Scientific Works. Series C. Veterinary Medicine. Vol. LX (1)
ISSN 2065-1295, ISSN 2343-9394 (CD-ROM), ISSN Online 2067-3663, ISSN-L 2065-1295

EFFECTS OF VEGETAL FIBER LEVEL OF DIETS ON THE RABBIT CARCASS QUALITY

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Abstract

The aim of this study was to investigated the effects of a different vegetal fiber diet on the daily gain and quality of rabbit carcass. Thus, four random groups of domestic rabbits aged 11 weeks were fed for 20 days with diets enriched in different percentages of vegetal fibers (wheat straw): 11% (control group) 14% (group A), 23% (group B) and, respectively, 33% (group C).. The average daily gain of the control group was 50.2 g /capita/day. The experimental groups showed a descending trend in the average of daily gain compared with control of 55.2 g (group A), 52.0 g (group B) and, respectively, 49.4 g/capita/day (group C), P=0.2877 . Gastrointestinal mass weight (calculated as percent from the living mass) was 22.2% in the control group, 21.4% in the group A,24.4% in the group B, respectively, 24.9% in the group C. With regard to dressing percentage, it was found that in the case of rabbit control group, dressing percentage amounted to a value of 58.9 ± 8.0%. In the experimental groups, the dressing percentage values were 59.50%, 56.5% and, respectively, 55.9% (P=0.0639). Total dissectible fat amounted to 2.03% of whole carcass in group A (P=0.0822), 1.77% in group B (P=0.0549) and 1.70 % in group C (P=0.0320), while in the control, this value amounted to 1.86%. Meat/bone ratio of the control group was 4.98. In the experimental groups the values of meat/bone ratio were 5.62 (P=0.0023), 4.87 and, respectively, 4.44, decreasing proportional with the increase in the fiber percentage of the diet. Moderate supplementation of the fiber percentage in the rabbit diets can increase the average daily gain and the percentage of dissectible fat and the meat / bone ratio, but fiber percentage of the diet (23% or over) is followed by lower average daily gain, decreased dressing percentage, decreased dissectible fat and meat / bone ratio.

INRODUCTION

In the world, there are a lot of specialized institutions for the study of rabbit nutrition, including the effects of nutritional factors, together with the effects of many other factors, on meat quality and carcass traits of rabbits. However it was not yet reached a consensus on the structure and composition of rabbit diets. A reason could be insufficient knowledge of the effects of different food components on the chemical composition of the meat. Often, feed composition changes cause changes in the composition of the meat, which in turn are reflected on the organoleptic characteristics of the meat, and obviously default on commercial traits on profit (Ouhayoun, 1997, Zsédely *et al.*, 1998). Accordingly, the aim of this work is to find the effects of fiber level of forages on the daily gain and carcass traits in rabbits.

MATERIAL AND METHODS

In this experiment four groups of domestic rabbits (7 rabbits/group each one) were used: a control group and three experimental groups (noted as following: group A, group B and group C). The rabbits were 11 weeks aged weighing 1,595±186 g, and were housed in a household system. The rabbits were fed for 20 days with diets containing different percentages of vegetal fibers (wheat straw), 11% (control group), 14% (group A), 23% (group B) and, respectively, 33% (group C). and a DP(digestible protein)/DE (digestible energy) ratio = 12.27/2,405 compared with a control rabbit group fed by a diet containing 11% dietary fiber (and a ratio of DP/DE = 12.33/2,548). Water was provided *ad libitum* and enlightened was provided from natural sources. During the all experimental periods, the rabbits were clinical monitored and were periodically weighted. The slaughter was performed in a slaughterhouse. To characterize the effect of the fiber enriched diets on the traits of carcass, the following parameters were determined: dressing percentage, dissected fat and meat/bone ratio according to the methods previously described (Dojană *et al.*, 2011).

The data were statistically processed and presented as mean ± standard error of mean ($\bar{X} \pm s_{\bar{x}}$). The differences between the groups were analyzed by ANOVA test and the null hypothesis was rejected for $P < 0.05$ (Tacu, 1968).

RESULTS AND DISCUSSION

The evolution of the weight gain in the experimental groups vs. control is presented in Table 1. The statistic analysis revealed no significant differences between the groups.

The results concerning the evolution of the weight gain should be seen by the fact that for their determination we used the live weight of animals fed *ad libitum*. Increased average daily gain in the group fed by fiber-enriched feed at the rate of 15% can be explained by a better conversion of fibers by saprophytic microbial mass, and that fact should be considered by nutritionists.

