DIFFERENCES IN CARCASS COMPOSITION IN THREE RABBIT LINES SELECTED FOR DIFFERENT TRAITS.

Feki, S.; Gómez, E.; Baselga, M. and Cifre, P.
Dpto. Ciencia Animal. Universidad Politécnica de Valencia. Camino de Vera, 14. 46020 Valencia. Spain.

SUMMARY

An experiment, involving 240 rabbits of three lines was carried out in order to compare the lines on traits such as hot, commercial and reference carcass weight, age at slaughter weight ((16 2000 g), dressing percentage and drip loss percentage. Other studied traits were some carcass lengths and the weight of several organs, joints and fat depots. The experiment was conducted during the four seasons of the year. The rabbits, after weaning, were housed either in individually or in collective cages with 8 animals.

One of the three lines is a specialized sire line selected for postweaning growth rate and the others are dam lines selected for litter size at weaning. The results confirm that the high feed consumption and low degree of maturity at slaughter of the first line account for the major differences found out respect to the dam lines. Recommendations are suggested for using properly the sire line in a crossbreeding scheme of three ways.

INTRODUCTION

In broiler rabbit production, two types of economically important traits are those related with litter size and those concerned with feed efficiency, growth rate and carcass composition. These traits have been objectives of selection in different rabbit lines (Rochambeau *et al.*, 1988; Rochambeau *et al.*, 1989; Rafel *et al.*, 1988; Estany *et al.*, 1992). The most common practice has been to develop dam lines selecting for litter size, and sire lines selecting for post-weaning growth. The expected response in selection of sire lines is to reduce the fattening period needed to reach market weight, to increase gross feed efficiency and to reduce the maturity degree at slaughter time. Therefore carcass composition could be affected by selection on growth rate.

This experiment intends to compare differences in carcass composition, when the rabbits are slaughtered around the market weight, between three lines of rabbits, two selected for litter size at weaning and the other for postweaning growth rate.

MATERIAL AND METHODS

Slaughter data of 240 rabbits pertaining to three lines (line R, selected for post-weaning growth, and lines V and A, selected for litter size) were recorded during four seasons (summer and autumn of 1992, winter and spring of 1993).

The kids were weaned at 28 days of age and fed *ad libitum* with commercial pelleted food, and each one was individually eartagged, sexed and weighed. Four kids from each litter were randomly taken at weaning. Two animals were placed in individual cages, and the other two in collective cages (8 kids per cage). The animals were slaugh p 2 tered at a weight within the interval 1900-2100g.

The recorded traits, expressed and measured as indicated by Blasco *et al.* (1992), were: liveweight before slaughter (LVW); hot carcass weight (HCW); commercial carcass weight (CCW) after a short period of airing (between 45 minutes and three hours) and 24 hours of storing at 4°C; gastrointestinal tract weight (GW) including urinary content; commercial skin weight (CSW) with the distal part of fore legs; reference

carcass weight (RCW) as commercial carcass without liver, kidneys and the set of organs of neck and chest; liver weight (LW); weight of the set make up by lungs, heart, thymus, oesophagus and trachea (LHW); head weight (HW); fore legs weight (FLW); thoracic cage weight (TW); loin weight (LWW); hind legs weight (HLW); scapular fat weight (SFW); perirenal fat weight (PFW); length from the atlas vertebra to the 7th lumbar vertebra (L1); length from the 7th lumbar vertebra to the ischium insertion point (L2); interiliac circumference (CL) of the commercial carcass at the level of the 7th lumbar vertebra (including abdominal wall); dressing percentage (DP) and drip loss percentage (DLP).

The model included line, season and type of housing with interactions. Mean individual liveweigth at slaughter or reference carcass weight were taken into account as covariates depending on the character.

The sex effect was not considered because it has not any effect on carcass traits at market slaughter time (Varewyck and Bouquet, 1982).

RESULTS AND DISCUSSION

The slaughter weights were 2023±8.6 g; 2066±8.5 g and 2033±8.5 g for the lines A, R and V respectively.

A set of traits has been analyzed to a constant live weight of 2040 g . Line and season effects on them are shown in Table I. Line R reached the slaughter weight of comparison around a week earlier than the others. Feki *et al.*(1993) found out daily growth rates for these lines of 35.7 g (line A), 44.9 g (line R) and 37.6 g (line V) for a fattening period of five weeks.

