

EFFECTS OF MOLASSES INCORPORATION IN RABBIT FATTENING DIET ON GROWTH PERFORMANCES

Kpodékon T.M.^{1,2*}, Youssao A.K.I.¹, Tossou C.M.¹, Djago A.Y.², Coudert P.³

¹Ecole Polytechnique d'Abomey-Calavi – Laboratoire de Recherche en Biologie Appliquée (LARBA), Unité de Recherche Cunicole et Cavicole (URCC), 01 BP 2009 Cotonou, Bénin

²Centre Cunicole de Recherche et d'Information (CECURI), 01 BP 2009 Cotonou, Bénin

³INRA – BASE, Equipe de pathologie du lapin, 37380 Nouzilly, France

*Corresponding author: marc.kpodekon@epac.uac.bj

ABSTRACT

The effect of molasses incorporation in rabbit fattening diet on growth performances was studied on 48 local rabbits, initially 35-37 days old. They were distributed at random among two groups (experimental and control) at the rate of 24 young rabbits per group. The experimental group received a pellet diet which contained 5% of molasses (MPD) and the second group received a control pellet diet without molasses (CPD). Diets contained about 18% crude protein and 11.5% crude fibre on dry matter basis. The animals were weighed once a week during 8 weeks, corresponding to the fattening period. During the trial, the mortalities of the young rabbits were recorded but were not different between treatments: 4/24 and 5/24 for the MPD and the CPD diets respectively. At the start of this trial, no significant difference was recorded between the young rabbit weight of the experimental group (454 g) and that of the control group (431 g). At the end of the trial, the average live weight of the young rabbits feed with the MPD was still similar (1718 g) to that of the control group (1693 g). The feed conversion ratio during the trial period was 3.59:1 g DM/g LWG for the experimental group and 3.39:1 g DM/g LWG for the control group. In conclusion, the incorporation of molasses at 5% in the rabbits diet did not affect average daily gain, feed conversion ratio, feed consumption or mortality rate of the young rabbits. The opportunity of the introduction of molasses in rabbit diets depends mainly of their relative price compared to that of other ingredients.

Key words: Fattening rabbits, Molasses, Feed conversion ratio, Growth rate.

INTRODUCTION

Rabbit breeding is in full expansion in Benin. From 2003 to 2005, the number of the rabbit breeders increased from 300 to 700, in the South of Benin (ABeC, 2005). This production provides 240 tons of rabbit meats per year and makes live approximately 7000 persons in Benin (ABeC, 2005). One the mains factors of the success of this sector is the control of the diet. Since ten years, the CECURI (*Centre Cunicole de Recherche et d'Information*) has undertaken research tasks to develop ideal diet which could ensure better raising performances and the best economic profitability. An inventory of food resources was initially made and their palatability was then studied (Odjo, 1992; Adéhan *et al.*, 1994; Adéhan, 1998; Djago and Kpodékon, 2000). Then, several diets for the fattening rabbits were developed (Kpodékon *et al.*, 1998; Djogbénu, 2004; Baba, 2004; Amida, 2005; Fayomi, 2006). In order to continue the research to obtain ideal diet, the CECURI is today interested in molasses incorporation in rabbit fattening diet on growth performances. The aim of the present study was to compare growth performance, feed conversion ratio, mortality rate and economic profitability of rabbit groups fed with a pellet diet witch contained 5% of molasses with another group fed with a control pelleted diet but without molasses.

MATERIALS AND METHODS

Site of study

The experimentation was carried out in CECURI facilities, located in the University of Abomey-Calavi (Benin), from April 23rd to June 18th, 2007.

Management of the experimentation

The effect of molasses incorporation in rabbit fattening diet on growth performances was studied on 48 rabbits 35 to 37 days old of the local population. They were distributed at random among two groups (experimental and control) at the rate of 24 young rabbits per group. Two types of pellet diet were used: the first containing 5% molasses (MPD) and the second without molasses (CPD). They were distributed *ad libitum* as well as the drinking water. The centesimal composition of each diet is given in Table 1. The chemical compositions of MPD and CPD diets were respectively: dry matter (92 and 89%), crude protein (17.83 and 18.52%), ash (7.01 and 7.27%), crude fibre (11.05 and 11.84%) and digestible energy (2580 and 2530 kcal/kg). The digestible energy value was estimated according to INRA tables (Blum, 1989).

