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EFFECT OF TEMPERATURE ON GROWTH, FEED EFFICIENCY, AND MORTALITY OF RABBITS

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SUMMARY - Weaned rabbits Hyla 2000 were housed in a climatized environment at 6,16 and 25°C for 59 days; 64 rabbits per treatment. Rabbits were fed a granulated feed containing (g/kg): dry matter - 885, crude protein - 180, fibre - 124, fat - 33.4, ash - 62.4. Eight rabbits per treatment were used for digestibility measurements. Rabbits kept at 6°C were fed also a modified feed mixture containing more fat (69.1g/kg). One half of rabbits kept at 25°C received ascorbic acid in water at 30 mg per kg of body weight, twice a week. As expected, rabbits kept at 16°C gained more than rabbits of other groups. The average daily gain, feed conversion and mortality in this group were 36.0 g, 3.21 kg/ kg and 3.6%, respectively. Rabbits fed the same diet at 6°C gained 30.8 per day and those kept at 25°C gained 27.3 g per day. The mortality of rabbits housed at 25° C was 21.4 % and 5.4 % in the control and in the ascorbic acid - treated group, respectively. Also mortality of rabbits housed at 6°C was high (21.4%). Fat (rapeseed oil) addition decreased mortality in this group to 7.1%. No statistically significant differences in digestibility of nutrients were found.

Key words:Rabbit, temperature, performance, mortality

RÉSUMÉ - *Nous avons étudié l'influence de la temperature (optimal 16°C, haut 25°C et bas 6°C) sur les performances de croissance des lapins. Les expériments ont été realisé dans un batiment climatisé chez trois groupes des lapereaux (Hyla 2000) de 3O a 89 jours d'age. Des animaux ont été nourri avec un mélange nutritif granulé de la composition suivante: 855 g/kg de la mati re s che, 180 g/kg mati res azotées, 124 g/kg de fibre, 33.4 g/kg des lipides et 62.4 g/kg des mineraux. La moitié d'animaux a 6°C a été nourri avec un mélange plus riche aux lipides (69 g/kg). Dans la groupe entretenu a 25°C, la moitié de lapins a été supplémenté avec 3O mg d'acide ascorbique par kg de poids vif deux fois par semaine. Les meilleurs param tres de croissance ont été observé chez les animaux entretenus a 16°C: gain de poids/jour 36.0 ± 1.7g, l'efficacité alimentaire 3.21 kg/kg et taux de mortalité de 3.6%. Les gains de poids de 30.8 ± 0.8 et 27.3 ± 0.9 g/jour ont été trouvé chez les animaux a 6°C et 25 °C. Le taux de mortalité de lapins a 25°C était 21.4%. Le supplément d'acide ascorbique a réduit la pourcentage de mortalité a 5.4%. L'addition de lipides a réduit le taux de mortalité dans la groupe a 6°C de 21.4% a 7.1%. En ce qui concerne la digestibilité des aliments, il n'y avait pas de différences significatives entre les groupes.*

Mots - clés: Lapin, temperature, performance, mortalité

INTRODUCTION

The earliest rabbit fossils were found in Andalusia, i. e. in a region with warm climate. In spite of it, the optimal temperature in rabbits is 15-18°C (Vogel, 1991). Rabbits exposed to the ambient temperature of 25°C for 12h daily had lower weight gains than rabbits kept at 15°C (Centoducati et al., 1990). The optimal protein content in the feed of rabbits decreases with increasing ambient temperature. Environmental temperatures above 28°C cause heat - induced physiological stress. Thermoregulation in rabbits is rather poor as they have few functional sweat glands. In heat-stressed rabbits, both respiration rate and pulse rate are increased (Naqvi et al., 1995). The feed intake and growth are decreased. Enviromental temperatures around 25°C are common in the Central Europe in summer. Although this temperature is not a typical stressor in rabbits, practical experience of farmers documents its unfavourable influence on rabbits. Research Institue of Animal Production disposes with a climatized hall (temperature

range from -20°C to + 40°C). The aim of this study was to compare performance of broiler rabbits at 6, 16 and 25°C. The effect of these three temperatures was examined in separate experiments.

