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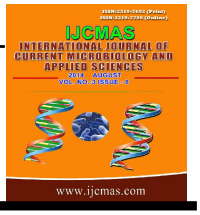

Original Research Article

Effect of different selection to improve the performance of local growth of the Rabbit

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Keywords

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Divergent selection
Lineage
Progress genetic
Growth performance

A B S T R A C T

The application of divergent selection on parental and offspring has improved animal performance of Algerian local growing rabbits. Genetic progress obtained are given in chronological order by 6 weeks, 10 weeks and 13 weeks respectively for the criteria of live weight, feed intake, average daily gain and feed efficiency. The results achieved in line growth are: 29.59 g, 0.41 g / s / d, 3.23 g / d and 0.01 point. - 89.52 g, 3.56 g / s / d, 3.21 g / d and -0.44 point. - 141.76 g, 0.03 g / s / d, 0.88 g / d and -0.42 point. The results are in line prolific; - 62.31 g, 5.76 g / s / d, 1.42 g / d and 0.00 point. - 145.14 g, 7.63 g / s / d, 7.60 g / d and -0.32 point. - 133.78 g - 0.65 g / s / d -0.72 and +0.11. Weight gain affect both the tradition and lineage prolific growth. The latter is selected for litter size and individual weight at weaning, eliminating individual's weight low or very high compared to the average population which induces interesting weight at slaughter. Growth in line, there was an improvement in all the zootechnical parameters related to growth performance.

Introduction

Discipline for the study of animal performances rabbit has had its rise until the sixties, coinciding with the early work of breeding for meat production (De Rochambeau al.1989 , De Rochambeau et al .1994). After 1960, rearing techniques are streamlined and progress is being made (Rougeot Chantry Darmon 2005).

In Algeria, the development of rabbit production was weak and marginalized, and for a long time. Production of rabbit meat came mainly subsistence-oriented family farms, usually maintained by women. This situation prevailed until the eighties when we saw appear a rational area consists of medium units and marketing-oriented productions.

These modern units are populated with selected strains of animals Foreign, whose performance is considered much more interesting than the native population. Decisions were taken and compare performance in two different environments. This attempt to introduce unfortunately failed due to many factors. According Berchiche 1992; ignorance of the animal in the Algerian specific environmental conditions are the cause of this failure.

All scientists converge on the idea of integrating the native population in farms rational. But keep the animal as such by focusing only on the middle component, seems insufficient to meet economic requirements.

Moreover, the study of performance in our native rabbit breeding conditions shows a significant heterogeneity within population. Growth performance show that the animal belongs to the small size, with the presence of dwarf prototypes and some even tend to average Mefti Korteby and al.2010. A very heterogeneous population described.

Between 10 and 11 weeks of age, which coincides with the normative time for slaughter abroad, the native animal has a weight of 1.2 kg to 1.3 kg. Deemed insufficient weight with carcasses not accepted by consumers. Forcing to extend livestock to provide heavier carcasses. The age of slaughter in Algeria is 13 weeks. This extension of the rearing period leads downside risks zootechnical indices.

To achieve improved productivity weight of local rabbit, we propose a divergent selection, it removes unwanted characters, homogenize animal performance, reduce the age at slaughter, improve weight of rabbit type and age to keep topics that may be of interest to other selection criteria.

Materials and Methods

Experiments performed at the hutch for the rabbit population local technical institute farms Ali Baba in Algiers, aims to assess the genetic progress on animal performance growth. The approach is to apply a divergent selection by creating a line and a prolific line growth. The data collected in 2005 and 2006.

Experimental Animal

This is the rabbit population. The herd and set up breeding in 1998 from broodstock from nine regions of Algeria. These animals were classified according to the group from the methods described by De Rochambeau 1990, females remain in the breeding group from which they originate, their brothers are assigned to another group of reproduction.

Animals are carried out in a closed system and rotary intersection described by Matheron and Easel 1977. Rotation began in 1998 and ended in 2005.

Animals of the local population ITELV are characterized by a diversification of the format and color of the hair phenotype and dispersal. Sexual dimorphism is unapparent in the local population. Sexing is done by observation of primary sexual characteristics.

Building and equipment

The hutch has an area of 220m2, the walls of the hutch are hard, the roof is sheet metal ceiling insulated with polystyrene. It is divided into two rooms, one for maternity and other fattening. They are separated by a room service (food weighing and identification of animals and weaned), storage of food and veterinary products.

The fattening room is 72 m2 composed of 144 collective cages types Californians two floors without offset; raised in pits with scraper and low extraction 2200 m2 / h. Cages on the 2nd floor are equipped with tilt floor droppings. The cages are arranged in three parallel rows separated by corridors of service. The rows arranged in two rows on and others. Galvanized metal cages are equipped with automatic waters and trough collective 4 stations with a total capacity of 5kg.

