International Journal of Sciences

Research Article Volume 3 - February 2014 (2)

Effects of Hull Inclusion in Diets for Rabbits

Trigo M. S.[1,2], Borrás M. M.[1], Cordiviola C. A.[1], Arias R. O.[1], Lacchini R. A.[1], Antonini A. G.[2]

[1]Facultad de Ciencias Agrarias y Forestales. Universidad Nacional de La Plata
[2]IGVET. Facultad de Ciencias Veterinarias. Universidad Nacional de La Plata

Abstract: Improving efficiency of digestion and use of balanced diets is one of the challenges ahead, both to improve the health conditions of animals and to design production systems compatible with the environment. The aim of this work was to study the effect of the addition of hull to the diet of meat rabbits on days to slaughter, on mortality in the fattening period and N (nitrogen) and P (phosphorous) percentages excreted in feces. 64 rabbits were used weaned at 28 days. They were fed ad libitum. Diets consisted of two commercial formulations (Ga and Ge) with and without husk of wheat and oats by 10% (P / P). Time of fattening and mortality was recorded for each diet. Feces were collected from 48 cages at the beginning and end of fattening (45 and 65 days) and percentage of NT (total nitrogen) was determined by micro-Kjeldahl and TP (total phosphorus) by colorimetry with metavanadate. The animals fed with husks in the diet showed a higher slaughter age and mortality decrease. The only factor tested that caused significant differences in nitrogen excretion was the addition of hull. The oat hull diet showed a significantly lower nitrogen removal. Phosphorus excretion showed a significant difference according to the type of commercial diet fed, the addition of husk and the fattening stage. While adding outside fiber to food causes a delay in the time of slaughter, this would be partially offset by a reduction in mortality. The addition of oat hulls would be a viable alternative to reduce emissions of nitrogen and phosphorus to the environment via feces.

Keywords: hull, mortality, nitrogen, phosphorus, rabbits

Introduction

Rabbit diet usually contains an excess of protein to fulfill amino acids needs. This increase in protein content brings a number of disadvantages in the production, deviate of a sustainable management, raising the cost of balanced feed, causing problems in the cecum and increasing pollution from excreted nitrogen and phosphorus. Fattening period mortality occurs mainly during the first two weeks of this phase. About weaning, enteric diseases occur in a context of incomplete development of the digestive physiology, abnormalities in the transit of digesta along the intestine. The type of diet may affect the incidence of these pathological processes (De Blas 2002). Several authors studied the effect of feeds on intestinal health, finding that they are enteric diseases directly linked to the level of crude protein in the diet, being the increase in the digestibility of the protein or the protein level in the diet determinant digestive diseases. (Haffar 1988, Chamorro 2005, García-Palomares 2006). Several authors have mentioned the importance of evaluating the product not only in terms of productivity, but also with awareness of the impact that is generated in the environment. (Atkinson 1996, Maertens L. 1999, De Blas 2002). The waste, mainly manure, is primarily responsible for the impacts on air, soil and water because they are concentrated in small areas and are the main source of nutrients, heavy metals, antibiotics and other veterinary drugs and pathogens. As a result of intensification, in Argentina there has been detected an accumulation of more than 220 kg / ha of nitrate, 2500 ppm of phosphorus and 261 kg / ha of zinc in soil (Herrero, M. 2008). Improving the efficiency of utilization and the use of balanced diets is one way of promoting both animal health and production systems compatible with the environment. The aim of this work was to study the effect of the addition of hull to the diet of meat rabbits on days to slaughter, on mortality in the fattening period and percentages excreted of N (nitrogen) and P (phosphorous) in feces.

Materials and Methods

The animals and facilities were provided by the Facultad de Ciencias Agrarias y Forestales of the Universidad Nacional de La Plata, Buenos Aires, Argentina.

Animals and experimental design

Sixty four New Zealand x Californian rabbits, weaned at twenty eight days of age, were used. Animals were randomly distributed into individual cages. The experimental design was a 2x3 factorial. Diets consisted of two commercial formulations (Ga and Ge) with and without husk of wheat and oats by 10% (P / P). The animals were used since weaning till they reached the slaughter weight (2,200 kg + 0,100 kg). Food was supplied *ad-libitum*. Animals were weighed weekly using a scale with a sensitivity

Trigo, M. S. (Correspondence)
mstrigo@agro.unlp.edu.ar
+

of 10 grams. Mortality and slaughter age were recorded. The rabbits were slaughtered, following the standard procedures of rabbit slaughter and carcass dissection by Blasco and Ouhayoun (1996).