MATERIAL AND METHODS

Two hundred and fifty - six weaned rabbits, Hyla 2000 breed, were used. Two hundred and twenty - four rabbits were kept in stainless mesh cages, two per cage (33.1 dm^3 per rabbit). The remaining rabbits were used in digestibility trials and housed individually (36.7 dm^3 per animal). Rabbits had free access to a commercial granulated feed (Table 1), barley straw and water.

Table 1. Composition of rabbit diet

Components (%)	Basic diet	Fat - supplement diet
Alfalfa meal	27	30
Oat	20	20
Wheat	15	7
Barley	10	10
Wheat bran	10	-
Soybean meal	10	15
Sunflower	-	5
Extracted sunflower meal	5	-
Fat supplement (Rapeseed)	-	10
Mineral supplement	2	2
Vitamin supplement	1	1
Nutrients (g/kg)		
Dry matter	885	896
Crude protein	180	179
Crude fibre	124	123
Fat	33.4	69.1
Ash	32.4	64.1

The 12h:12h light: dark daily photoperiod cycle was used. Numbers of rabbits in treatment groups are given in Table 2. Rabbits kept at 6°C were fed also a modified feed mixture containing more fat (69.1 g/kg). One half of rabbits kept at 25°C received ascorbic acid in tap water at 30 mg per kg of body weight, twice a week. The duration of the trial was 59 days. Weights of rabbits and consumption of the feed were measured weekly. Three digestibility trials were carried out, in the second, the fourth and the sixth week of experiment. Rabbits were slaughtered at the age of 89 days. Both carcass parameters and meat quality variables were estimated. The difference in mortality was evaluated by χ^2 distribution. Other differences were tested by the *t*-test.

RESULTS AND DISCUSSION

Our results are summarized in Table 2. Rabbits housed at 16°C gained more than rabbits housed at 6°C or 25°C. The average daily gain of rabbits housed at 6, 16 and 25°C was 30.8, 36.0 and 27.3g, respectively. Fat addition to the diet of rabbits kept at 6°C non-significantly decreased mortality from 21.4 to 7.1%. Other zootechnical parameters were not influenced by the fat addition in this group. The worst performance and high mortality (21.4%) were observed in rabbits kept at 25°C. Ascorbic acid addition significantly decreased mortality to 5.4%, but other zootechnical parameters were not significantly influenced. Digestibility of nutrients, slaughter parameters and meat quality were not significantly influenced by the fat or ascorbic acid addition (data not shown). The exception to this was an increased fat content of meat of rabbits fed the fat - supplemented feed.

It can be concluded from our results that temperature of housing has a profound influence on performance and mortality of rabbits. Mortality of rabbits kept at 6°C was decreased by the fat addition, i.e. thank to the increase of energy content of the feed. Mortality of rabbits kept at 25°C was decreased by the ascorbic acid addition. Ascorbic acid reduced the heat - associated mortality also in chickens (Pardue, 1984). Anti - stress effects of ascorbic acid in poultry are well known (Thornton and Moreng, 1959, Pardue and Thaxton, 1986). Neither fat nor ascorbic acid improved gains and/or feed conversion in rabbits housed at 6°C and 25°C, respectively.

Table 2. Zootechnical parameters in rabbits housed at 6, 16 and 25°C for 59 days.

	Temperature				
	6°C	6°C	16°C	25°C	25°C
Experiment No	1	1	2	3	3
Fat supplement	-	+	-	-	-
Ascorbic acid	-	-	-	-	+
Number of rabbits	32	32	64	64	64
Initial weight (g)	757	759	806	730	737
Final weight (g)	2575	2522	2887	2341	2408
Daily gain (g)	30.8	29.9	36.0	27.3	28.3
Feed conversion* (kg/kg)	3.93	4.02	3.37	3.13	3.04
Mortality (%)	21.4	7.1	3.6	21.4[a]	5.4[b]

[ab] Significantly different (P<0.025); * Feed intake per kg of gain

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