

EFFECTS OF FEED RESTRICTION ON THE PERFORMANCE AND CARCASS OF GROWING RABBITS

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ABSTRACT

Seventy two Hyla rabbits were studied from 6 to 11 weeks of age. They received a commercial diet distributed at 3 levels: *ad libitum* (C), 85% (R85) and 70% (R70) of *ad libitum* intake. Restricted animals consumed more quickly their rations. The animals receiving 70% finished their ration after 10 hours, those in 85% in 16 hours. Feed restriction significantly affected daily weigh gain (38.54, 34.58 and 29.42 g/day for C, R85 and R70 groups, respectively), reducing the growth and final weight of rabbits (2115, 1955 and 1740 g, respectively) but improving the feed conversion of diets (by 5 and 8% respectively for R85 and R70). Restricted animals had lower percentages of caecum and presented less fat than those fed *ad libitum* (1.31, 1.68 and 1.85% of reference carcass, respectively for R70, R85 and C).

Key words: Rabbit, Feed restriction, Carcass.

INTRODUCTION

The meat of rabbit knows some success last years and consumption is increasing. However some problems in the breeding persist like high mortality of young rabbits in the weaning and the high feed cost. Feed restriction just after weaning became systematic in much country as a preventive method against *Epizootic Rabbit Enteropathy (ERE)*. This practice would also allow an economy of feed and a better control of the quality of carcasses (decrease of percent of fat). The aim of this work is to study mortality, feed consumption and feed conversion, characteristics of the different parts of the digestive tract and the carcass in feed restricted rabbits.

MATERIALS AND METHODS

Animals

80 rabbits "HYLA" aged at 5 weeks were used. The study was carry in the rabbitry of the National Agronomy Institute of Tunisia between March and May 2006. Rabbits were placed by 2 animals in fenced cages. After one week of adaptation, they were weighed, identified and distributed to form 9 lots of 8 rabbits each. They receive a granular commercial feed (2500 kcal DE, 15.5% crude protein, 16% crude fibre) at 3 different levels.

Treatments

Three levels feed restriction were used: C: control, *ad lib* access to the feed; R85: rabbits received 85% of the feed consumed by the control; R70: rabbits received 70% of the feed consumed by the control.

Measure of performances and feed consumption rhythm

We measured the daily consumption of feed 3 times (8, 9 and 10 weeks of age), the variation hour per hour of the consumption of 24 rabbits during 8 hours after feed distribution; weekly the growth of the rabbits.

Measure of the characteristics of the carcass

At 11 weeks of age 24 rabbits were slaughtered (8 rabbits by treatment) and cut (Blasco and Ouhayoun, 1996). All the parts of the body were weighed. Warm carcasses were weighed then placed for 24 hours in the refrigerator at 4°C. The digestive tract was dissected to determine the weigh of every section (stomach, intestine, caecum and colon). The cold carcasses were weighed. The head, liver, the loins, thymus + trachea + oesophagus, lungs and heart were cut and weighed separately. The perirenal fat and the scapular fat were also isolated and weighed.

Statistical Analyses

Daily weight gain of rabbits, carcass yield at slaughtering and measures of organ proportions were treated with the SAS version 8.1 and the S.N.K (Student Newman Keul) for the test of comparison of the average.

RESULTS AND DISCUSSION

Growth and daily weight gain (DWG)

Over all the period of fattening, the *ad libitum* animals present the highest live weights. Animals restricted at 70% were the lightest. Those restricted at the level of 85% are in an intermediate position. At the 11th week of age, the animals reached 2115 g, 1955 g and 1740 g respectively for C, R85 and R70. For the daily weight gain, the R70, over all the period of fattening, presents the lowest DWG, the R85 is always in intermediate position and the C rabbits show the higher weigh increase (Table 1).

Feed conversion

Feed restriction improved the feed conversion ratio, than was a 9% lower in the R70 and a 5% lower in the R85 in relation to C group value (Table 1).

Table 1: Evolution of the daily weigh gain (DWG), feed consumption (CONS) and feed conversion (FC) of rabbits

Age (week)	DWG(g/d)			CONS (g/d)			FC (g/g)		
	R70	R85	C	R70	R85	C	R70	R85	C
6 - 7	27.14a	35.32b	44.22c	88	106	125	3.24	3.00	2.83
7 - 8	24.20a	28.74b	33.50c	88	106	125	3.64	3.69	3.73
8 - 9	40.63a	45.98b	47.72c	117	142	167	2.88	3.09	3.50
9 - 10	22.76a	26.29b	30.32c	119	144	170	5.23	5.48	5.61
10 - 11	32.35a	36.58b	36.93b	119	144	170	3.68	3.94	4.60
Average	29.42	34.58	38.54	106.20	128.40	151.40	3.61	3.71	3.93
In % of C	76.34	89.72	100	70.15	84.81	100	91.86	94.40	100

Means with different letters on the same row differ significantly at the 5% level

Mortality

Feed restriction had no effect on the sanitary state of the animals. Only two animals dead over all the period of fattening, one rabbit from the R85 and another from the C during the 2 last weeks of fattening. This corresponds to a mortality of 2.8%. Some cases of diarrhoeas were observed but not in a particular lot. Concerning the behaviour intra-cage, we did not see mark of aggressiveness (bite,

scratch, fight...) or of competition to the feeding between animals. Variability of the final weights between rabbits of the same cage was not important.