Table 1: Ingredients (%) of diets

	Molasses pelleted diet	Control pelleted diet
Sugar cane molasses	5	0
Maize grain	8	8
Wheat bran	30	30
Rice bran	4	5
Palm kernel meal	20	20
Cotton seed meal	4	5
Soybean meal	2.5	2.5
Sunflower seed meal	24	26.5
Oyster shell	2	2.5
Common salt	0.4	0.4
L-lysine	0.1	0.1
Total	100	100

The young rabbits were distributed in group of 3 per cage. These cages were provided with a system of recovery laid out below each cage in order to collect wasted diet. The distribution of the cages was made in a symmetrical way to get the same microclimatic conditions to all animals, and each cage was numbered. The animals were weighted once a week during 8 weeks, corresponding to the fattening period. ANTICCOX^R was used to prevent the coccidiosis and OXYTETRACYCLINE^R 50% (oxytetracycline) for the prevention of young rabbit's infections. The CRESYL^R (cresol sodic) was used for the disinfection of the habitat and the breeding materials. Mortalities, morbidities, diet quantities served and remaining were daily recorded.

Statistical analysis

The weight at the start of the fattening, the weekly weights during the fattening period, the average daily gain, the individually feed quantities consumed and rejected and the feed conversion ratio were the variables taken into account in the data processing. The fixed effect considered in the model of analysis of variance was the diet (MPD or CPD). The procedure of the generalized linear models (Proc GLM) of SAS (Statistical Analysis System, 1989) was used for the analysis of variance. The data of the individually feed quantities consumed and rejected and the feed conversion ratio were calculated per cage and by diets for each week. The comparison of the mortality rates was made by proc freq procedure of SAS (1989) using the chi-squared test.

RESULTS

Effect of diets on live weight and growth rate

The weekly weight of each group and the average daily gains are given in Table 2. At the start of this trial, the average weights of young rabbits were 454 and 431 g respectively, for young rabbit fed with MPD and those fed with CPD. At the end of the experimental period, weight of young rabbits fed with the MPD was 1718 g and that of the CPD rabbits was 1693 g. No significant difference were observed between the 2 groups for the rabbits weights at start of the experiment or during the fattening period ($P>0.05$). During the eight weeks of the experimental period, the average daily gain was the same (22.7 g/d) for the two groups. Thus, the molasses had no effect on the average daily gain and the live weights during this experimentation.

Table 2: Weight (W) and average daily gain (ADG) of the young rabbits fed with two types of diet

Variables	Molasses pellet diet (MPD)			Control pellet diet (AGT)			Test of Significativity
	Number	Mean (g)	SD	Number	Mean (g)	SD	
W ₀	24	454	77	24	432	74	NS
W ₇	24	737	130	23	940	106	NS
W ₁₄	24	960	150	23	1122	106	NS
W ₂₁	24	1131	182	23	1224	118	NS
W ₂₈	20	1258	205	23	1224	160	NS
W ₃₅	20	1406	214	22	1395	142	NS
W ₄₂	20	1540	205	22	1509	141	NS
W ₄₉	20	1601	220	20	1538	115	NS
W ₅₆	20	1718	212	19	1692	154	NS
ADG ₀₋₄	20	28.9	5.3	23	28.2	5.2	NS
ADG ₄₋₈	20	16.4	4.8	19	17.9	9.9	NS
ADG ₀₋₈	20	22.7	3.0	19	22.6	2.7	NS

SD: standard deviation; W_i: weight at day i; ADG_{i-j}: average daily gain from week i to week j in g/day; NS: difference non significant ($P>0.05$)

Feed intake and feed conversion ratio

The quantity of ingested feed was 79.39 g for the young rabbit fed with MPD and 76.81 g for those fed with CPD. The quantity of wasted feed was 0.88 g for the young rabbit fed with MPD and 0.83 g for those fed with CPD. No significant difference was observed between the two groups of young rabbit for the quantities of ingested or wasted diet. The average feed conversion ratios are given in Table 3 for the two types of diet. The use of 5% molasses proportion did not have any effect on the feed efficiency. Thus, the average of the feed conversion ratio for the whole experimental period was of 3.59:1 g DM/g LWG for the rabbits fed with the MPD and 3.39:1 g DM/g LWG for the rabbits fed with the control.

