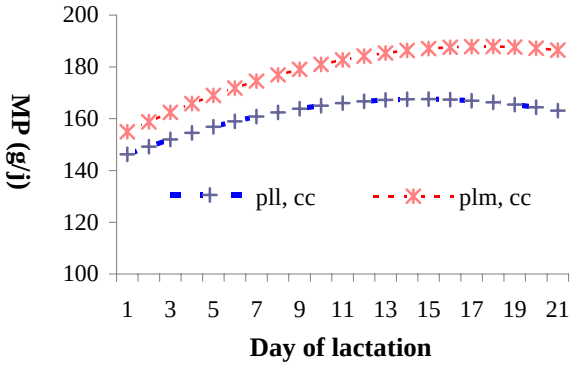

Fig. 2 : Evolution of average lactation curves of the scheme (CC) ; PLM: Milk production estimated from the difference in weight of mothers before and after feeding ; PLL: Milk production estimated from the difference in weight of young rabbits before and after feeding.

Diet A1

Milk production (PLL) is characterized by an initial production of 83.97 g / d and a peak production of 117.83 g / d in 18th day of lactation. Milk production (PLM) is characterized by an initial production of

114.13 g / d and a peak production of 134.1 g / d by day 16 of lactation.

Thas, mathematical models for both estimation methods are as follows :

PLL = 100, 142703*(D/30) $^{1.17}$*(1-D/30) $^{0.1}$

PLM = 75, 05572138*(D/30) $^{0.82}$*(1-D/30) $^{1.85}$

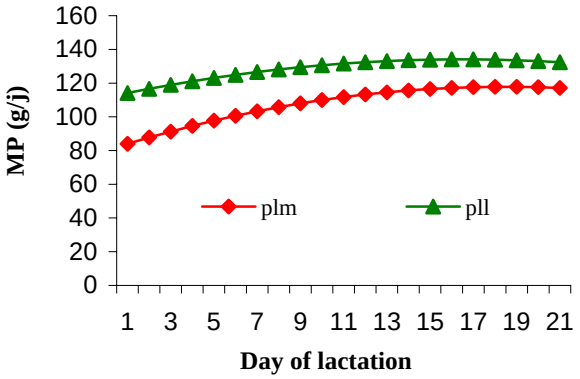

Fig. 3 : Evolution of average lactation curves of the system (A1) ; PLM: Milk production estimated from the difference in weight of mothers before and after feeding ; PLL: Milk production estimated from the difference in weight of young rabbits before and after feeding

Diet A2

Milk production (PLL) is characterized by an initial production of 99.31 g / d and a peak production of 132.98 g / d in 18th day of lactation. Milk production (PLM) is characterized by an initial production of 110.37 g / d and a peak production of 151.63 g / d in 20th day of lactation.

Thas, mathematical models for both estimation methods are as follows:

PLL = 79, 6746941*(D/30) ^{1,3}*(1-D/30) ^{1,28}

PLM = 101, 624187*(D/30) ^{1,218}*(1-D/30) ^{1,22}

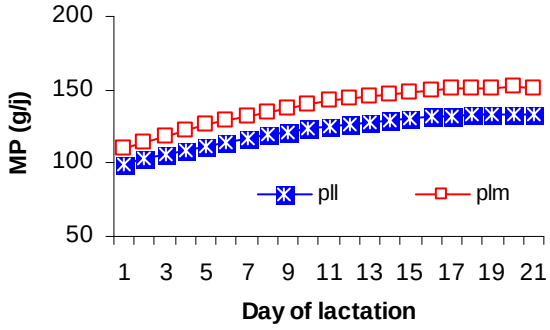

Fig. 4: Average lactation curves of the system (A2); PLM: Milk production estimated from the difference in weight of mothers before and after feeding; PLL: Milk production estimated from the difference in weight of young rabbits before and after feeding.

Diet B1

Milk production (PLL) is characterized by an initial production of 127.18 g / d and a peak production of 152.08 g / d in 18th day of lactation. Milk production (PLM) is characterized by an initial production of 150.36 g / d and a peak production of 164.04 g / d by day 15 of lactation.