- The building is equipped with pad cooling and 2 extractors with a capacity of 6000 m3 / h (high extraction).

- The nycthemeron is "Light 8/16 Dark," an intensity of 28 lux/m2.

Food

The food is distributed granules of commerce. According to the manufacturer it is composed of dehydrated alfalfa, barley, corn, soy, wheat bran and vitamin mineral supplementation. Animals received only a standard pelleted food type whose percentage composition of raw materials is presented in Table 1.

Experimental method

Based on the 2004 population compartment fat, we chose the stock replacement for 2005 and 2006. This stock will be separated into two lineages, each consisting of 45 females and 5 males.

The selection criterion is based on the results of the correlations between characters (characterization study over a period of seven years of breeding). The two lines and their criteria are:

a- Prolific Line is selected according to:

- the litter size born [LSB $\leq 6 \leq 10$];
- Weaning body weight [400g$\leq$ BWW$\leq$ 550g].

b- Growth line is chosen according to:

- Body weight at weaning [BWW> 550g];
- the litter size [$3 \leq$ LSB$\leq$ 6].

Weaning is practiced in 35 days. The animals are identified numerically by tattoo forceps and transferred to fattening room. They are installed in collective cages. The food is distributed on average 130 g / d. Feed intake is regulated by the animal. The weights of the fasted animals, feed not consumed or distributed are weighed weekly.

Calculation methods

Zootechnical parameters

-Body weight (BW)
It concerns a weekly weighing of animals.
-Average daily gain
ADG (g / d) = (final weight - initial weight) / number of days of measurement.
-Average daily consumption
ADC (g / d) = (-Distributed uneaten) / The number of individuals present.
-Consumption Index
CI = CMQ / GMQ

Genetic parameters

Correlation (r)

Genetic progress (E)

Genetic progress or response to selection is calculated Minvielle, 1990, Good et al. 1991.

$E = P (Gn +1) - P (Gn)$.

Modeling

P_{ij} = μ + Tik + Sik + oik + E.
P_{ij}: Performance of an individual father and mother i j.
μ: Mean performance of the population.
T_{ik}: Average performance of the first individual, at the k^{th} individual.
S_{ik}: Effect season (4 variants).
O_{ik}: Effect parity (7 variants).
E: Effect environment.

Statistical analyzes

The average standard deviations, minimum and maximum values, correlations and comparisons between means by ANOVA test, are processed by the SPSS Statistics software (Statistical Package for the Social Sciences, version 11.5) and SPSS, IBM Statistical Version 19.

Results and Discussion

All results for growth performance post-weaning, following the application of the selection are shown in Table 2. Figure 1 shows a comparison between the post-weaning growths of both strains

Table 3 summarizes the comparative genetic progress criteria in post-weaning growth.
Table 4 shows the correlations between the criteria for post-weaning growth.

Among the criteria selected paternal line quotes the weight at a typical age and average daily gain. All production parameters are significantly better growth in line C and second generation compared to the P line and their average as shown in Table 2. This selection resulted in a certain uniformity performance especially for live weight and average daily gain, where there is a relative decrease in the coefficient of variation compared to the period prior to selection.

In line C, rabbits and de1393g record weight 1999g respectively at 10 weeks and 13 weeks of age compared to 1276g and 1610g indicated by Mefti Korteby et al. 2010, prior to selection. Prolific in line relative weight at 13 weeks of age is much lower than line growth is 1734g. However it is better than indicated before selection is 1610g.

Indices of consumer specified by Mefti Korteby and al.2010, 5.64 and 7.16 respectively at the age of 10 and 13 weeks before selection improved in both lines. Growth traits are classified to medium heritability and therefore selection effort is experienced on performance over generations. In line P, the limiting minimum weight at weaning 400g has improved growth performance. Growth in post-weaning in Figure 1, has the same look for the line P and line C, however, a difference in favor of the latter throughout the fattening period.

Genetic progress of growth performanceTable 3 summarizes the comparative genetic progress criteria in post-weaning growth. Both groups reported positive genetic progress for weight. Group C also records positive genetic progress average daily gain, feed intake and feed efficiency for different age periods and for two successive generations. Recalling that the C line comes very prolific family. P lineage comes from prolific family but which has limited the lower weight at weaning.

Genetic progress weight is 72.24 g, 133.44 g and 179.27 g vs 37.09 g, 68.73 g and 14.23 respectively at 6, 10 and 13 weeks of age, in line C and line P. It also records positive genetic progress for average daily gain, feed intake and feed efficiency for different age periods in line C. The selection of future parents on their high weaning weights is

more effective than the average weaning weight. The first generation of selection, subject to slower growth has been eliminated.

