WEIGHT GAIN EVALUATION OF RABBITS (*Oryctolagus cuniculus)* MEANT FOR HUMAN CONSUMPTION USING TWO GROWTH PROMOTERS

RODRIGUEZ-CORREA JL.[2], VALLADARES-CARRANZA B.[1]*, VELÁZQUEZ-ORDOÑEZ V.[1], ALONSO-FRESÁN M.U., DE JESÚS A.P.[1], DOMÍNGUEZ-VARA I.A.[3], MARIEZCURRENA-BERASAIN M.A.[3]

1.-Facultad de Medicina Veterinaria y Zootecnia. Universidad Autónoma del Estado de México Cuerpo Académico en Salud Animal (UAEM-CA-3 Salud Animal).
2.- Programa de Ciencias Agropecuarias y Recursos Naturales – UAEM. Área Salud Animal. Centro de Investigación y Estudios Avanzados en Salud Animal. Km 15.5 carretera Toluca-Atlacomulco, Estado de México.
3.- Departamento de producción animal FMVZ-UAEM. Cuerpo Académico en Producción Animal.
Corresponding author: benvac2004@yahoo.com.mx

Summary

Food increasing demand has originated the use of additives in animal meat production. In animals meant for feeding, growth promoters not only contribute to the increase in total weight gain but to food conversion as well. Nandrolone laurate (NL) and clenbuterol clorhydrate (CBL), which have been used in animal meat production have sanitary and safety restrictions. The aim of the study was to evaluate the effect of NL in productive parameters of rabbits meant for human consumption, in which total weight gain (TWG) and food conversion (FC) were measured. Fifteen hybrid, male and female rabbits were used, divided into two treatment groups (n = 5 each): T1 (0.20µg/kg NL intramuscularly (IM) administered every 20 days); T2 (16 µg/kg/d CBL orally administered in drinking water); and a control group (CG) which received 1 mL IM saline solution as placebo every 15 days. Rabbits were observed for 30 days in which food and water was given *ad libitum*. Results were analyzed using variance analysis ($P<0.05$). TWG and FC according to the treatments were: T1 1.535 kg and 9.94; T2 1.335 kg and 10.72 and for CG 1.188 kg and 13.40 respectively. The use of NL and LDN as promoters showed a slight effect on daily and total weight gain, with counterindication for rabbit production, affecting not only rentability but food safety as well.

Key words: Nandrolone laurate, clenbuterol clorhydrate, weight gain, food conversion, food safety

Introduction

Animal protein consumption is necessary for healthy human feeding, therefore the interest on increasing meat production from traditional species (hen, beef, pork and sheep) as well as other not so common species such as rabbit, duck or ostrich. Regarding rabbits, they have numerous advantages due to their easy handling and high reproductive efficiency, as well as their elevated productivity rate when compared to other species. Moreover, rabbit meat is high in protein and low in sodium, fat and cholesterol which makes it an excellent choice for human diet due to its high nutritional content (Santos *et al.,* 2010). Food additives allow the improvement of production and reproductive efficiency in farms. Nevertheless, they do not improve productivity when there is defficiency on productive handling and feeding and genetics of species meant for meat production (Chávez *et al.,* 2012). Recently, anabolic and promoter use in animal production have had serious consequences in public health (Bandala *et al.*, 2007). Moreover, when sanitary regulations as well as good production practices are not followed, health, animal welfare and food safety may be compromised. The lack of technical and economical information for producers, make them susceptible of mistakes in sanitary handling and poor production practices that may have legal implications (Ley Federal de Sanidad animal, 2012; Directive 64/433/EEC). The use of food additives and growth promoters are classified as risky in several countries (Directive 64/433/EEC). Clenbuterol has been employed as growth promoter, but its use is banned in Mexico (NOM-065-ZOO-2003). Nandrolone laurate is used to improve beef meat quality. It should be retired in a rigorous period of time (NOM-004-ZOO-1994). The last improves weight gain and as well as clenbuterol may diminish production costs in production units (Morales *et al*., 2010). Nandrolone is an steroidal androgenic anabolizer which promotes growth, with no collateral effects, that stimulates weight gain, bone formation and improvement of body condition. It stimulates the formation of muscle, by retaining nitrogen and promotes calcium and phosphate retention and at the same time, stimulates and maintains sodium and potassium levels without water retention and fat in tissues (Veloz, 2005). Clenbuterol is an adrenergic β-agonist which was first used as drug in animals due to its bronchodilating and

tocolytic action. Afterwards, it was discoved that when used at ten times more than therapeutical dosis, it showed an anabolizing action, favouring protein synthesis and diminishing fat, which gave their name as energy share out agents. This effect was proven in different species such as bovines, ovines and pigs (Olaya, 2012). Due to its effect as growth promoter, its illegal use has increased because it speeds up production with lower resource use (Chávez *et al.,* 2012). The objective of this study was to evaluate the effect of NL and CBL on total weight gain (TWG) and food conversion (FC) in rabbits used for human consumption by following meat production regulations.

Material and Methods

Fifteen hybrid, thirty days old, male and female rabbits with an average live weight of 0.600 Kg were used. Each rabbit was individually penned and identified. Commercial food containing 17% crude protein, 15% crude fiber, 2% crude fat, 12% moisture, 8% ashes and 46% nitrogen free extract as well as drinking water was given *ad libitum* for thirty days. Three experimental groups were formed divided into two treatment groups (n=5 each): T1 (0.20µg/kg NL intramuscularly (IM) administered every 20 days); T2 (16 µg/kg/d CBL orally administered in drinking water); and a control group (CG) which received 1 mL IM saline solution as placebo every 15 days. Rabbits were weighed evey week to measure weight gain and the relationship between treatents and humanitarily sacrificed following NOM-033-ZOO-1995 protocol. To determine total weight gain (TWG), rabbits were weekly weighed using a digital toploading balance. Food consumption was undertaken by weighing the daily food amount divided by the number of rabbits per group, as a follow up to growth promoter administration. Food conversion (FC) was calculated based on daily consumption and the weekly increase using the formula: Food consumed/Weight gain. Results were analyzed using variance analysis ($P<0.05$) in a random block experimental design using Megastat for Microsoft office Excel 2007.

Results and Discussion

TWG and FC according to the treatments were: T1 1.335 kg and 10.72; T2 1.535 kg and 9.94 and for CG 1.188 kg and 13.40 respectively, demonstrating that in rabbits there is not an adequate weight gain when using CBL and NL. Carcass at slaughter did not show weight or volume increase. Nevertheless, there was less fat deposition in animals when CBL was used, when compared to T2 and CG. There are no reports of the use of these promoters in rabbits, which are widely used in bovines with significant anabolic effect, but representing a food safety and health problem nowadays because the dosis used are unknown. There was no growth promotion effect shen using CBL and NL in rabbits in the evaluated parameters, which could be associated to the rabbit's physiology and maybe due to hepatic and other systemic alterations. It would be important to evaluate functional parameters and correlate them to dilucidate what is happening in species where these anabolic are commonly used (Chávez *et al.,* 2012).

Conclusion

It is concluded that the use of NL and LDN did not show effect on TWG and FC. The use of these additives as growth promoters is unnecessary for intensive rabbit production because it represents an important risk in food safety.

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