Chemical Analyses

24 samples of feces were randomly taken twice (45 and 65 days old) to determine the total nitrogen (NT% by Kjeldahl) and total phosphorus (PT% by metavanadate colorimetry) in feces. (AOAC 1990).

Statistical Analysis

Data were statistically processed using multifactorial ANOVA and Chi square and the averages compared by Tuckey Test

Results

Table 1 shows the effect of the addition of husk and formulation type on age at slaughter, being significant in both cases ($p < 0.05$). Table 2 provides mortality rates for diets with and without husk, it can be seen the differences between them ($p < 0.05$). The animals fed with husks in the diet showed a higher slaughter age and mortality. The only factor tested that caused significant differences in nitrogen excretion, was the husk addition. Among them, the oat bran diet showed a significantly lower nitrogen removal. Phosphorus excretion showed a significant impact both on the type of commercial diet and the husk addition and the fattening stage (Table 3).

Table 1: Averages comparison for Age to the slaughter

Level	Frequency	Average
Total average	64	79.7633
Aggregate of hull		
Without	20	76.6630 a
With	44	82.8636 b
Formulation		
Ge	31	76.8934 a
Ga	33	82.6332 b

Different letters indicate differentiate significant among the averages of each effect ($p<0,05$)

Table 2: Percentage of mortality in function of the fiber addition

Processing	Mortality (%)
With husks addition	3,13 a
Without husks addition	28,13 b

Different letters inside the column indicate differentiate significant ($p < 0.05$, for Chi square, with test of Yates)

Table 3: Analysis of Variance for% N and % P excreted as diet, husk addition and sample

Source	**P-Value %N**	**P-Value %P**
Ga vs. Ge	0,2117	0,0152
Husk of wheat vs. oats	0,0090	0,0055
45 vs. 65 days old	0,8040	0,0000

Discussion and Conclusions

In agreement with De Blas 2002, the type of diet can affect the incidence of disease processes. While the addition of fiber food caused a delay in the time of slaughter, this was partially offset by a reduction in mortality. Given the importance, as mentioned Atkinson 1996, Maertens L. 1999, De Blas 2002, evaluation of the product, not only in terms of productivity, but also awareness of the impact that is generated in the environment, the addition of oat hulls would be a viable alternative to reduce emissions of nitrogen and phosphorus through the feces.

References

1. AOAC Oficial Methods of Análisis. (1990) 15° edición. Vol 1. (965.17)
2. AOAC Oficial Methods of Análisis. (1990) 15° edición. Vol 2. (960.52)
3. ATKINSON, D & CA WATSON. 1996. The environmental impact of intensive systems of animal production in the lowlands. An. Sci. 63:353-361
4. BLACSO A., OUHAYOUN J. 1996. Harmonization of criteria and terminology in rabbit meat research. Revisal proposal. *World Rabbit Science, 4 (2), 93-99.*

5. CHAMORRO S., GÓMEZ-CONDE M.S., PÉREZ DE ROZAS A.M., BADIOLA I., CARABAÑO R., DE BLAS C., 2005. Efecto del nivel y tipo de proteína en piensos de gazapos sobre parámetros productivos y salud intestinal. Proc. XXX Symposium de Cunicultura de ASESCU, Valladolid, Spain. pp. 135-142
6. DE BLAS, C., GARCÍA, J., GÓMEZ-CONDE, S. Y CARABAÑO, S. 2002. Restricciones a la formulación de piensos para minimizar la patología digestiva en conejos XVIII curso de especialización FEDNA
7. GARCÍA-PALOMARES J., CARABAÑO R., GARCÍAREBOLLAR P., DE BLAS C., CORUJO A., GARCÍA RUIZ A.I., 2006. Effects of a dietary protein reduction and enzyme supplementation on growth performance in the fattening period. World Rabbit Sci
8. HAFFAR A., LAVAL A., GUILLOU J.P., 1988. Entérotoxémie à *Clostridium spiroforme* chez des lapins adultes. Le Point Vét 20, 99-102
9. HERRERO, MARÍA A Y GIL, SUSANA B. 2008. Consideraciones ambientales de la intensificación en producción animal. *Ecol. Austral*. Vol.18, no.3, p.273-289. ISSN 1667-782X.
10. MAERTENS, L. 1999. Towards reduced feeding costs, dietary safety and minimal mineral excretion in rabbits; a review and opinion article. *World Rabbit Sci. 7: 65-74*