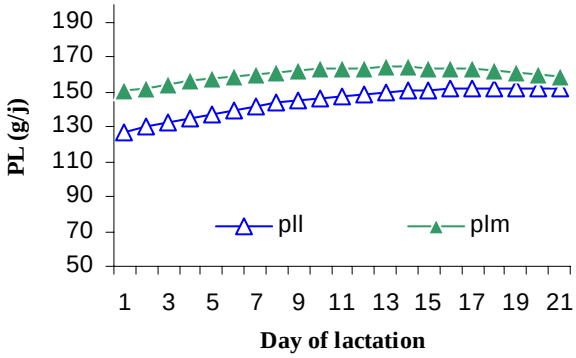

Fig. 5 : Average lactation curves of the system (B1) ; PLM: Milk production estimated from the difference in weight of mothers before and after feeding ; PLL: Milk production estimated from the difference in weight of young rabbits before and after feeding

Thas, mathematical models for both estimation methods are as follows :

PLL = 76, 67469413*(D/30) ^{1,50}* (1-D/30) ^{1,31}

PLM = 78, 14371615*(D/30) ^{1,03}*(1-D/30) ^{1,86}

Diet B2

Milk production (PLL) is characterized by an initial production of 142.4 g / d and a peak production of 165.46 g / d in 17th day of lactation. Milk production (PLM) is characterized by an initial production of 159.59 g / d and a peak production of 177.34 g / d by day 15 of lactation. Thus, mathematical models for both estimation methods are as follows :

PLL = 84, 592662*(D/30) ^{1,54}* (1-D/30) ^{1,25}

PLM= 79, 5999914*(D/30) ^{1,68}*(1-D/30) ^{1,29}

Figures 2, 3, 4, 5 and 6 show that milk yields estimated from rabbits (PLL) are always lower than those estimated from mothers (PLM). The difference between PLL PLM and five diets ranged from 5.5% to 26.4%, which is relatively high compared to values reported by Lebas (1968).

Compared to the results found by Maertens (2006) and Lebas (2003) showing that daily milk production grows from 30 to 50 g the first two days at 200 to 250 g by the end of the 3rd week of lactation, milk yield (PLL) start with low production levels 83.9, 99.31, 127.18, 146.27 and 142.4 g / d respectively for diets A1, A2, B1, B2 and Cc. Milk production (PLM) also start with low production levels 114.13, 110.37, 150.36,

159.59 and 154.95 g/day respectively for the same plans.

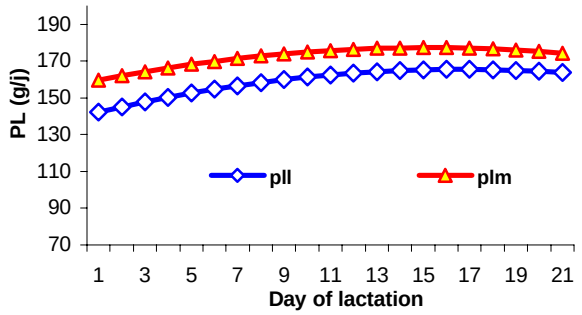

Fig. 6 : Average lactation curves of the system (B2); PLM: Milk production estimated from the difference in weight of mothers before and after feeding ; PLL: Milk production estimated from the difference in weight of young rabbits before and after feeding.

Peak production (PLL) and (PLM) is reached between the 15th and 20th day of lactation, which coincides with the values given by Maertens et al. (2006). The evolution of milk production (PLL) and (PLM) submitted plans to B1 and B2 are better than those subject to the arrangements A1 and A2 (P<0.05) which are rich in fiber and low in protein. The results of the plans (CC) and (B2) are similar (P>0.05), (167, 5 g / d PLL cons 165, 5 g / d) and (187.6 g / d of 177.3 g PLM cons / d). These production levels are still lower than those reported by Maertens et al. (2006) and Lebas (2003). This is explained by the fact that imported animals have been no action so their breeding performance remained weak. Evolution of the average milk production estimated from rabbits (PLL) based diets

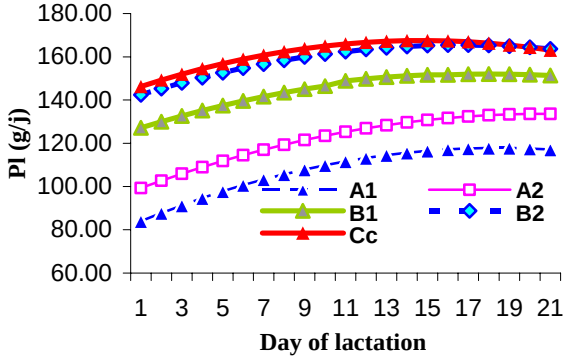

Fig. 7: Lactation curves estimated (PLL) based diets; A1: 120 g concentrate + green oats will, A2: 180 g concentrate + green oats will, B1: 120 g concentrate + green of berseem at will, B2: 180 g concentrate + greenery berseem at will and CC: 100% concentrated.

