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# EFFECT OF TWO DIFFERENT DIETS AND TEMPERATURES ON THE GROWTH OF MEAT RABBIT[1]

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## INTRODUCTION

The response of growing rabbits chronically exposed to high ambient temperatures has sometimes been determined, generally showing a marked decrease in liveweight gain and food intake (Prud'hon, 1976 and Stephan, 1980). High temperatures could reduce protein deposition due to a depressed food intake, and assuming an adequate supply of energy, the inclusion of some extra-protein in diets has been recommended in order to cover the requirements of the most important non-energy nutrient.

The experiment reported below was designed to test the response of growing rabbits fed two diets with different levels of protein to a high environmental temperature.

## MATERIALS AND METHODS

128 Californian × New Zealand White hybrid rabbits, weaned at four weeks between 400 and 800 g liveweight, were fed *ad libitum* during eight weeks. Half of animals were housed in a traditional insulated building whith provided natural ventilation, and half in a controlled environmental chamber on a constant schedule of 30ºC (dry bulb temperature). Three successive trials were carried out in Autumn, Winter and Summer respectively.

Two alfalfa-barley based diets, with a similar energy (2.5 Mcal/Kg DM digestible energy) and fiber (13.0% DM), but differing in crude protein percentage (18 and 20% DM), were pelleted and offered *ad libitum* from weaning to twelwe weeks of age.

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Feed consumption, liveweigth gain, rectal temperature and respiratory frecuency were recorded once a week. Data were analyzed as a 2×3×2 factorial experiment with diet, season of the year and environment as the three factors (Dixon, 1985). Means were compared following the test of Scheffe's.

## RESULTS AND DISCUSSION

The type of diet did not significantly influence daily feed intake, for which very similar figures in both diets were found. The season of the year affected ingestion ($p<0.01$). High temperatures, usual in Valencia during Summer, caused a marked depression in feed intake, 68.6 g as a mean, significantly different to those obtained in other seasons.

Table 1. Feed g DM/day)

| Season | Intake | Temperature | Intake |
|---|---|---|---|
| Autumn | $96.1_a$ | Ambient (A) | $89.6_a$ |
| Winter | $100.9_a$ | High (H) | $71.2_b$ |
| Summer | $71.7_b$ | | |

$_{a,b}$ Means followed by different subscript differ $p<0.01$

On the other hand food consumption of rabbits at 30ºC was significantly lower for all seasons ($p<0.001$), compared to the ambient temperature treatment. In Summer food intake was about to that recorded in H treatment, suggesting a comparable effect of constant and fluctuant temperatures in the conditions of the experiment. An impairing effect of constant Vs fluctuant temperature has been shown in other especies (Forbes, 1985), but the results are largely dependant on the scheme of variation designed for each particular experiment. The same results were found when figures for food intake are given in grams per metabolic weight ($Kg^{0.75}$).

Considering weekly results, ingestion was signifficantly influenced by temperature ($p<0.001$), with the exception of the first week of fattening. There, the difference was small, about 4 grams/day, and it would suggest that up to 5 weeks of age, rabbits would not be so greatly affected by a high environmental temperature.

Increment of liveweight showed a similar trend, and the difference between the corresponding values for A and H treatments (30.5 Vs 25.8 g/day) and between Summer and the other two seasons (25.7 Vs 29.3 g/day) were significant, at 1% level. Diet containing 20% CP resulted in a higher performance ($p<0.05$) although the absolute values for both diets were almost the same.

Table 2. Liveweight gain (g/day)

| Season | Gain | Temperature | Gain |
|---|---|---|---|
| Autumn | $31.2_a$ | Ambient (A) | $30.5_a$ |
| Winter | $32.7_a$ | High (H) | $25.9_b$ |
| Summer | $27.5_b$ | | |

$_{a,b}$ Means followed by different subscript differ $p<0.01$

The average figures for daily water intake in treatments A and H were 211 and 298 g respectively. As water intake is related to the intake of dry matter, the water/dry matter intake ratio was determined,being negatively correlated with age. There was a rise in that ratio from 2.7 to 4.5 for ambient and high environmental temperatures ($p<0.001$); these values, higher that those reported by Prud'hon, 1976 at 10 and 30ºC in adult does. The protein level of the diet did not stimulate any increased water intake.

Temperature and season affected to food conversion ratio at a different level of significance (1 and 5%), but higher season effect should be expected, if considering growth and food intake figures. Cenversion indexes were within the range previously published by Stephan, 1980 also working in a 30ºC ambient and Blas and Santoma, 1984 in a normal environment with similar animals. Adverse conditions at 30ºC should deteriorate food conversion, but the integrated view of daily gains and food intake can explain these apparent contradictory results, that have eventually been reported elsewhere, when animals are on a restricted feeding regime.

Respiratory frecuency increased in animals exposed to 30ºC ($p<0.001$), from 133 movements per min for A treatment during Autumn and Winter to a mean of 180 for H treatment, but did not vary much along the whole experiment.

Rectal temperature ranged between 38.7ºC in Autumn (treatment A) up to 39.6ºC in Summer (H). The difference between treatments A and H and the interaction of season and temperature were significant, but there appeared no changes for the seasons studied here. Both indexes, rectal temperature and repiratory rate suggest a compensatory response of the animals to the imposed thermal stress.

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## SUMMARY

Performance of 384 commercial rabbits from 4 to 12 weeks of age was conducted in an experiment with two diets and two enviroments as factors, to examine its interaction. Half of animals were housed in a climatic chamber at a constant temperature of 30ºC (H) and the rest in a free ventilated traditional building (A). Two diets were formulated to contain 180 and 200 g crude protein per Kg dry matter.

Ambient temperature affected ($p<0.001$) food intake, liveweight gains, rectal temperature and respiratory frecuency; the influence of season was only significant in Summer, linked to a high environmental temperature. No difference was found between the two diets tested.

## RESUMEN

Se estudió el efecto de dos raciones y dos ambientes distintos en el engorde de 384 conejos entre 4 y 12 semanas de edad. La mitad de los animales se alojaron en una cámara climática regulada a 30ºC de temperatura (H) y la otra mitad en una granja tradicional con ventilación estática (A). Simultaneamente se suministraron dos piensos con 180 y 200 g de proteína bruta respectivamente.

La temperatura ambiente afectó ($p<0.001$) a la ingestión de pienso, ganancia de peso, temperatura rectal y ritmo respiratorio. El verano fue la única estación que tuvo influencia significativa sobre estos parámetros.No se observó diferencia significativa alguna debida a los piensos.

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