Table 1. The effect of fiber (wheat straw) enriched diets on the weight gain evolution of rabbit experimental groups following 20 days of experimental feeding

No	Group	Statistics	Live weight 10 weeks	Live weight 13 weeks	Daily gain (grams)
1	Control (11% vegetal fibres)	Mean ± s.e.m.	1,609.8± 210	2,615.8± 209	50.2± 8.9
		Max. value	1,666	2,656	55.8
		Min. value	1,514	2,555	48
2	Group A (14% vegetal fibers)	Mean ± s.e.m.	1,546.2± 255	2,650± 320	55.2± 1.2
		Max. value	1,657	2,760	66.2
		Min. value	1,436	2,590	47.6
3	Group B (23% vegetal fibers)	Mean ± s.e.m.	1,579± 201	2,619± 91	52.0± 2.2
		Max. value	1,610	2,645	55.7
		Min. value	1,576	2,589	49.9
4	Group C (33% vegetal fibers)	Mean ± s.e.m.	1,660.6± 96	2,647± 112	49.4± 10.3
		Max. value	1,680	2,679	50.0
		Min. value	1,625	2,543	45.5
P					0.2877

Our results regarding the effect of these formulations on daily gain agree with those reported by Villena *et al.* (2008): these authors show that gastrointestinal mass weight, chilled carcass weight and cut yield of rabbits can be modified by feeding high fiber feed in the last week of the fattening period. The effects depend on the levels of digestible fiber and energy of the recipe.

Since the intestinal mass represents a significant percentage in the balance of the dressing percentage, it was weighed and the results are presented in Table 2. As it is shown in Table 2, no statistical differences were found between control and any fiber enriched diet fed groups.

As follows from the analysis presented in the Table 2, there is an increase of the percentage of gastrointestinal mass in all the experimental groups vs. control, which will lead to a corresponding decrease in dressing percentage. Other authors (Villena *et al.*, 2008), after feeding rabbit batches with diets enriched in vegetable fibers for longer periods from weaning (29 days), they achieved at slaughter (80 days) comparable results. Thus, in a group fed with a diet containing 33% fiber, gastrointestinal mass percentage was 19.5% and in a group fed with diet containing 41% fiber, the weight percentage of gastrointestinal was 22.2%.

Table 2. Full gastrointestinal weight in rabbit groups fed by vegetable fibre enriched diets vs. a control rabbit group fed by a standard recipe for 20 days

No	Item	Control (11% fiber)	Group A (14% fiber)	Group B (23% fiber)	Group C (33% fiber)
1	Weight on gastro-intestinal mass in grams	568.9 ±44.2	556.8 ±26.1	625.6 ±19.0	646.5 ±22.1
2	Rabbit live weight before slaughter	2562.7±87.8	2602.2±112.3	2564.0±101.5	2596.7±88.0
3	% of gastro-intestinal mass from the live weight	22.2%	21.4%	24.4%	24.9%

Dressing percentage of the rabbits groups fed by vegetal fiber enriched diets compared with control is presented in Table 3. According to the data presented in Table 3, in the case of the control group, the dressing percentage amounted to 58.9%, while in the experimental group, the dressing percentage amounted different values: higher or lawyer. Moderate fiber enriched diets (14% full fiber content) led to an increase of the dressing percentage while 23 or 33% fiber enriched diets led to a decrease of the dressing percentage. According to Xicatto (1999), an increase in fiber intake plays a role similar to restricted feedings, with a decrease of digestible energy intake, limiting growth and falling the dressing percentage. Furthermore both, it is not exactly known whether the fiber content has a special effect in amending meat quality and carcass or only the energy concentration change (Xicatto, 1999).

On the other hand, the decrease in dressing percentage occurs because: 1. there is a long-term retention of food in the digestive tract and therefore, an increase in the weight of the digestive tract and 2. decrease in the rate of growth improves the relative increase of fast maturing organs, such as the digestive tract (Ouhayoun, 1998).

Table 3. Effect of vegetable fiber (wheat straw) enriched forage on the dressing percentage in rabbits

No	Item	Control (11% fibers)	Group A (15% fibers)	Group B (23% fibers)	Group C (33% fibers)	P
1	Live weight before slaughter	2,562.7±87.8	2,602.2±112.3	2,564.0±101.5	2,596.7±88.0	
2	Weight of carcass (g)	1,501.7±54.5	1,548.0±75.7	1,448.6±43.4	1,451.5±50.0	
3	Dressing percentage	58.9± 8.0	59.5±11.0	56.5±14	55.9±5	0.0639

The dissectible fat in the experimental groups vs. control is presented in Fig. 1. According to the date presented in Fig. 1, the values of the total (scapular and perirenal) dissectible fat in control amounted 1.86±0.21% from the carcass while in the experimental groups, the values were higher: 2.03±0.33 in group A (P=0.0822), 1.77±0.54% in group B (P=0.0549) and 1.70±0.22% in group C (P=0.0320).

Account that supplementation with dietary fiber influences carcass weight both decreasing muscle mass and by decreasing the amount of fat in the carcasses.