Table I.- Least square means (and standard errors) for lines and seasons of age, hot, commercial and reference carcass weight, comercial skin weight, gastrointestinal tract weight and dressing and drip loss percentages adjusted to a constant liveweight

	LINE			SEASON			
	A	V	R	SUMMER	AUTUMN	WINTER	SPRING
AGE	63^{a}(.40)	62^{a}(.40)	56^{b} (.40)	65^{a}(.51)	61^{b} (.47)	58^{c}(.46)	58^{c}(.46)
HCW	1200^{a}(5.9)	1214^{a}(5.6)	1145^{b} (5.9)	1221^{a}(6.9)	1183^{b} (7.5)	1185^{b}(6.1)	1155^{c}(6.8)
CCW	1170^{a}(5.0)	1183^{b}(4.9)	1112 ^{c}(5.0)	1189^{a}(6.3)	1142^{bc}(5.8)	1156^{b}(5.7)	1131^{c}(5.7)
RCW	950^{a}(5.2)	958^{a}(5.2)	887^{b} (5.3)	969^{a}(6.8)	910^{b} (6.1)	938^{c}(5.9)	910^{b}(6.0)
CSW	287^{a}(2.4)	298^{b}(2.4)	293^{b} (2.4)	294^{a}(3.0)	280^{b} (2.8)	302^{a}(2.8)	295^{a}(2.8)
GW	385^{a}(5.2)	366^{b}(5.2)	434^{c} (5.3)	374^{a}(6.6)	419^{b} (6.2)	382^{a}(6.0)	405^{b}(6.0)
DLP	2.03^{a}(.11)	2.31^{b}(.10)	2.49^{ab}(.10)	2.30^{a}(.11)	2.91^{b} (.13)	2.40^{a}(.11)	1.75^{c}(.12)
DP	58.6^{a}(.23)	59.3^{a}(.26)	56.0^{b} (.27)	59.8^{a}(.29)	57.8^{b} (.36)	57.9^{b}(.28)	56.4^{c}(.32)

^{a,b,c} Means within rows lacking a common superscript differ significantly ($P \leq 0.05$). Comparisons were made within factors.

There were differences between lines in hot carcass weight. The minimum corresponded to line R that was 62 g lighter than the average of the others. Consequently the dressing percentages were 58.6 (line A), 56.0 (line R) and 59.3 (line V), being significant the differences between line R and the other two lines. This result is due, mainly, to the differences observed in the weight of the gastrointestinal tract. The

gastrointestinal tract weights were significantly different between the three lines, being 49 g and 68 g heavier in line R, than in lines A and V. The differences in skin weight were lower, corresponding the minimum to line A, significant respect to lines R and V when the rabbits were fattened collectively, and the maximum to line V when the fattening was in individual cages. The differences in commercial carcass weight were higher than in hot carcass weight because the drip loss percentage reached 2.49 % in line R, significantly different from 2.03 % in line A. Finally, line R had also a reference carcass weight significantly lighter than lines A and V; 67 g less as average. It is remarkable the similarities between lines A and V in hot carcass weight, reference carcass weight and dressing percentage.

Table II shows the line effects on some longitudinal body measures and organ weights at a constant live weight. The length from the atlas vertebra to the 7th lumbar vertebra (L1) was significantly longer (0.5 cm) for line A than for lines R and V, but this measure showed significant line-season interactions. The shortest length from the 7th vertebra to ischium insertion point (L2) occured in line R, 0.35 and 0.29 cm. shorter than lines A and V respectively. Concerning interiliac circumference of the commercial carcass at the level of the 7th lumbar vertebra (CL), the line R was again the line that had the shortest measure, 0.4 cm. less than the other lines, being this effect significant. Another important difference between lines refers to the weight of the liver, being the liver of the line R the heaviest, 4 and 3 g more than in lines A and V, respectively. There were no statistically significant differences in kidneys weight between lines. There were significant but not important differences in the weight of the set make up by thymus, trachea, oesophagus, lung and heart (LHW), corresponding the lowest values to line R, only 1.2 and 1.9 g lighter than in lines A and V. The weight of the head was similar between lines. This result is expected because head is an early developing region (Deltoro and López, 1986).

Table II.- Least square means (and the standard errors) for lines and seasons of the length mesures and organ weight adjusted to a constant liveweight

	LINE			SEASON			
	A	V	R	SUMMER	AUTUMN	WINTER	SPRING
L1	25.8^{a}(.09)	25.4^{b}(.09)	25.2^{b}(.09)	25.2^{a}(.11)	25.3^{a}(11)	25.5^{a}(.10)	25.9^{b}(.10)
L2	8.17^{a}(.05)	8.11^{a}(.05)	7.82^{b}(.05)	7.97^{ab}(.06)	7.90^{b}(.06)	8.15^{c}(.06)	8.12^{ac}(.06)
CL	15.2^{a}(.05)	15.2^{a}(.05)	14.8^{b}(.05)	15.3^{a}(.07)	15.2^{ab}(.06)	15.1^{b}(.06)	14.6^{c}(.06)
LW	79.0^{a}(1.3)	80.0^{a}(1.3)	83.0^{b}(1.3)	74.0^{a}(1.7)	81.9^{b}(1.5)	80.3^{b}(1.5)	86.6^{c}(1.5)
KW	13.3 (.13)	13.6 (.12)	14.0 (.13)	11.7^{a}(.19)	13.8^{b}(.16)	14.7^{c}(.15)	14.2^{b}(.15)
HW	106.3 (.60)	106.3(.60)	105.0(.60)	106.1^{a}(.60)	108.5^{b}(.60)	106.8^{ab}(.60)	102.2^{c}(.60)
LHW	30.2^{a}(.39)	30.9^{a}(.39)	29.0^{b}(.40)	28.0^{a}(.50)	29.0^{a}(.50)	32.4^{b}(.46)	30.6^{c}(.48)

^{a,b,c} Means within rows lacking a common superscript differ significantly ($P \leq 0.05$). Comparisons were made within factors.