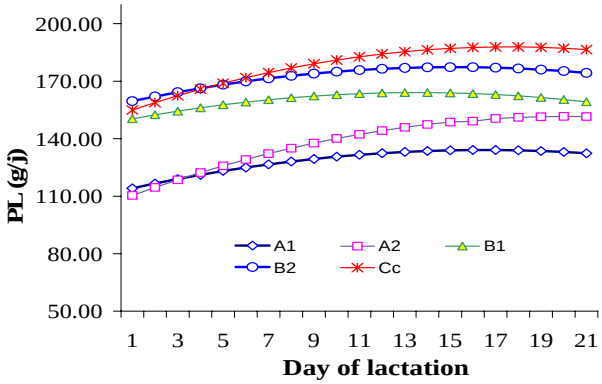

Fig. 8: Lactation curves estimated "PLM" according to plans; A1: 120 g concentrate + green oats will, A2: 180 g concentrate + green oats will, B1: 120 g concentrate + green of berseem at will, B2: 180 g concentrate + greenery berseem at will and CC: 100% concentrated.

According to figures 7 and 8 which illustrate the evolution of milk production estimated from mothers (PLM) and production was estimated from rabbits (PLL) based on different schemes, we can draw the following conclusions: For the regime with concentrate exclusively and berseem at will concentrate avec180g milk yield (PLL and PLM) have recorded the highest levels compared to other diets of oats which allows us to conclude that the adding berseem *ed libitum* to a diet relatively rich in concentrate will improve the level of milk production in females. Schemes are less efficient schemes oatmeal remaining far behind other systems with berseem compounds and concentrates, and with concentrate only because they are relatively poor in nitrogen and high in fiber. Diets richer in nitrogen gave better results than diets rich in fiber. Indeed, lactating females need very high nitrogen materials (18%) and needs relatively low in CB (12%) (Lebas et al., 1996).

Conclusion

Milk production levels for rabbits reared in our hutch are low and vary between 83.9 and 167.54 g / d for milk yield (PLL) and 114.13 and 187.89 g / d for milk yield (PLM). Indeed, these animals have suffered any action of genetic improvement since their importation from outside. For cons, the duration of the rising phase of some of these lactation curves coincides with the values proposed by Maertens et al. (2006). It can be inferred that the best results are saved with control diets with concentrate exclusively and berseem at will over 180 g of concentrate. Levels of milk production are the lowest recorded for the other two diets based on oats with different levels of incorpora-

tion of the concentrate. This clearly demonstrates that a diet rich in energy but low in nitrogen does not improve performance of lactating does.

References

Hedhly, T., Kamoun, M., Miladi, D., Rekik, B., Ouerghi, S., Tayachi, L. and Bergaoui, R. 2010. Impact de l'incorporation du bersim (Trifolium alexandrinum L.) et de l'avoine (Avena sativa L.) dans la ration sur les performances des lapereaux à l'engraissement. *Livestock Research for Rural Develepment*, 22(7).

Gidenne, T. 2001. Besoins en fibres et sécurité digestive du lapin en croissance. *Cuniculture*, 157-8(1):7-9

Casado, C., Piquer, O., Cervera, C. and Pascual, J.J. 2004. A mathematical model for the lactation curve of the rabbit does. Proceedings -8th word rabbit congress- September 7-10, 2004-Puebla, Mexico.

Lebas, F. and Sardi, G. 1968. Mesure quantitative de la production laitière chez la lapine. *Ann zootech*, 17 (2): 169 – 182.

Lebas, F., Coudert, P., De Rochambeau, H. and Thébault, R.G. 1996. Le lapin Elevage et pathologie. P : 227.

Lebas, F. 2003. La biologie du lapin. http://www.cuniculture.info/Docs/Biologie/biologie-ref.htm.

Maertens, L., Lebas, F. and Szendrö, Zs. 2006. Rabbit milk: A review of quality and non-dietary affecting factors, *World Rabbit Science*, 14 (4): 205-230.