- The weight of a weaned at 5 weeks is strongly correlated with weight at 10 weeks and 13 weeks weight quite agree with Lukefahr Feria and Ruiz 2003, Vostrý et al. 2008, 2008 and Iraqi Mefti korteby al.2010 and a selection early weaning may be as effective as a late selection.

- The slaughter weight was positively and moderately correlated with average daily gain in accordance with the work of De Leon and al.2004 which are r = 0.64, the selection of the weight leads to an improved indirect average daily gain.

Table 1: Elemental composition of the food material

Raw Material	Dehydrated Alfalfa	Mais	Gros son	Soybean	Barley	Mineral Vitamin supplement
%	44	4	21	8	20	3

Figure 1 : Evolution of body weight in fattening line P and line C.

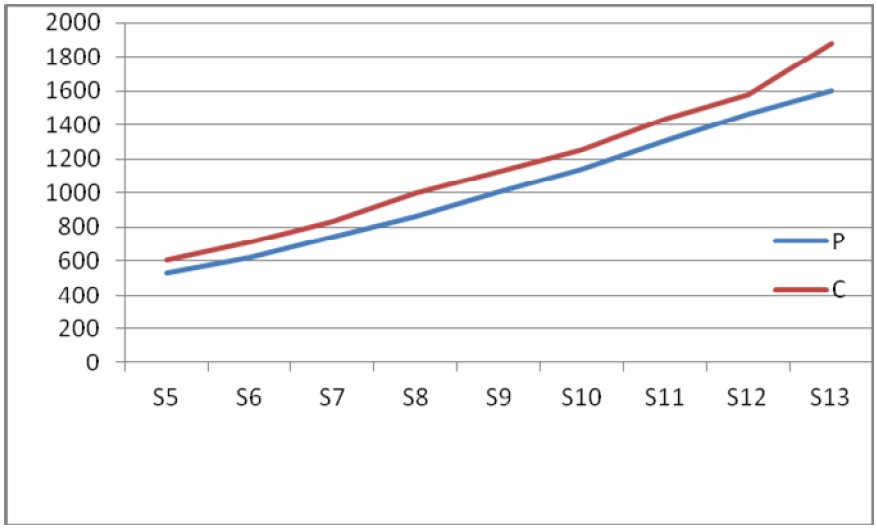

Table.2 Post-weaning growth performance of lines selected for prolificacy and growth

Génération		6 Weeks				10 Weeks				13 Weeks			
		BW (g)	ADC (g/s/j)	ADG (g/j)	IC	BW(g)	ADC (g/s/j)	ADG (g/j)	IC	BW(g)	ADC (g/s/j)	ADG (g/j)	CI
	T	650,64 ±107,30 **16%**ab	65,42 ±12,16 **19% ab**	17,28 ±7,22 **42%** a **c**	3,67 ±1,00 **27%** a	1220,48 ±198,21 **16%** ab	90,01 ±15,23 **17%** c**	20,96 ±7,30 **35%** c*	4,39 ±1,02 **23%** a	1720,25 ±300,28 **17%** c**	115,84 ±20,64 **18%** c**	22,79 ±7,56 **33%** c**	5,15 ±1,23 **24%** c**
G1 2005	P	625,42 ±110,51 **18%** b	59,02 ±13,20 **22% b**	16,59 ±8,07 **59% b***	3,6 ±1,05 **29%** a	1144,07 ±201,26 **18%** b	84,68 ±18,01 **21% b****	19,67 ±7,80 **40%**b**	4,33 ±1,29 **30%** a	1600,7 ±327,46 **20%** b**	111,78 ±21,39 **19%** b**	21,32 ±7,99 **37%** b**	5.25 ±1,34 **26%** b**
	C	711,62 ±127,51 **18% a**	69,37 ±11,31 **16%** a	18,11 ±8,44 **52%** a*	3,86 ±1,09 **28%** a	1251,16 ±208,92 **21%** a	95,85 ±16,15 **17%** a**	22,62 ±8,00 **35%a****	4,42 ±1,23 **28%** a	1881,83 ±314,18 **17%** a**	119,06 ±22,72 **17%** a**	24,02 ±8,91 **37%** a**	4,96 ±1,29 **26%** a**
	T	680,23 ±104,53 **15%** b	65,83 ±9,23 **17%** b	20,51 ±7,01 **34%** b**	3,31 ±1,04 **31% b****	1310 ±201,26 **15%** ab	93,57 ±16,36 **17%** a	24,17 ±7,83 **32%** b**	3,95 ±0,96 **24%** b**	1862,01 ±250,15 **13%** c**	115,87 ±19,11 **16%** a	23,67 ±7,41 **28%** b**	4,73 ±1,01 **44%** a**
G2 2006	P	687,73 ±114,28 **17%** b**	64,78 ±9,48 **15%** c**	18,01 ±7,06 **39%** b	3,6 ±1,20 **33%** c**	1249,21 ±207,55 **17%** b	92,31 ±18,83 **20%** a	23,02 ±8,28 **36%** c**	4,01 ±1,03 **26%** c**	1734,48 ±259,62 **15%** b**	111,13 ±19,14 **17%** b**	20,6 ±7,47 **36%** c**	5,36 ±1,26 **24%** b**
	C	734,88 ±118,95 **16%** a**	68,44 ±9,67 **14%** a**	22,61 ±7,41 **33%** a	3,06 ±1,13 **37%** a**	1393,92 ±212,82 **15%** a	94,06 ±17,78 **19%** a	25,07 ±8,07 **32%** a**	3,75 ±1,02 **27%** a**	1999,52 ±288,06 **14%** a**	118,2 ±20,56 **17%** a**	25,26 ±7,99 **32%** a**	4,74 ±1,19 **25%** a**