Table 3: Feed conversion ratio per type of diet (g dry matter ingested/g live weight gain)

Period	Molasses pelleted diet (MPD)		Control pelleted diet (AGT)		Test of significativity
	Mean	SD	Mean	SD	
FCR ₀₋₄	2.55	1.05	2.47	0.87	NS
FCR ₄₋₈	4.71	1.62	4.40	1.62	NS
FCR ₀₋₈	3.59	1.73	3.39	1.59	NS

SD: standard deviation; FCR_{i-j}: feed conversion ratio from week i to week j; NS: difference non significant ($P>0.05$)

Mortalities

The mortality rate was 16.67% for the rabbits group fed with the MPD (4/24) and 20.83% for the group fed with the CPD (5/24). The difference between these two rates was not significant ($P>0.05$). The autopsies carried out revealed on the one hand, one case of enterotoxaemia, two cases of mucoid enteritis and one case of accident in rabbits of the MPD group and on the other hand, one case of respiratory affection, four cases of mucoid enteritis for rabbit fed with CPD.

DISCUSSION

Contrary to the expected results, the quantity of ingested diet and the feed efficiency of the young rabbits fed with 5% molasses were similar with those of the control. According to the results of this study, the molasses did not have the expected effect on the growth performances like growth, the quantity of ingested diet and the feed efficiency. Even if molasses are often used for other animal species in the Europe, the United States and the South America, few research were carried out on their evaluation in the rabbit diet. In most studies, molasses are often used in the feeding of rabbits in order to increase the consumption of fresh fodder or hay. According to Sanchez *et al.* (1984), the young rabbits utilized better farinaceous diet which contained 5% of molasses compared with farinaceous diet, of the same composition but without molasses. Likewise, the molasses improve significantly farinaceous diet which containing 5% of molasses and give an average daily gain comparable with that of pelleted diet without molasses; and a more important molasses supplying in the diet does not improve anything but can remain interesting if the economic conditions lend themselves to it.

Moreover, the use of the molasses in the evaluation of farinaceous diet is still better than the sugar cane in the rabbits diet (Linga *et al.*, 2003). When one farinaceous diet containing the molasses and the other the sugar cane, it were observed that the average daily gain of rabbits which consumed the block of molasses instead of sugar is of 3.8 g/d over that of those feed with diet which contain sugar with a significant deviation of live weight (+201 g) ($P < 0.10$) (Linga *et al.*, 2003). This improvement of the growth could be related to the proportion in dry matter of proteins and ashes which is more important in the molasses. In the other hand, significant results were obtained by using the molasses with urea. Thus, Linga *et al.* (2003) had studied the effect of *Lablab purpureus* with the molasses-block or sugar of sugar cane on the performances of growth and feed consumption of the young fattening rabbits. It comes out from this experimentation that the animals subjected to the control diet (commercial pellet) had a weight gain of 580 g and an average daily gain more important than the animals subjected to the experimental diet.

In the present study, the rabbits were fed with pelleted diet which energy and proteins values were very close and not by fodder and/or farinaceous diet. According to Baba (2004), Djogbenou (2004), and Fayomi (2006), the fattening rabbits fed *ad libitum* consume pelleted diets better than the farinaceous diets with the same formula and have the best performances of growth. The pelleted diet already being palatable and consumed *ad libitum*, the animal won't be able to exceed its gastric capacities of food intake even if it contains molasses which makes it more sweetened and more palatable. This would explain the similarity of the effect of pelleted diet which containing or not molasses on the performances of growth, feed ingestion and the feed conversion ratio in the present study. A content of 5% of molasses is generally recommended in rabbits and an insertion up to 10% of the diet, remains without effect on the performances of growth (Sanchez *et al.*, 1984). The molasses incorporation of 4-6% in the diet improved also pellets quality (Mendez *et al.*, 1998 in de Blas and Wiseman 1998), which is an incitation to introduced molasses even in absence of effects on growth performances.