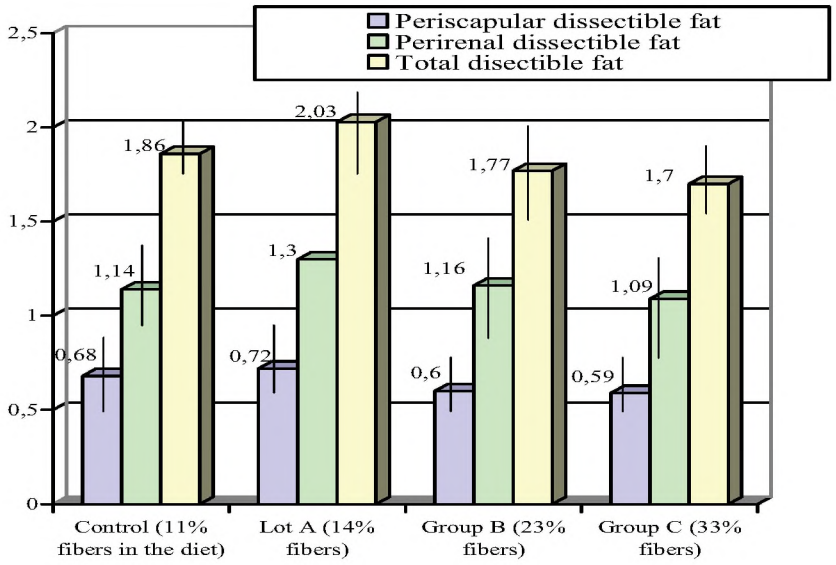

Figure 1. The % dissectible fat in rabbits fed for 20 days by forages with different vegetal fibre level diets vs. a control rabbit group fed by a standard diet

In the literature, data on dissected fat of rabbit and the influencing factors are relatively few. Metzger *et al.* (1994, cited by Parigi Bini, 2004) have determined some parameters of the carcasses, including kidney fat at various hybrid of rabbits. The reported values ranged between 0.85 and 1.15% by carcass weight and between 1.96 and 2.38% by weight of the meat, depending on the genotype (Metzger *et al.* 1994). On the other hand, Pascual *et al.* (1992, cited by Lebas, 1994) determined the effects of the selection and composition of the meat on the carcass traits in rabbits and they found values of 2.16 to 2.55% dissected fat, depending on the level of selection.

Regarding the meat / bone ratio, the results are presented in Fig. 2. Determination of the meat / bone ratio of rabbit groups in this experiment was performed by extrapolation based on meat / bone ratio of the hind leg, which was determined immediately after slaughtering. Fig. 2 shows an increased meat / bone ratio in group A (5.62) vs. control (4.98) but decreased meat/bone ratios in B (4.87) and C (4.44) groups.

Influences on meat / bone ratio of the diets operated, in our opinion, by the decrease in digestible energy, which resulted in a lower accumulation of muscle mass, and so, muscle protein in rabbits of experimental groups B and C, where this surplus was significantly higher, vs. group B, where this surplus was lower.

As it has been shown, a decrease of digestible energy intake plays a similar role of food restriction, limiting growth and decreasing the dressing percentage. This formulation would be the case of a high fiber proportion diets. The carcasses are loaded with less fat, the skeleton is more developed, the lipid content of the carcass is very low, and the meat / bone ratio is lower (Parigi Bini *et al.*, 2004).

Researches on meat / bone ratio of the carcass of rabbit performed Perrier and Ouhayoun (1996). The authors studied the effect of three levels of the restricted feeding. The authors found that in the groups of rabbits that with restricted feeding at rate of 70% of *ad libitum* feeding, followed by a low restriction (90% of *ad libitum* feeding) had similar effects on growth, feed efficiency, carcass weight, meat-bone ratio and the pH vs. groups fed at a lower level of restriction.

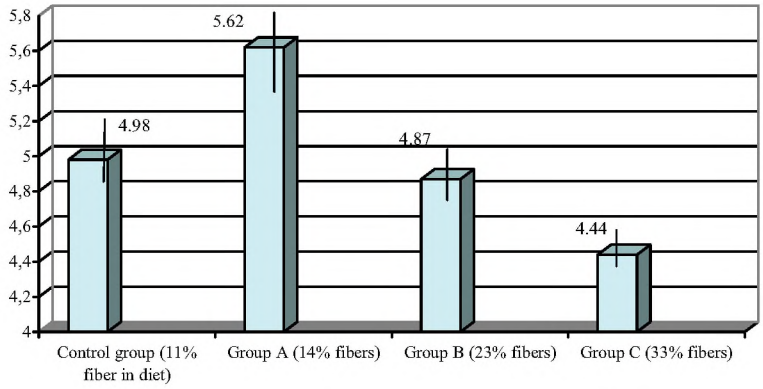

Figure 2. Comparative values of the meat / bone ratio in rabbits fed for 20 days by vegetal fiber enriched diets vs. a control group fed by a standard diet

Note: P = 0.0023, calculated between control and group A

CONCLUSIONS

Moderate supplementation, from 11% to 14% of the fiber percentage in the rabbit diets increases the average daily gain, dressing percentage (by a small decrease of gastrointestinal mass percentage), the percentage of dissectible fat and the meat / bone ratio. Higher fiber percentage of the diets (23%) is followed by lower average daily gain, decreased dressing percentage, decreased dissectible fat and meat / bone ratio.

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