BW: Body weight, ADC: average daily consumption, ADG: average daily gain, CI consumption index. G: Generation T: average group C and P. P: prolific line, C: Growth line.
Comparison of values of the same column and the same generation. Values followed by the same letter are statistically comparable. Values followed by different letters are statistically comparable level α = 5%.
**: Significance at 1%. **: Significant at 0.1.*

Table.3 Genetic progress of growth performance post weaning

Groupe de comparaison et année		**6 weeks**				**10 weeks**				**13 weeks**			
		BW.(g)	**ADC (g/s/j)**	**ADG (g/j)**	**CI**	**BW.(g)**	**ADC (g/s/j)**	**ADG (g/j)**	**CI**	**BW.(g)**	**ADC (g/s/j)**	**ADG (g/j)**	**CI**
2006	**TG2/TG1**	**+29,59**	**+0,41**	**+3,23**	**+0,01**	**+89,52**	**+3,56**	**+3,21**	**-0,44**	**+141,76**	**+0,03**	**+0,88**	**-0,42**
	PG2/TG1	+37,09	-0,64	+0,73	+0,30	+68,73	+2,30	+2,06	-0,38	+14,23	-4,71	-2,19	+0,21
	PG2/PG1	**+62,31**	**+5,76**	**+1,42**	**00,00**	**+145,14**	**+7,63**	**+7,63**	**-0,32**	**+133,78**	**-0,65**	**-0,72**	**+0,11**
	CG2/TG1	+72,24	+3,02	+5,23	-0,24	+133,44	+4,05	+4.11	-0,64	+179,27	+2,36	+2,47	-0,41
	CG2/CG1	**+11,26**	**-0,93**	**+4,4**	**-0,80**	**+102,76**	**-1,79**	**+2,45**	**-0,67**	**+17,69**	**-0,86**	**+1,24**	**-0,22**

BW: Body weight; ADC: average daily consumption, ADG: average daily gain, CI consumption index.
T: total, P: prolific line, C:growth line, G: generation /: compared

Table.4 Correlation between growth criterions in post weaning line P and line C

Critères		B.W. 5s	B.W.10s	A.D.G.	A.D.C.	C.I.
B.W.13s	P	+0,72**	+0,68**	+0,46**	+0,26**	-0,24**
	C	+0,65**	+0,88	+0,54**	+0,37**	-0,24**
A.D.G.	P				-0,45**	-0,51**
	C				-0,69**	-0,69**
A.D.C.	P					+0,12**
	C					+0,13

B.W.: Bodyweight, A.D.G.: average daily gain, A.D.C.: average daily consumption, C.I. consumption index. s: week
P: prolific line, C: line growth.
* Correlation is not equipped insignificant.
* Correlation is fitted significant at $P \leq 5\%$.
Correlation is fitted ** significant at $P \leq 1\%$.

-The weight is weakly and negatively correlated with the consumption index.
- The average daily gain was negatively and moderately correlated with the index of consumption, a trend in favor of a selection of individuals with good growth and better conversion. Other authors found that negative correlation but very strong and Moura al.1997, Batteries and al.2004 and Larzul al.2005, and this trend is the result of positive selection.

The local population very diverse and low animal performance responds positively to divergent selection. Positive genetic progress are noted on the growth performance of the two lines and prolific growth. However, the improvement is in line with best growth when individuals reach a weight of 1999g 1610 against before selection, subject to weight ratio comes from small family prolific. Prolific in line weight is improved but lower than the growth line is 1734g. Many families can not give heavy subjects. Not to lose weight in productivity in this type of family, channeling the litter size and weight at weaning.

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