CONCLUSIONS

The study of the effect of pelleted diet which contains 5% molasses on the live weight of the young rabbits showed that the molasses had no effect on the average daily gain and the live weight. Likewise, no significant difference was observed between the two groups of rabbit for the quantities of ingested or wasted food. The use of molasses at a proportion of 5% did not also have any effect on the feed efficiency. The difference between the mortality rate of rabbit groups fed with MPD and that of rabbits group fed with CPD was also not significant. Nevertheless a content of 5% of molasses could be generally recommended in rabbits feeding because of the positive side effects on pellets quality, but the economical interest of inclusion in rabbits fattening diets depends mainly on its price on the market.

REFERENCES

- ABeC 2005. Association Béninoise des Cuniculteurs. *Rapport d'activité, Abomey-Calavi, 45 p.*
- Adéhan R., Kpodékon M., Houenou J., Osseni T. B., Lebas F. 1994. Etude comparée de l'appétabilité de 23 plantes fourragères chez le lapin. Premiers résultats. *Cahiers Options Méditerranéennes Volume 8, «Rabbit Production in Hot Climate», 125-130.*
- Adéhan S. 1998. Etude comparative de l'appétibilité de quinze fourrages chez le lapin. *Mémoire de fin d'études pour l'obtention du DIT à l'EPAC/UAC., 101 p.*
- Amida E. 2005. Influence du niveau alimentaire du tourteau de coton sur les lapins nourris à l'engraissement. *Mémoire de DIT, EPAC/Bénin, 59 p.*
- Baba L. 2004. Comparaison des performances de croissance de deux lots de lapins : l'un nourri avec un aliment farineux et l'autre à base du même aliment sous forme granulée. *Mémoire de DIT, EPAC/Bénin, 66 p.*
- Blum J.C. 1989. L'alimentation des animaux monogastriques, porc, lapin, volailles. 2^{ème} édition revue et corrigée. *INRA ed., Paris, 282 p.*
- Djago A.Y., Kpodékon M. 2000. Le guide de l'éleveur de lapin en Afrique de l'Ouest. *Cecuri ed., Cotonou Benin, 106 p.*
- Djogbenou I. 2004 Performances de croissance des lapereaux nourris à l'engraissement avec un aliment granulé. *Mémoire de fin d'étude pour l'obtention du DIT, EPAC/Bénin, 64 p.*
- Fayomi J. 2006. Incorporation du tourteau de tournesol dans l'alimentation des lapins à l'engraissement. *Mémoire DIT, EPAC/Bénin, 74 p.*
- Kpodekon M., Lebas F., Djago Y., Coudert P. 1998. Relative efficiency of local meal concentrate and pelleted feed for fattening rabbits in tropical conditions Interaction with rabbit's origin. *Cuni-Sciences, 4, 15-26.*
- Linga S.S., Lukefahr S.D., Lukefahr M.J. 2003. Feeding of *Lablab purpureus* forage with molasses blocks or sugar cane stalk to rabbit fryers in subtropical south Texas. *Livestock Production Science, 80, 201-209.*
- Mendez J., Rial E., Santoma G. 1998. Feed manufacturing. In: *The Nutrition of the Rabbit. de Blas C., Wiseman J. (Eds.), CAB International, Wallingford England, UK, 215-239.*
- Odjo C.E. 1992. Test d'appétibilité comparé de cinq fourrages sur le lapin : *Ipomoea aquatica, Pennisetum purpureum, Centrosema pubescens, Manguifera indica, Eleis guineensis.* *Mémoire de fin d'étude pour l'obtention du DIT CPU/UAC 52 p.*
- Sanchez W.K., Cheeke P.R., Patton N.M. 1984. The use of chopped alfalfa rations with varying levels of molasses for weaned rabbits. *Journal of Applied Rabbit Research, 7, 13-16.*
- SAS 1989. User's guide. Vers. 6, *SAS Inst. 4th ed. Cary, NC, USA.*