The line effects on some joints and components of the reference carcass are showed in Table III. It must be noted that line R was the heaviest in thoracic cage and fore legs, 4.5 g more for the first one and 5.5 g for the second one as average. The situation was inverted refering hind legs, because their weight in line R was 10 and 13 g less than in lines A and V. There were no differences in loin weight between lines, but there was a significant line-type of housing interaction for this trait. When the housing was in collective cages, the heaviest weight corresponded to line R, and the lightest to line A; but in individual housing the

line A was, significantly, the heaviest.

The line R had the fore legs heavier than lines V and A. This fact was more pronounced in collective than in individual housing. There were no differences between lines in scapular fat, but in perirenal fat the line V had the highest content, and line R the lowest with a significant difference of 3.9 g between them. Line A lied in an intermediate position closer to line V than to line R.

The highest gastrointestinal content in line R is explained by its highest daily feed intake (Feki *et al.*, 1993). Selection for growth rate increases adult weight (Masoero, 1982) and currently the adult weight of line R is higher than in lines A and V. Therefore, rabbits of line R had a lower degree of maturity at slaughter. This lower degree of maturity is important to account for differences in joint weight and fat depots. Differences in daily feed intake and degree of maturity are both important to account for line effects on carcass weight and dressing percentage.

Table III.- Least square means (and standard errors) for line and season of the joint weight and fat depots adjusted to a constant reference carcass weight

	LINE			SEASON			
	A	V	R	SUMMER	AUTUMN	WINTER	SPRING
TW	101^{a}(0.7)	100^{a}(0.7)	105^{b}(0.7)	110^{a}(0.9)	103^{b} (0.8)	99^{c}(0.8)	97^{c}(0.8)
FLW	159^{a}(1.1)	162^{b}(1.1)	166^{c}(1.1)	158^{a}(1.2)	160^{a} (1.0)	166^{b}(1.0)	166^{b}(1.0)
HLW	361^{a}(1.7)	364^{a}(1.8)	351^{b}(1.8)	366^{a}(2.5)	364^{a} (2.1)	355^{b}(2.0)	350^{b}(2.1)
LWW	277 (1.1)	276 (1.1)	278 (1.2)	287^{a}(1.6)	276^{b} (1.4)	272^{c}(1.3)	273^{c}(1.3)
PFW	14.6^{a}(.39)	15.9^{b}(.39)	12.0^{c}(.40)	12.2^{a}(.55)	14.7^{bc}(.47)	15.6^{b}(.44)	14.1^{c}(.46)
SFW	4.92 (.18)	5.28 (.19)	5.16 (.18)	5.07 (.27)	5.26 (.21)	5.09 (.20)	5.05 (.21)

^{a,b,c} Means within rows lacking a common superscript differ significantly ($P \leq 0.05$). Comparisons were made within factors.

The use of line R as a sire line in a three way cross would advice the increase of the slaughter weight and the practice of fasting before slaughtering to reduce the inconveniences of this line in carcass composition and dressing percentage.

REFERENCES

BLASCO, A; OUHAYOUN, J and MASOERO, G. (1992) *Options Méditerranéennes* 17: 105-120.

DELTORO, J.; LOPEZ, A.M. (1986) *Livest. Prod. Sci.* 15:271-283

ESTANY, J.; CAMACHO, J.; BASELGA, M.; BLASCO, A. (1992) *Genet. Sel. Evol.* 24:527-537

FEKI, S.; BASELGA, M.; BLAS, E.; GOMEZ, E. (1993). *IV Jornadas Producción Animal, AIDA*. Zaragoza.

MASOERO, G. (1982) *2nd W.C.G.A.L.P.* Madrid. VI: 499-512

RAFEL, O.; TRAN. G.; RAMON, J., BOSCH, A.; VALLS, R.; DUCROQ, V. (1988) *IV World Rabbit Science Association Congress*. Budapest. II: 79-86

ROCHAMBEAU, H. de; TRAN, G.; VRILLON, J.L. (1988) *IV World Rabbit Science Association Congress*. Budapest. II: 87-95

ROCHAMBEAU, H. de; de la FUENTE, L.F.; ROUVIER, R.; OUHAYOUN, J. (1989) *Genet. Sel. Evol.* 21:527-546

VAREWYCK, H.; BOUQUET, Y. (1982) *Ann. Zootech.* 31:257-268