Feeding Behaviour

Figure 1 presents the curves of consumption of the feed during the 8 hours after distribution of the feed. The R70 quickly consume their feed and consume 85% of their ration at the end of 8h. In the same time the *ad libitum* animals consume only 30% of their ration and 53% for R85.

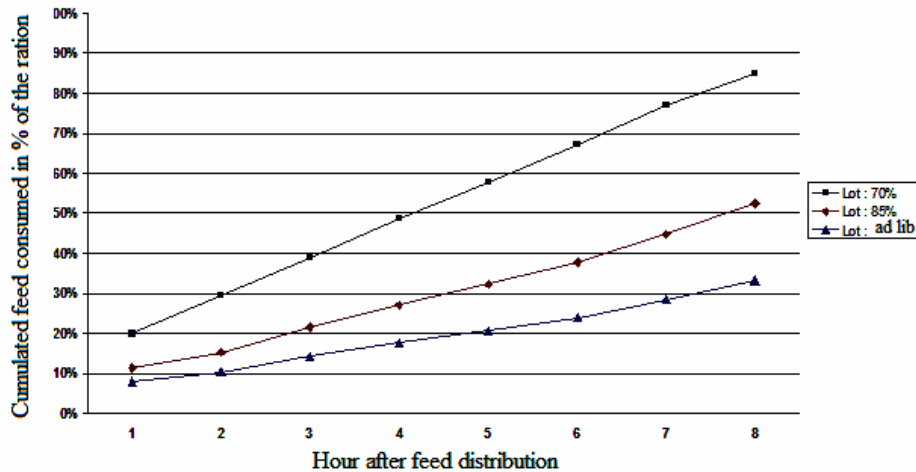


Figure 1: Cumulated feed consumed in % of the ration

We can conclude that R70 rabbits consumed the totality of their ration at the end of ten hours; the R85% rabbits will have consumed all their ration after 16.

Carcass yields

The results on carcass yield are show in Table 2. Dalle Zotte (2000) estimates that a good rabbit must give a hot carcass yield between 55 and 60%. All the values of carcass yield were significantly affected by feed restriction ($P < 0.05$). The hot carcass yields were proportional of the level of restriction and the live weight of the rabbits. The losses during the ressayage were very small (<1%) and cold yields are proportional to those of hot carcass. The *ad libitum* animals present the higher reference carcass yields, the smallest are with the R70% and the R85% are intermediate.

Table 2: Effect of feed restriction on carcass yields (%)

	R70	R85	C
Live weight (g)	1740	1955	2115
Hot carcass yield	55.00a	56.17b	57.31c
Cold carcass yield	54.14a	55.29b	56.43c
Reference carcass yield	44.09a	45.62b	46.85c

Means with different letters on the same row differ significantly at the 5% level

Body composition

Table 3 shows the proportions of different organs and parts of the carcass in the three treatments. The part of gastrointestinal tract is higher with the restricted animals. This can partly explain the deterioration of carcass yields (Cantier *et al.*, 1969). A part the proportion of live and kidneys, the proportions of the other part of the carcass change in the three treatments. This is probably in rapport of the different weight of the animals. The proportions of the different part of the carcass (hind part, intermediate part and fore part) vary little between the three treatments. The perirenal fat is correlated with the total fat of the carcass (Ouhayoun, 1984). Carcasses of *ad libitum* animals are more fatty than the others animals. The muscle/bone ratio is better in the *ad libitum* animals.

Table 3: Effect of feed restriction on body composition and organs proportions

Lot	R70	R85	C
In % of live weight:			
Skin	13.02a	14.08b	14.75c
Gastrointestinal tract	23.39a	21.11b	20.05c
In % of cold carcass:			
Head	9.53a	8.96b	8.28c
Liver	6.04a	6.03a	5.42b
Kidneys	1.03a	1.04a	1.06a
TTHL*	2.11a	1.95a	2.20a
In % of reference carcass:			
Hind part	36.58a	36.52a	36.38a
Intermediate part	23.99a	24.20b	24.27b
Fore part	37.35a	37.33a	37.28a
Perirenal fat	1.02a	1.31b	1.47c
Scapular fat	0.29a	0.37ab	0.42b
Muscle/ bone ratio	4.33a	4.82b	5.06c

TTHL*: Trachea + thymus + heart + lungs

Means with different letters on the same row differ significantly at the 5% level

Proportion of the digestive tract

Table 4 gives the respective proportions of the digestive tract in the different treatments. In the restricted lots, the proportions of caecum and colon are higher than in the *ad libitum* animal the opposite for the stomach and the intestine.

Table 4: Digestive organs (% of gastrointestinal tract)

Lot	R70	R85	C
Stomach	23.68a	24.52b	25.21c
Intestins	22.75a	24.71b	28.25c
Caecum	40.96a	38.70b	35.13c
Colon	12.61a	12.07b	11.40c

Means with different letters on the same row differ significantly at the 5% level

CONCLUSIONS

The restricted level 70% *ad libitum* presented the least satisfactory performances and it is not recommended in practice. The restricted animals at 85% have little delay of growth (approximately one week) but a better feed conversion. The feed restriction conducts to a change in the alimentary behaviour, an increase in the proportions of the caecum and colon and a decrease in the fat of the carcass. Feed restriction is a possible method to reduce feeding costs and a better control of the quality of the carcasses. This study requires to be completed with economic analysis.

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